

**An Archaeological Evaluation on Land at The Former Goodyear Dunlop Tyre
Factory, Wear Industrial Estate, Washington, Tyne and Wear**

Central National Grid Reference: NZ 2925 5452

Site Code: DFW 08

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1. NON-TECHNICAL SUMMARY

- 1.1 An archaeological evaluation was undertaken by Pre-Construct Archaeology Limited on land at the former Goodyear Dunlop Tyre Factory, Wear Industrial Estate, Washington, Tyne and Wear. The central National Grid Reference for the site, which covers approximately 18 hectares, is NZ 2925 5452. The fieldwork, undertaken 2nd to 17th December 2008, was commissioned by Cundall as part of a planning application process to Sunderland City Council for a proposed development of the site, the northern half of which was occupied by the derelict factory.
- 1.2 An archaeological desk-based assessment of the site concluded that the site had high potential for archaeological remains of the late post-medieval and early modern industrial eras, particularly for evidence of late 18th and 19th century colliery transport systems. Historic map evidence shows that Fatfield Waggonway entered the site towards its south-eastern corner and three branches of this important route are known to have run broadly to the north-west across the site, serving outlying workings of Harraton Outside Colliery, some or all of which were certainly operational during the late 18th century.
- 1.3 The evaluation comprised four machine-excavated trenches (Trench 1-4) all located within or close to an area of woodland in the south-eastern portion of the site. The trenches were sited specifically to target the waggonway known to have crossed the site and to determine whether or not sub-surface remains for these features survived. Trench 1 was aligned NNE-SSW and measured 20m x 1.50m, Trench 2 measured 23m NE-SW x 1.50m wide, Trench 3 was aligned NE-SW and measured 22m x 1.5m and Trench 4 measured 36m NE-SW x 3m wide at ground level, this trench having to be 'stepped-in' due to the depth of deposits.
- 1.4 No significant archaeological remains were encountered within Trench 1, which was sited to examine the southernmost waggonway branch, which served Hall Pit. Natural boulder clay was recorded across the extent of the trench at a maximum depth of 0.40m below existing ground level. This was overlain by a thin spread of coal waste, of probable modern origin, and the uppermost deposit within Trench 1 comprised topsoil.
- 1.5 Trench 2 was sited to examine the central waggonway branch, which continued the SE-NW line of Fatfield Waggonway running towards Anna Bella Pit. Natural boulder clay was encountered within the trench at a depth of 1.20m below existing ground level. A NW-SE aligned clay embankment was recorded towards the north-eastern end of the trench and this was likely raised for a colliery waggonway. A deposit of clay overlying the central part of the embankment was probably a bedding layer for the waggonway rails. Although no rails survived *in situ*, parallel linear features represent their former positions. To the north-east of the embankment was a linear feature interpreted as a trackside drainage ditch. The waggonway remains were overlain by numerous dumped deposits, presumably representing ground consolidation and levelling, which had been truncated by several linear features of early modern or modern origin but unknown function. The uppermost deposit in Trench 2 was topsoil.

- 1.6 Trench 3 was sited to examine the northernmost waggonway branch, which ran to the NNW to serve, after sub-dividing, a cluster of outlying pits. It contained no conclusive archaeological evidence for the feature. Natural boulder clay was encountered across the trench at depths of between 0.30m and 0.85m below existing ground level. A group of linear features aligned NW-SE provides evidence for ridge and furrow agriculture, with the narrowly spaced furrows indicating a post-medieval date. Dump deposits containing large quantities of crushed coal recorded towards the central portion of the trench potentially represent material that may have originated from a waggonway, possibly having been deposited when such a feature was dismantled. A linear earthwork running southwards through the woodland between Trenches 3 and 4, potentially represents the waggonway route. The uppermost deposits in Trench 3 comprised levelling dumps of early modern or modern origin and topsoil.
- 1.7 Trench 4, which was the southernmost trench, was positioned across the line of Fatfield Waggonway, just south of the point where it branched into three routes. This trench revealed particularly well-preserved waggonway remains. Natural boulder clay was encountered within the trench up to 2.0m below existing ground level. Several horizontal timbers, crudely fashioned tree branches arranged parallel to each other, are interpreted as sleepers of a waggonway track. They were exposed towards the centre of the trench, laid directly upon boulder clay, at 1.30m below existing ground level. A deposit of crushed coal, probably ballast from the waggonway track-bed, overlay the timbers. Running parallel and adjacent to the south-western side of the waggonway was a broad ditch, interpreted as a trackside drainage feature. No similar feature could be identified along the north-eastern side due to a modern intrusion. Substantial levelling and consolidation dump deposits of early modern or modern origin were recorded across Trench 4, along with several features of relatively recent origin, some pipe trenches, others of unknown purpose. Again, topsoil comprised the uppermost deposit within the trench.
- 1.8 In summary, the archaeological evaluation revealed the presence of significant archaeological remains, probably of the industrial later post-medieval and early modern eras, at the former factory site. Features associated with the construction and use of colliery waggonways were recorded in Trenches 2 and 4 and these features were probably in use between the late 18th century and the mid-late 19th century, with a late 18th century date of origin considered likely. Although no waggonway remains as such were encountered in Trench 3, deposits possibly representing its disuse were recorded and earthwork remains to the south potentially represent a better surviving portion of the feature. The area in which Trench 1 was located, to the west of the woodland in which Trenches 2, 3 and 4 were sited, has certainly been landscaped in recent times, probably when the tyre factory was built and this activity probably destroyed archaeological remains in that part of the site.

2. INTRODUCTION

2.1 General Background

- 2.1.1 This report details the methodology and results of an archaeological evaluation undertaken by Pre-Construct Archaeology Limited (PCA) between the 2nd and 17th December 2008 on the site of the former Goodyear Dunlop Tyre Factory, Wear Industrial Estate, Washington, Tyne and Wear. The fieldwork was commissioned by Cundall as part of a planning application process to Sunderland City Council. The central National Grid Reference for the site, which covers c. 18 hectares, is NZ 2925 5452 (Figure 1).
- 2.1.2 The tyre factory closed some years ago and it is proposed to develop the site with a mixed-use scheme. There is particular archaeological potential for remains of the late post-medieval and early modern industrial eras as a colliery waggonway – Fatfield Waggonway - is known to have entered the site close to its south-eastern corner before splitting into three branches, all running, in broad terms, to the north-west across the site. This potential was established by an archaeological desk-based assessment (DBA) undertaken by PCA in 2008.¹
- 2.1.3 A Specification² for the evaluation was prepared by the Tyne and Wear Specialist Conservation Team, part of the Historic Environment Section of Newcastle City Council (NCC) and, as that document set out the work required in detail, a Project Design did not have to be compiled.
- 2.1.4 The evaluation comprised four machine-excavated trial trenches (Trenches 1-4) located within the south-eastern quadrant of the site (Figure 2). Trench 4 was sited to target Fatfield Waggonway towards the southern boundary of the site while Trenches 1-3 were sited further to the north-west in order to target the three branch routes.
- 2.1.5 The Site Archive (PCA site code: DFW 08) comprising written, drawn and photographic records and all recovered materials, is currently held at the Northern Office of PCA and will ultimately be transferred to the Tyne and Wear Museum Archive, Arbeia, South Shields. The Online Access to the Index of Archaeological Investigations (OASIS) reference number for the project is: preconst1-53926.

2.2 Site Location and Description

- 2.2.1 Washington, designated a new town in 1964, is based around the former colliery villages of Columbia, Fatfield, Harraton, Usworth and Washington. The modern town comprises 18 self-sufficient 'villages' (originally it was series of numbered 'districts') and, in administrative terms, lies within the City of Sunderland, Tyne and Wear. Sunderland itself lies to the north-east, while the town of Chester-le-Street, in County Durham, lies to the south-west, and immediately to the west, beyond the north-south route of the A1(M), is the town of Birtley, in the Metropolitan Borough of Gateshead.

¹ PCA 2008.

² Newcastle City Council (Tyne and Wear Specialist Conservation Team) 2008.

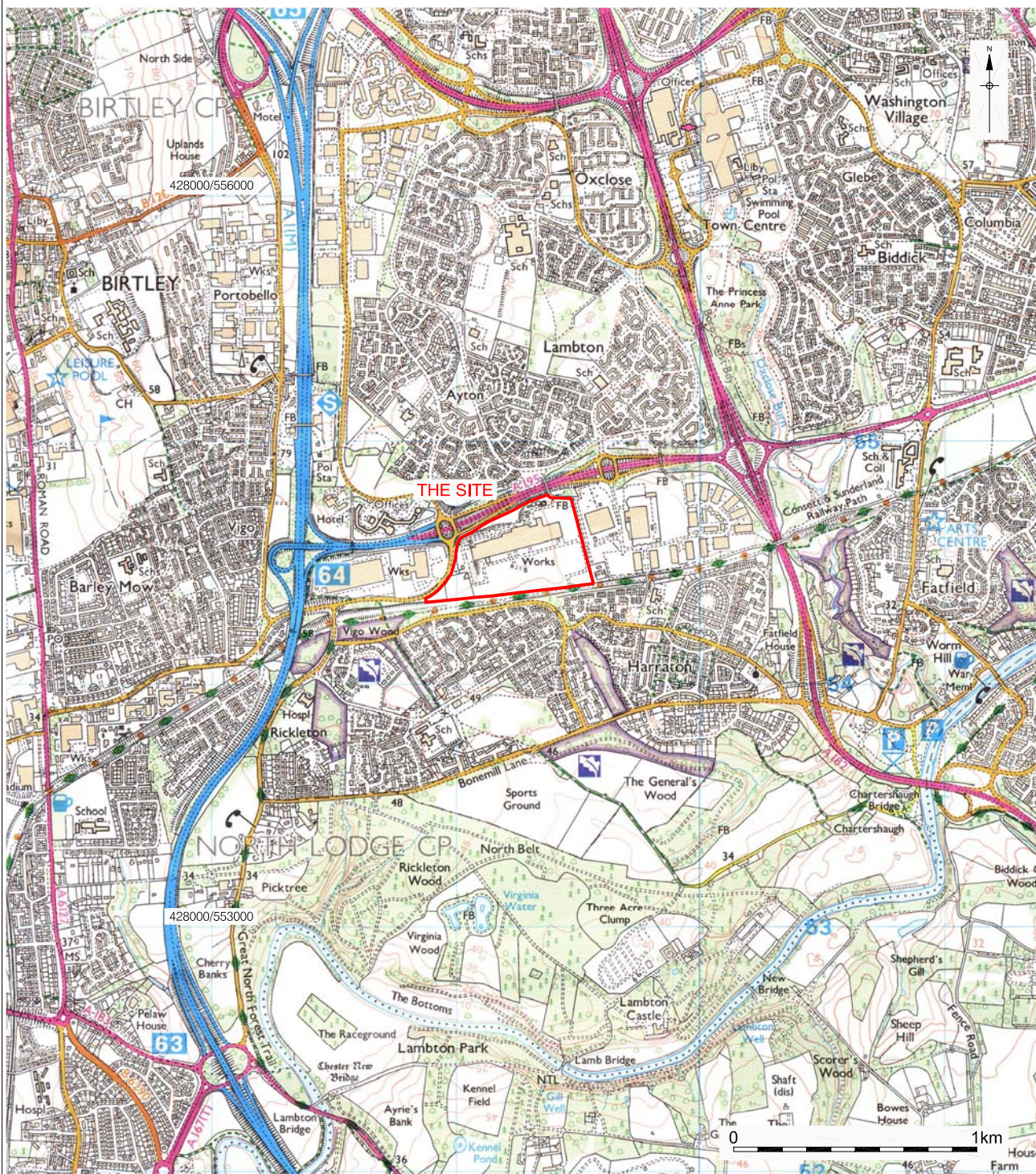


Figure 1. Site location
Scale 1:25,000

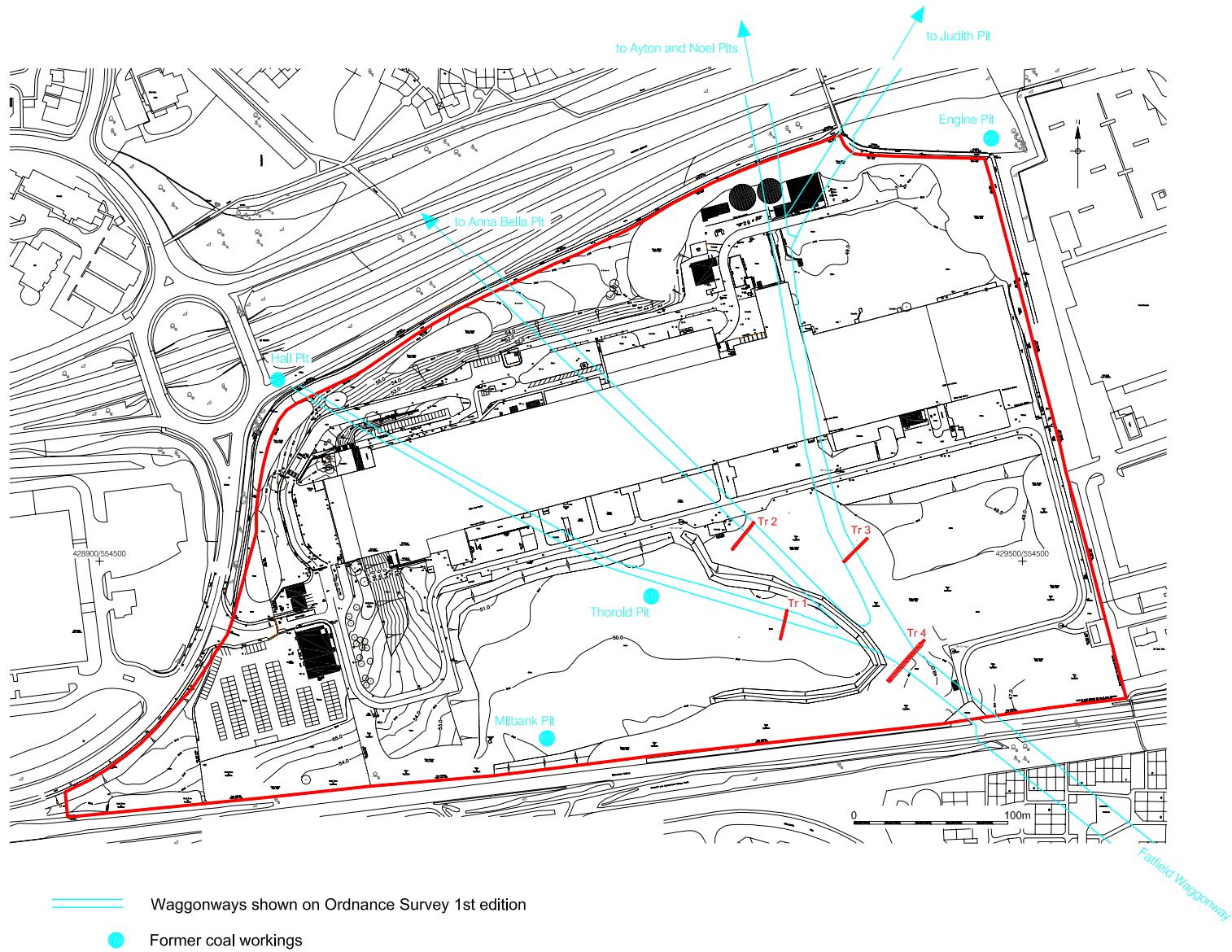


Figure 2. Trench location
Scale 1:4,000

- 2.2.2 The former tyre factory site forms the central portion of an east-west corridor of land occupied by the Wear Industrial Estate, in the south-western part of Washington. The industrial estate – which dates from the late 1960s - occupies approximately 46 hectares and is delimited on three sides by main roads: to the north by the west-east A195 Western Highway, to the west by the north-south A1(M) (Junction 64) and to the east by the SE-NW aligned A182. To the south, the industrial estate is entirely bounded by a section of what is now the Consett and Sunderland Railway Path, this being a footpath and cycleway running along the former route of what was originally (at the time of its opening in 1834) part of the Stanhope and Tyne Railway. The land beyond the former railway line is occupied by a sprawl of housing forming the northern extent of the villages of Harraton and Rickleton.
- 2.2.3 The former tyre factory site is roughly triangular in shape and c. 18 hectares in size, centred at NZ 2925 5452 (Figures 1 and 2). It is bounded to the west by the curving route of Vigo Lane, to the east by operational premises within the industrial estate, with the A195 and the former railway line to the north and south, respectively, as described above. The site has steel security fence around its entire perimeter and is accessed at its western end, from Vigo Lane, where there are security gates/barriers at the entrance.
- 2.2.4 The derelict factory building dominates the northern half of the site. It is an extensive, roughly east-west orientated, structure occupying a landscaped terrace (Figure 2). An access road skirts the majority of the factory, with a branch running off to the south-eastern corner of the site. There are various areas of hardstanding, mostly surfaced with concrete, in the immediate vicinity of the building, as well as a large, concrete and tarmac car park in the south-western portion of the site.
- 2.2.5 The factory building comprises one extensive main range, more than 450m in length and basically rectangular on plan. There are several smaller buildings on the site, most notably at the site entrance, where there is a brick gatehouse and, within the car park, a complex of largely pre-fabricated buildings representing former social facilities for the factory personnel. In addition, there are various factory outbuildings and a group of water tanks close to the site boundary to the north-east. There are several utility sub-stations around the site, with those for gas and electricity in the south-eastern portion of the site accessible from the aforementioned branch road.
- 2.2.6 Away from the buildings, most of the remainder of the site comprises scrubland, some of which was evidently tended as grassed lawns during the operational life of the factory. There are also areas covered by thick ground level vegetation and others with tree cover, particularly in the eastern half of the site and skirting much of the site perimeter fence. A distinct belt of woodland in the south-eastern quadrant of the site is of particular note, since this area, which appears to have escaped development in the modern era, is known to have been crossed by colliery waggonways in the late 18th-mid 19th century.

2.3 Geology and Topography

- 2.3.1 The site lies within the eastern central portion of the Durham Coalfield, west of the late Permian age Magnesian Limestone escarpment that runs north-south through Sunderland. The solid geology of this lower lying ground below the Limestone outcrop is the Carboniferous age Upper and Middle Coal Measures, consisting of a succession of mudstones, siltstones, sandstones and coals.³
- 2.3.2 Across much of the wider area Coal Measures rocks are concealed beneath a mantle of superficial or drift deposits of Quaternary age. These largely comprise boulder clay, known locally in the Washington area as Pelaw Clay. Boulder clays are typically extensive, with an average thickness of 10m in most places. Relatively thick deposits of laminated clay can occur locally in buried valley locations, such as Birtley to the west of the study site, where such deposits were extensively exploited for brick-making. Pockets of sand and gravel are also known in the Washington area.
- 2.3.3 The area of the site lies at c. 50m OD, with localised variations on the site itself, as described below. The main geographical feature in the wider area is the River Wear, which flows c. 2km to the south and 1.5km to the south-east of the site, carving a meandering path through the Carboniferous rock and then, further east, through the Permian Magnesian Limestone towards its outlet at Sunderland.
- 2.3.4 Ground levels across the site are variable, with significant landscaping evidently having been undertaken at the time of the construction of the industrial estate. The former factory building occupies an extensive terrace, at c. 51.0m OD, running roughly east-west across the northern central portion of the site. To the north and west, the ground rises, steeply at first, from this terrace, before almost levelling out towards the site boundaries. Ground level stands at c. 56.0m OD at both the northern and south-western boundaries of the site, while the north-western corner, at c. 58.0m OD, represents the highest area.
- 2.3.5 The southern central portion of the site comprises an expanse of fairly level ground, with a slight fall away from west to east, from c. 51.0m OD to c. 50.0m OD. This area, now scrubland but probably tended grassland during the life of the factory, is surrounded by a low bund. It is assumed that this area was landscaped at the time of the construction of the factory. The lowest lying part of the site is the south-eastern portion, where ground level falls locally to c. 47m OD. This part of the site contains a defined belt of heavy woodland extending north-westwards toward the factory building and other areas of scrubland and heavier ground level vegetation. Within the overgrown areas, particularly the woodland, there are localised surface variations, in the form of depressions and raised mounds, some linear. The woodland belt is, as previously described, the part of the site of greatest archaeological interest.

³ Geological Survey of Great Britain 1978; Smith 1994.

2.4 Planning Background

- 2.4.1 An outline planning application for the former tyre factory site has been submitted to the Local Planning Authority (LPA), Sunderland City Council. The proposal is to redevelop the site for mixed-use following demolition of the existing factory, with an extensive production unit occupying the easternmost portion of the site, new warehouse facilities in the central area, housing to the west of these and leisure/retail facilities, including a hotel, occupying the south-western portion.
- 2.4.2 The site does not lie within one of the 14 conservation areas in the City of Sunderland (the nearest being Washington Village Conservation Area), and there are no scheduled monuments, listed buildings or historic parks and gardens within its boundaries or within its immediate vicinity.
- 2.4.3 At a national level *Planning Policy Guidance Note 16: 'Archaeology and Planning'* (PPG16)⁴ provides advice concerning the safeguarding of archaeological remains within the planning process. PPG16 is informed by the principle that archaeology represents a finite and non-renewable resource and that its conservation, either by preservation *in situ* or preservation by record (through archaeological excavation) should be the primary goal of archaeological resource management. Implicit in PPG16 is the process for determining archaeological risk on a development site through assessment. DBAs usually form a baseline consideration of the archaeological potential of a proposed development site.
- 2.4.4 At a local level, the Unitary Development Plan adopted in 1998⁵ of Sunderland City Council contains the following policies:

B11. THE CITY COUNCIL WILL PROMOTE MEASURES TO PROTECT THE ARCHAEOLOGICAL HERITAGE OF SUNDERLAND AND ENSURE THAT ANY REMAINS DISCOVERED WILL BE EITHER PHYSICALLY PRESERVED OR RECORDED.

This policy highlights the need to take archaeological considerations into account at the pre-planning stage before the development control process and stresses that potential conflict between the needs of archaeology and development can be reduced if developers discuss their preliminary plans with the City Council and County Archaeologist in advance. It emphasises that an archaeological assessment will be needed to support a planning application should it require the loss of remains or the removal of artefacts from the site and underlies that it should clearly state the means of preservation or recording if that is the agreed intention.

B13. THE CITY COUNCIL WILL SEEK TO SAFEGUARD SITES OF LOCAL ARCHAEOLOGICAL SIGNIFICANCE. WHEN DEVELOPMENT AFFECTING SUCH IS ACCEPTABLE IN PRINCIPLE, THE COUNCIL WILL SEEK TO ENSURE MITIGATION OF DAMAGE THROUGH PRESERVATION OF THE REMAINS IN SITU AS A PREFERRED SOLUTION. WHERE THE PHYSICAL PRESERVATION OF REMAINS IN THE ORIGINAL SITUATION IS NOT FEASIBLE, EXCAVATION FOR THE PURPOSE OF RECORDING WILL BE REQUIRED.

This policy deals with the category of site which includes the numerous known sites of archaeological interest and sensitivity which do not have the status of scheduled monuments but which may still be worthy of preservation because of their national or local significance. These may be known only from aerial photographs, or comprise sites of industrial or post-medieval archaeology such as collieries, railways or farm buildings (some of which may also be listed buildings).

⁴ Department of the Environment 1990.

⁵ *The Planning Portal* website.

The policy notes that when an application is made to develop such a site, the Council, in consultation with English Heritage and the County Archaeologist, will weigh up its relative importance (national/ local) against other material considerations including the actual need for the proposed development in that particular location. Should permission be granted and it is not possible to preserve the remains *in situ*, then the developer should make appropriate and satisfactory provision for their excavation and recording. If this has not already been secured through a voluntary agreement, planning permission may be granted subject to conditions which provide for excavation and recording before development takes place, again in consultation with the County Archaeologist.

B14. WHERE DEVELOPMENT PROPOSALS AFFECT SITES OF KNOWN OR POTENTIAL ARCHAEOLOGICAL IMPORTANCE, THE CITY COUNCIL WILL REQUIRE AN ARCHAEOLOGICAL ASSESSMENT/EVALUATION TO BE SUBMITTED AS PART OF THE PLANNING APPLICATION. PLANNING PERMISSION WILL NOT BE GRANTED WITHOUT ADEQUATE ASSESSMENT OF THE NATURE, EXTENT AND SIGNIFICANCE OF THE REMAINS PRESENT AND THE DEGREE TO WHICH THE PROPOSED DEVELOPMENT IS LIKELY TO AFFECT THEM.

This policy deals with those areas or sites where remains such as prehistoric artefacts and signs of early industrial development have been found. Development in these areas should always be preceded by an archaeological assessment, arranged by the developer (possibly as a Section 106 agreement) to determine whether or not recording is required. Assessments can take the form of desk-based evaluations of existing information e.g. records of previous discoveries, historic maps or of geophysical survey data.

B15. WHERE MAJOR DEVELOPMENTS INVOLVE LARGE SCALE GROUND DISTURBANCE IN CURRENTLY UNDEVELOPED AREAS, THE CITY COUNCIL WILL DETERMINE WHETHER, AND TO WHAT EXTENT, AN ARCHAEOLOGICAL ASSESSMENT IS REQUIRED.

This policy highlights that large-scale works, which cause extensive disturbance of ground such as open casting, the construction of major highways and substantial areas of new development may affect areas with as yet unidentified archaeological interest. The City Council will be guided by the advice of the County Archaeologist in this matter.

B16. WHERE ANY HISTORIC SITES AND MONUMENTS ARE DISCOVERED PROVISION WILL BE MADE FOR AN APPROPRIATE LEVEL OF ASSESSMENT, RECORDING AND PRESERVATION (IN ADVANCE OF OR IF NECESSARY DURING CONSTRUCTION) COMMENSURATE WITH THE IMPORTANCE OF THE FIND.

This policy covers instances where there is accidental discovery of artefacts during development and stresses that any such objects should not be disturbed. Work should cease and the find immediately reported to the Environment Department of the City Council. Steps should be taken to preserve the objects as they are found and the County Archaeologist must be informed so that the object(s) can be recorded or recovered.

- 2.4.5 The aforementioned DBA concluded that the site has high potential for significant archaeological remains of the post-medieval and early modern industrial eras, particularly for the remains of late 18th-mid 19th century colliery transport systems. Three branches of Fatfield Waggonway, all serving workings of Harraton Outside Colliery, are known to have crossed the site. In accordance with PPG16 and UDP Policy B14, a programme of archaeological trial trenching was therefore required at the site. The Tyne and Wear Specialist Conservation Team, part of the Historic Environment Section of Newcastle City Council, provides archaeological development control in the City of Sunderland. As previously mentioned, a Specification for the evaluation was prepared by the Tyne and Wear Archaeology Officer, a member of the Specialist Conservation Team.
- 2.4.6 In sum, the archaeological evaluation was required, as part of the planning process, to inform the LPA regarding the character, date, extent and degree of survival of archaeological remains, specifically those associated with the former colliery waggonways known to have crossed the site. The results should inform a decision by the Specialist Conservation Team regarding further archaeological mitigation measures required for the development scheme.

2.5 Archaeological and Historical Background

2.5.1 Prehistoric

- 2.5.1.1 There are no Tyne and Wear Historic Environment Record (HER) entries relating to any of the prehistoric eras for the site or within the wider area. Slightly further afield, there are HER entries of prehistoric artefacts in the Birtley area, such as flint scatters of probable Mesolithic date (HER 302) found between the World Wars at Sheddon's Hill and in the Black Fell area, north of Birtley and c. 3km to the NNW of the site. Clay extraction for brick-making in Birtley in the 1930s produced a flint knife, found in association with secondary flakes and debitage (HER 650), this material of likely Mesolithic date being discovered c. 2.5km north-west of the site.
- 2.5.1.2 In the Washington area, a polished axe of Neolithic date (HER 342) was found in 1963, c. 3.5km to the north-east of the site, while a flint dagger of Neolithic or Bronze Age date (HER 329) was found in 1977, c. 5km to the NNE. A bronze wing-flanged axe (HER 654) of Bronze Age date and a fragment of perforated stone hammer of broadly prehistoric date (HER 655), were also discovered, c. 2.5km to the north-west of the site, during clay extraction for brick-making in Birtley in the 1930s. Approximately 2km to the south-west of the site, a geophysical survey in Picktree detected a circular enclosure of possible late prehistoric date (County Durham HER 4026) and there are antiquarian records of Bronze Age cists being examined in Lambton Park, c. 2.5km to the south.
- 2.5.1.3 In summary, the discovery of prehistoric artefactual material in the surrounding areas broadly suggests some human occupation and exploitation of the wider area throughout prehistory.

2.5.2 Roman

- 2.5.2.1 There are no HER entries of the Roman period for the site and only one entry within the wider area This is a Romano-British brooch (HER 4605) found c. 1km south-east of the site on a housing estate in Harraton in the mid 1960s.
- 2.5.2.2 Evidence of Roman activity in the broader vicinity should not be unexpected given that the site lies only c. 2km to the east of the line of the Dere Street Roman road, as it runs northwards from the well-documented fort and settlement at Chester-le-Street towards Newcastle. Unsurprisingly, therefore, other finds of Roman metalwork are recorded on the HER, lying just beyond the wider area. Most notable is a hoard of at least 59 Roman coins (HER 341) found in an earthenware vessel in 1939 near Washington village, c. 2.5km to the north-east of the site. In the same general area, a mid 4th century coin (HER 1999) was found in 1995 in a garden in Biddick, c. 2km to the north-east.

2.5.3 Anglo-Saxon

- 2.5.3.1 No entries relating to Anglo-Saxon or early medieval activity are recorded in the HER within the wider area. Neither is there any documentary evidence to suggest settlement or exploitation of the land in the vicinity of the site during this era.

2.5.4 Medieval

- 2.5.4.1 There are no records in the HER for the medieval period at the site or within the wider area. There are, however, several entries for this period just beyond the wider area and these are briefly discussed below for the purposes of establishing the historical background of settlement in the wider Washington area.
- 2.5.4.2 The name Washington may date to the Norman Conquest, potentially being of Norse origin.⁶ The earliest documentary reference to Washington village (HER 352) comes from the 'Boldon Buke' (c. 1183) when the vill, but not the church (HER 353) or its lands, was held by William de Hertburne. The church today is almost entirely 19th-20th century, although a potentially 12th century font survives within it. Bishop Hatfield's survey of 1382 indicates William of Washington held the manor, before it passed into the hands of the Blaykestones in the 15th century.
- 2.5.4.3 The Boldon Buke gives brief mention to nearby settlements at Birtley and Penshaw and there is some documentary evidence to suggest that Birtley may have been producing coal since the mid 14th century.⁷ The village of Harraton – as part of the ancient manor of 'Harvertune' – was originally in the ownership of the Bishops of Durham, although Bishop Ranulf Flambard purportedly gave the estate to a family member sometime before his death in 1128 and eventually it came by marriage into the possession of the Hedworth family.⁸ In 1599 the estate is recorded as being owned by Sir John Hedworth.⁹
- 2.5.4.4 Since most of the known settlement areas within and around the wider area appear in documentary evidence from the medieval period, it is possible that archaeological remains of that era could exist upon the site. These would most likely take the form of features derived from agricultural activity, such as plough scars or field boundaries, since the site itself was almost certainly not settled in the medieval period.

2.5.5 Post-medieval and Early Modern/Industrial

HER and other documentary evidence

- 2.5.5.1 With regard to general settlement and agricultural activity, the HER contains no entries for the post-medieval period at the site or within the wider area. Two entries designated as post-medieval - in terms of the chronological timescales adopted for this report – actually refer to early industrial sites of this period. Around three-quarters of the HER entries in the wider area are directly or closely related to the early modern industrial era development in the south-western portion of what is now Washington. Two of these entries are for sites lying within the site, both being former waggonways branching from Fatfield Waggonway (HER 3018).

⁶ Hill 1929.

⁷ Archer 1897. Probably the earliest record of the shipment of coal in the region - from Tynemouth – is from 1269.

⁸ Mackenize and Ross 1834.

⁹ Lind 1974.

- 2.5.5.2 Although the coal trade on the Wear did not begin to flourish until the middle of the 17th century,¹⁰ there were certainly workings in the Washington area before that. In fact, a colliery at Harraton may have been amongst the first to operate in the area, with a shaft possibly being sunk as early as c. 1590.¹¹ Harraton Colliery (HER 3022) lay to the south of the site, while the area in which the site itself was located was known as Harraton Outside Colliery or simply Harraton Outside and, on occasion, possibly Harraton Moor. In 1603 a London merchant, Robert Bromley, leased Harraton Colliery for £300 per annum and that same year it reportedly had 6,000 chaldrons of coal available.¹² The year 1605 saw Sir John Bourchier lease the colliery for £500 per annum on behalf of a group of London businessmen and by the 1630s it was reportedly contributing 6,000 tons of the total of 10,000 shipped annually from Wearside. An account of 1635 mentions Harraton Colliery as having '*divers Ingines, trammes, shouells*'.¹³
- 2.5.5.3 Successive consortia of primarily local adventurers undoubtedly provided the driving force behind the pre-Civil War success of Harraton Colliery.¹⁴ After the Civil War, Harraton estate was divided into thirds, two being retained by another former army officer, Colonel John Jackson, who became the lessee of Harraton under Cromwell, the third comprising the dower of Dame Dorothy Hedworth, widow of John Hedworth, who then married the same Colonel Jackson in 1655. In 1696, the Harraton estate entered the ownership of the Lambton family through marriage.
- 2.5.5.4 The early post-medieval coal trade on the Wear was well-known for being patronised by both land-owning gentry and industrialists from Sunderland itself.¹⁵ By 1700, the port was very much renowned for its coal trade, much of it derived from workings in the Chester-le-Street/Washington area and brought down river to the port by shallow-draught keels. By 1728 there were eight collieries active along the Wear and Lambton was the furthest point up-river accessible by keel, even using the shallow-draught variety in use on the river.
- 2.5.5.5 There are other documentary records of Harraton Outside from the 18th century. Of particular note are two leases, one dated 1778, the other undated but probably also from the 1770s,¹⁶ containing details regarding coal workings and waggonways at Harraton Outside - these are described in detail in the DBA.¹⁷ This documentary evidence paints a vivid picture of the landscape in which the site was set in the late 18th century, an essentially rural landscape having elements of increasing industrialisation forced upon it. It also establishes definitively that waggonways were in use serving the coal workings at Harraton Outside by the 1770s.

¹⁰ Moss 1926.

¹¹ Durham County Record Office. Document reference: NCB 24/117.

¹² Hatcher 1986.

¹³ Lewis 1970.

¹⁴ Hatcher 1986.

¹⁵ Cookson no date.

¹⁶ Lincolnshire Archives references: THOR 1/1/7/1 and THOR 1/1/7/2.

¹⁷ PCA 2008.

- 2.5.5.6 The 1st Earl of Durham, John George Lambton had a lengthy tenure as owner of the Harraton estate from 1797 until his death in 1840. Throughout the 19th century, much of the land, including the collieries, was leased out by the Earls of Durham, the Lambton family. By the 1820s, Harraton Colliery was evidently operated by Messrs. Lamb and Co. and by the 1850s it was in the hands of Stobart, Bell and Co.¹⁸ As detailed further below, the Tithe map of 1847 records that all of the land within the boundary of the site, located in the area known as Harraton Outside, was owned by the Earl of Durham and under assorted occupancy. In 1896, Lord Lambton, who had gained control of the estate, sold many of its elements to Sir James Joicey.¹⁹ Harraton Colliery thus became part of The Lambton Collieries Limited, before becoming part of The Lambton and Hetton Collieries Limited in 1911, and then, in 1924, in its last private incarnation before nationalisation in 1947, it became part of The Lambton, Hetton and Joicey Collieries Limited, the largest colliery company in County Durham. Harraton Colliery was closed 1964.
- 2.5.5.7 The first waggonway on Wearside was supposedly constructed in the 1690s.²⁰ Across the North-East, the heyday of these forerunners of the railways proper was arguably between the mid 18th century and the first decade of the 19th century. Their widespread use throughout the coalfields of the North-East in the 18th century was linked directly to the need to move coal quickly and efficiently for export, especially to London. The existence of waggonways serving Harraton Outside in the 1770s has been discussed above and by the 1780s an extensive network was in place on Wearside. In the case of Harraton, the waggonways fed staithes at Fatfield (HER 3037) on the Wear, which in turn provided a direct route to the Sunderland dock facilities, where colliers were loaded.
- 2.5.5.8 Colliery waggonways had their origin in the simple horse and cart, with wooden rails being laid down in the early 17th century to facilitate the movement of wheeled vehicles in overground colliery transport systems. In the North-East, the vehicles were initially known as 'wains', this word eventually being replaced by 'waggons'. The early systems were usually designed so that full waggons would travel under their own weight, on a gradual downhill incline, with horses pulling the empty vehicles uphill to the coal workings for reloading. By 1797 the self-acting inclined plane was in operation at Benwell in Newcastle, this using the principle that the weight of a loaded waggon going downhill could be utilised to pull an empty waggon back uphill. Early rails were typically of oak, ash or birch, with sleepers between, with a variety of gauges in use. Early lines were single track, with a buffer zone to either side where lines passed through private property. The aforementioned 1778 lease for Harraton Outside provides precise instructions regarding maximum dimensions of this waggonway, '*14 yards in breadth only, including the gutters except where mounts, bridges or cuts are to be built wider as occasion requires*'. That document also details the importance of issues such as, for example: not allowing cattle to trespass on land through which the waggonways ran, although tenants were allowed to use the routes on foot, in carts, on horseback, and with cattle or sheep, and specifies that adjacent ground should not be damaged during waggonway construction.

¹⁸ The Durham Mining Museum website.

¹⁹ Mountford and Holroyde 2006.

²⁰ Cookson no date.

- 2.5.5.9 Double-tracked lines were certainly in existence in the 18th century, although many remained single track, facilitating vehicular movement with a series of sidings and passing places. The waggons were also initially made entirely of wood, with a brake to regulate the downhill descent, while wooden axles were replaced by iron ones and from around the 1730s manufacturers started adding iron tyres, then iron spokes to wheels, before all cast-iron flanged wheels were eventually introduced.
- 2.5.5.10 Upgrade of waggonway rails was inevitable in the 18th century with metal strips or bars being fitted at first before all metal rails came into use. The precise date at which all metal rails were introduced is much argued, as is the location of this technological improvement. Usage of crude iron rails by Richard Reynolds in 1762 is much quoted, although some authors claim that iron rails were in use as early as 1716. The earliest form was almost certainly the 'L-section' rail since casting iron wheels or tyres with a flange initially proved difficult. William Jessop has been generally accepted as the inventor of the ancestor of the modern rail in 1789, although this too is disputed,²¹ this being the flat-topped 'edge' rail along which ran a flanged iron wheel. Jessop's rails were cast in three foot to six foot lengths with the centre of the rail of deeper section than the ends – the so-called 'fish-bellied' type of rail. Initially these were made with side plates cast onto the rail through which bolts secured the rail to wooden or stone sleepers. From the 1790s the rails were cast with no built-in feet or fixing holes, rather they were mounted in cast iron brackets called 'chairs' and, again, wooden sleepers remained in widespread use. Cast-iron fish-bellied rails were widely used on light waggonways throughout the country from the late 18th century and in fact remained in use in some remote locations up to the 1940s, mainly carrying horse-drawn or manually pushed light mineral waggons.²²
- 2.5.5.11 In the North-East specifically, it is documented that two-foot long malleable iron rails were first used at Walbottle Colliery, Newcastle in 1794. A survey of 1810 noted that although 'traditional' wooden waggonways remained in extensive use in the Tyneside area, replacement of wooden rails with metal ones was taking place on most routes.²³
- 2.5.5.12 To date there has been only a handful of examples of detailed archaeological investigation of former colliery waggonways, two of which in Tyne and Wear - both of likely late 18th century date - have led to published papers, underlining the significance of these structures in terms of post-medieval and early modern industrial archaeology. The first reported on an excavation at Lambton D Pit in 1995, which uncovered the substantial and well preserved remains of a timber waggonway, dating from c. 1780-90.²⁴ The second reported the findings of an excavation in 2002 at Rainton Bridge, near Houghton le Spring, which revealed a waggonway that could pre-date the example at Lambton D Pit.²⁵ Although timber preservation was poor in this case, the excavation was able to determine the rail gauge, and identify a series of re-cut ditches and fencelines that would have demarcated the surrounding wayleave.

²¹ The *Stephenson Locomotive Society & Waggonway Research Circle* website.

²² The *Goods & Not So Goods (an overview of railway freight operations for modellers)* website.

²³ Atkinson 1968.

²⁴ Ayris *et al.* 1998.

²⁵ Glover 2005.

2.5.5.13 These previous pieces of archaeological work have largely confirmed theories regarding general construction of late 18th century waggonways, in that initial groundworks involved laying down linear banks of ballast, often small-coal and ash, upon which wooden sleepers were placed and to provide gradients as required. Wooden rails were then laid down and pegged into place, before a further layer of fine ballast was deposited on and around the sleepers as protection. Further ballast could be added to raise or effectively conceal the rails, with provision sometimes made for a path and, more usually, drainage gutters either side.

Summary of historic map evidence

2.5.5.14 Gibson's map of 1788 shows the main colliery elements of the Washington/Harraton area sometime ahead of the introduction of the railways proper. The waggonways are depicted as terminating at staithes at Fatfield on the Wear and run in from various workings to the north-west and west. One of the lines, skirting the village of Pelaw in the west and running roughly west-east into Fatfield is certainly 'Beamish Old Waggon Way' (HER 2562) becoming 'Harraton Waggon Way' (HER 3036) to the east, as these appear on the Ordnance Survey 1st edition, whilst other lines are less easy to identify.

2.5.5.15 A map of 1839 by Hobson shows the line of the Stanhope and Tyne Railway (HER 2290) running through the general area, as well as Fatfield Staith (HER 3037), with various waggonway branches running into the staithes from the north-west and west. A waggonway north of Nova Scotia and on the line of the aforementioned railway could represent abandoned waggonways (HER 3009 and 3010), shown on the Ordnance Survey 1st edition.

2.5.5.16 Bell's coalfield map of 1843 shows the Stanhope and Tyne Railway with Harraton Colliery to the south, along with various pits associated with Harraton Outside. South-east of the former factory site, Fatfield Waggonway (HER 3018) branches from Harraton Waggonway (HER 3036) and, running to the north-west, enters the site close to its south-eastern corner before branching into two. The first branch runs north-west, passing Hall Pit (HER 3014), before terminating, south of Portobello, at an unnamed pit. The second branch runs NNW before dividing again just inside the boundary of the site, one branch continuing to the north-east to Judith Pit (HER 3005), the other dividing again, to the north of the site, this time into three branches, to feed Noel Pit (HER 3004), Boundary Pit (3002) and Ayton Pit (HER 3007). Anna Bella Pit and Engine Pit (HER 3008 and 3011, respectively) are not shown, despite documentary evidence suggesting that both were sunk before this date.²⁶

²⁶ The Durham Mining Museum website.

- 2.5.5.17 At the time of the drawing up of the Tithe maps in the mid 19th century, the site lay within Harraton township in the parish of Chester-le-Street in County Durham. None of the pits or waggonways within or in the immediate vicinity of the study site is named on either the 1847 Tithe map of Harraton or the accompanying apportionment. Fatfield Waggonway (HER 3018) enters the site towards its the south-eastern corner and then immediately divides into three branches, the first two of which correlate with those shown on Bell's map. The first branch runs to the north-west, past Hall Pit and onto the aforementioned unnamed pit south of 'Porto Bello'. The second branch (HER 3010) is the waggonway running in a NNW direction and which itself sub-divides to send a branch (HER 3006) to feed Engine Pit and Judith Pit, a branch (HER 2457) to feed Noel Pit and a third branch (which remains as HER 3010) to feed Ayton Pit, this route continuing to the north-west, to Boundary Pit.
- 2.5.5.18 The third waggonway branch (HER 3009) lies midway between the two branches and effectively continues the line of Fatfield Waggonway. It serves Anna Bella Pit (HER 3008), terminating in three short branches towards the pit head. The HER shows this route turning to the north-east and running to Ayton Pit (HER 3007), probably based on detail shown on the Ordnance Survey 1st edition map, which is supported to some degree by a dotted line on the Tithe map. Anna Bella Pit was possibly named after Annabella Milbanke, as detailed in the DBA. Since this person was born in 1792 – and assuming that the working was not renamed at any stage – it can be presumed that this pit was sunk on or after that year.
- 2.5.5.19 On the 1847 Tithe map, the remainder of the site is arable land, with a small plantation towards the north-eastern corner. The smallest land parcel at the site – this being a triangular plantation adjacent to the northern site boundary – survived, presumably unchanged, until the creation of the Wear Industrial Estate in the late 1960s, as evidenced by its presence on the Ordnance Survey map series until 1967. Just beyond the site, the land parcel in which Engine Pit is situated is described as 'waggonway and waste' in the apportionment. The Stanhope and Tyne Railway is annotated on the Tithe map simply as 'Stanhope Railway', although it had been renamed before 1847.
- 2.5.5.20 Oliver's map of 1851 is of note in that it shows two other pits, 'Milbank' and 'Thorold', south-east of Hall Pit and north of the railway and thus, potentially, within the southern central portion of the site. Rush Pit (HER 3013), which lay to the east of the site, is annotated as '10th' and another working, 'Melburn', is depicted just to the north. It is possible that this map reflects an earlier account of operational pits since none of Melburn, Milbank or Thorold pits evidently survived into the mid 19th century, even to appear as 'old' shafts on the Ordnance Survey 1st edition map. Thus the precise locations of these former workings are uncertain.
- 2.5.5.21 The Ordnance Survey 1st edition shows the site and the wider area in detail. The waggonways (HER 3006, 3009 and 3010, respectively) serving Judith, Anna Bella and Ayton Pits are each annotated as 'Old Wagon Way' probably indicating that they were out of use. In the southern central portion of the site, an area of woodland shown between two of the branch waggonways is probably the area of woodland that survives on site, although the existing woodland is much expanded due to planting in the modern era.

- 2.5.5.22 Fatfield Waggonway itself, to the south of what was by then the Pontop and South Shields branch of the North Eastern Railway (NER), is shown with the symbol for railway, indicating that this route had been upgraded. The branch waggonway (HER 2547) serving Noel Pit and the waggonway serving Hall Pit were both probably out of use by then. South of the NER, the 1st edition shows the main complex of Harraton Colliery, with a number of associated pits in the immediate vicinity, but all beyond the site. Ancillary industries are indicated by other features on the 1st edition, such as brick fields, ponds and ovens at the Harraton Colliery complex, along with a forge adjacent to Hall Pit.
- 2.5.5.23 By the time of the Ordnance Survey 2nd edition of 1896, the majority of the outlying workings of Harraton Colliery were disused, including those of relevance to the site, namely Hall Pit, Engine Pit, Rash (formerly Rush) Pit, Anna Bella Pit, Ayton Pit, Noel Pit and Judith Pit. The waggonways serving these workings, along with the portion of Fatfield Waggonway entering the site, were also clearly abandoned. The south-easternmost portion of the waggonway branch that served Hall Pit had evidently been obliterated entirely from the landscape, while the other former waggonway routes are depicted as simple roads, tracks or pathways, some with embanked sections.
- 2.5.5.24 The Ordnance Survey 3rd edition of 1921 little change within the site from the previous edition. The area of woodland between the trackways marking the former waggonway routes has the annotation 'Rises'. To the south, Harraton Colliery still dominates the landscape, although the associated brick field was evidently no longer operational. The branch railway linking Harraton Colliery into the NER at the southern boundary of the site remains annotated as a 'waggonway'.
- 2.5.5.25 In summary, the DBA concluded that the potential for archaeological remains of the early modern/industrial era was considered high, due to the known presence of three former colliery waggonways – all running broadly from SE-NW - across the site. The belt of thick woodland in the southern central portion of the site probably has its origins in the 19th century and this area, having avoided subsequent development of the site, potentially contains - as sub-surface remains - sections of a waggonway (HER 3009) that fed Anna Bella Pit to the north-west and a branching waggonway (HER 3010, becoming HER 2457 and HER 3006) which fed Ayton, Noel, Judith and Engine Pits to the north. The line of a third former waggonway (no HER number) crosses an area of scrubland to the south of the factory; running on a WNW alignment, it served Hall Pit. All the waggonways at the site probably originated in the late 18th century and all were probably out of use by the mid-late 19th century. Any sub-surface remains of these features would be of high archaeological significance, with any evidence of 18th or early 19th century date being of particular significance.

3. PROJECT AIMS AND RESEARCH OBJECTIVES

3.1 Project Aims

3.1.1 The project is threat-led with potential to disturb or destroy important sub-surface archaeological remains of the late post-medieval and early modern industrial eras, specifically evidence of Fatfield Waggonway and various branch routes serving workings of Harraton Outside Colliery. The routes are suspected as being operational between the late 18th century and the mid 19th century. The broad aim of the evaluation was therefore to inform the LPA regarding the character, date, extent and degree of survival of archaeological deposits across the south-eastern quadrant of the site, this being the most archaeologically sensitive area.

3.1.2 Archaeological trial trenching was chosen as the investigative tool to test the archaeological potential of the south-eastern quadrant of the site. Four trenches (Trenches 1-4) were sited in this area (Figure 2). Trench 4 was sited across the route of Fatfield Waggonway (HER 3018) to the north of the point at which it entered the site along its southern boundary, running to the north-west. The feature is known to have divided into three branch routes to serve workings of Harraton Outside Colliery. Trench 1 was tested by the southernmost branch, which has no HER number, but ran WNW across the site towards Hall Pit (HER 3014). Trench 2 tested the central branch (HER 3009), which effectively continued the north-westward line of Fatfield Waggonway to serve Anna Bella Pit (HER 3008). Trench 3 tested the northernmost branch (HER 3010), a waggonway running NNW before a number of sub-divisions served a series of pits, including Judith Pit (HER 3005) and Ayton Pit (HER 3007).

3.1.3 Additional aims of the project were:

- to compile a site archive consisting of all site and project documentary and photographic records, as well as all artefactual and paleoenvironmental material recovered;
- to compile a report that contains an assessment of the nature and significance of all data categories, stratigraphic, artefactual, etc.

3.2 Research Objectives

3.2.1 *Shared Visions: The North-East Regional Research Framework for the Historic Environment* (NERRF)²⁷ is a document that highlights the importance of research as a vital element of development-led archaeological work. In setting out key research priorities for all periods of the past, NERRF allows archaeological projects to be related to wider regional and national priorities for the study of archaeology and the historic environment. The relevant key research themes for the archaeological evaluation are:

PM1. Early coal industry and coal use:

To ensure improved targeting of archaeological evaluation there should be a survey of documentary evidence and cartographical evidence for early mining in order to identify precise locations.

²⁷ Petts and Gerrard 2006.

Development controlled commissioned fieldwork should also be aware of the potential for the buried remains of colliery buildings on later sites.

Sub-surface mine workings may survive. These may be revealed by modern deep ground disturbances in advance of other surface developments. It is essential that appropriate archaeological monitoring processes be put in place to record such remains.

PM2. Early railways:

Ongoing research needs to recognise the role of the North East in the development of the early railways, with several key areas of investigation having been identified.

Investigations should focus on the early waggonways and pre-locomotive hauled lines, whilst also recognising the potential archaeological importance of terminal, and specifically the development of coal staithes. Existing landscape features along the course of known early waggonways require survey, which if possible, should include railway formations, track beds and gradients.

The routes of early railways should be plotted on the HERs of the region, through archival research on early documentary and cartographic sources.

- 3.2.2 Given the location of the site, a specific research objective for the project was: do any sub-surface archaeological remains survive at the site for Fatfield Waggonway or the three branch routes that served outlying workings of Harraton Outside Colliery?

4. ARCHAEOLOGICAL METHODOLOGY

4.1 Fieldwork

- 4.1.1 All fieldwork was undertaken in accordance with the relevant standard and guidance document of the Institute for Archaeologists (IfA).²⁸ PCA is an IfA-Registered Organisation. The evaluation was undertaken according to the Specification provided by the Tyne and Wear Specialist Conservation Team, which should be consulted for full details of methodologies employed regarding archaeological excavation, recording and sampling. It forms Appendix C to this report.
- 4.1.2 The dimensions of the trenches were as follows:
- Trench 1 measured c. 20m NNE-SSW x 1.50m at ground level.
 - Trench 2 measured c. 23m NE-SW x 1.50m at ground level.
 - Trench 3 measured c. 22m ENE-SSW x 1.50m at ground level.
 - Trench 4 measured c. 36m NE-SW x 3m at ground level. Due to the depth of deposits, this trench had to be stepped for Health and Safety reasons to allow safe examination of exposures. A central 'slot' measuring 26m x 1.50m wide was excavated along the majority of the trench, with the exception of the south-western portion.
- 4.1.3 All trenches were excavated with a back-acting mechanical excavator utilising a wide-blade ditching (non-toothed) bucket under the direct supervision of the supervising archaeologist. Overburden and archaeologically insignificant material was gradually removed by the machine, in spits of approximately 100mm thickness, down to the first archaeologically significant horizon. Spoil was mounded beside each trench.
- 4.1.4 Excavation and recording was undertaken in accordance with recognised archaeological practice and following the methodology set out in PCA's *Field Recording Manual*.²⁹ Following machine clearance, the sections and the base of the trenches were cleaned using appropriate hand tools. The base of each trench was planned to scale relative to a survey baseline and one long section in each trench was drawn to scale. Other sections were drawn as appropriate.
- 4.1.5 Archaeological deposits were recorded using a 'single context planning' system. Features and deposits were recorded on *pro forma* context record sheets.
- 4.1.6 A photographic record of the investigations was compiled using SLR cameras. This comprised black and white prints and colour transparencies (on 35mm film), illustrating in both detail and general context the principal features and finds discovered. The photographic record also included 'working shots' to illustrate more generally the nature of the archaeological operation mounted. All photographs included a graduated metric scale. In addition, digital photographs were also taken. The photographic record forms part of the Site Archive.

²⁸ IfA 2001.

²⁹ PCA 1999.

4.1.7 Four Temporary Bench Marks (TBMs) were established on the site using existing survey data: TBM 1 had a value of 49.87m OD; TBM 2 had a value of 50.57m OD; TBM 3 had a value of 49.56m OD; and TBM 4 had a value of 48.52m OD. The height of all principal strata and features were calculated relative to Ordnance Datum and indicated on the appropriate plans and sections.

4.2 Post-excavation

4.2.1 The stratigraphic data generated by the project is represented by the written, drawn and photographic records. A total of 117 archaeological contexts were defined during the evaluation (Appendix B). Post-excavation work involved checking and collating site records, grouping contexts and phasing the stratigraphic data (Appendix A). A written summary of the archaeological sequence was then compiled, as described below in Section 5.

4.2.2 Artefactual material recovered from the evaluation comprised a section of iron rail and two coins, all recovered from Trench 3. Preliminary conservation and stabilisation was undertaken on completion of the fieldwork in accordance with guidelines set out in *First Aid for Finds* (3rd edition)³⁰ and *Guidelines No. 2. Packaging and storage of freshly excavated artefacts from archaeological sites*.³¹ Decisions will be made in due course regarding any requirement for specialist examination, specialist stabilisation or specialist assessment of potential for conservation research, as well as whether or not the material will be retained as part of the Site Archive. These decisions will be influenced by the results of any further archaeological work at the site, if any is undertaken, and will be made in consultation with the Tyne and Wear Specialist Conservation Team. No other categories of inorganic artefactual material were represented.

4.2.3 Biological material recovered from the evaluation comprised five timbers, all crude sleepers from a colliery waggonway in Trench 4. Preliminary conservation and stabilisation was undertaken on completion of the fieldwork in accordance with guidelines set out in *Waterlogged wood. Guidelines on the recording, sampling, conservation and curation of waterlogged wood*.³² Decisions will be made in due course regarding any requirement for specialist examination, specialist stabilisation or specialist assessment of potential for conservation research, as well as whether the material is to be retained as part of the Site Archive. These decisions will be influenced by the results of any further archaeological work at the site, if any is undertaken, and will be made in consultation with the Tyne and Wear Specialist Conservation Team.

4.2.4 The palaeoenvironmental sampling strategy of the project was to recover bulk soil samples where appropriate, from well-dated (where possible), stratified deposits covering the main periods or phases of occupation and the range of feature types represented, with specific reference to the objectives of the evaluation. To this end, no appropriate deposits were encountered and therefore no bulk soil samples were recovered.

³⁰ Watkinson and Neal 1998.

³¹ UKIC, Archaeology Section 1983.

³² English Heritage 1996.

- 4.2.5 The complete Site Archive will be packaged for long term curation. It will certainly include all written, drawn and photographic records, including all material generated electronically during post-excavation. As described above, decisions will be made in due course regarding retention of the metal artefacts and timbers as part of the Site Archive.
- 4.2.6 In preparing the Site Archive for deposition, all relevant standards and guidelines documents referenced in the Archaeological Archives Forum guidelines document³³ will be adhered to, in particular two well-established United Kingdom Institute for Conservation (UKIC), Archaeology Section documents³⁴ and an forthcoming IfA publication.³⁵ The depositional requirements of the receiving body, in this case the Tyne and Wear Museum Archive, Arbeia, South Shields, will be met in full. The depositional requirements of the body to which the Site Archive will be ultimately transferred will be met in full.

³³ Brown 2007.

³⁴ UKIC, Archaeology Section 1984 and 1990.

³⁵ IfA forthcoming.

5. RESULTS: THE ARCHAEOLOGICAL SEQUENCE

During the evaluation, separate stratigraphic entities were assigned unique and individual 'context' numbers, which are indicated in the following text as, for example [123]. The archaeological sequence in each trench is described separately, although contexts have been assigned to broad phases on a site-wide basis. Interpretation has been added to the data, where possible, and the phases have been correlated with recognised historical and geological periods, again where possible.

5.1 Trench 1 (Figure 3)

5.1.1 Phase 1: Natural sub-stratum

5.1.1.1 Natural boulder clay, [103], comprising firm, dark pinkish brown clayey silt, was exposed across the extent of Trench 1. The level at which this was encountered sloped down from a height of 50.13m OD at the north-eastern end of the trench to 49.84m OD at the south-western end.

5.1.2 Phase 5: Early modern or modern

5.1.2.1 The boulder clay was overlain by a deposit, [102], comprising dark greyish black coal with silty sand, presumably representing colliery waste, which was on average c. 50mm thick, but increasing in thickness towards the north-eastern end of the trench, where it was up to 0.16m thick.

5.1.3 Phase 6: Modern (topsoil)

5.1.3.1 The uppermost deposit encountered in Trench 1 comprised topsoil, [101], up to 0.30m in thickness. This was encountered at a height of 50.52m OD at the north-eastern end of the trench, sloping down to 50.38m OD at the south-western end.

5.2 Trench 2 (Figures 4 and 7)

5.2.1 Phase 1: Natural sub-stratum

5.2.1.1 The natural boulder clay sub-stratum, [236], comprising firm, light to mid yellowish brown clay was encountered across the extent of Trench 2 at a consistent height of 49.47m OD.

5.2.2 Phase 3: Late post-medieval? (construction of waggonway)

5.2.2.1 Towards the north-eastern end of Trench 2, the natural sub-stratum was overlain by a deposit, [235], comprising compact, mid grey to mid brown sandy clay. This formed a NW-SE aligned linear bank, 5.70m in width and with a maximum thickness of 0.54m in the centre, petering out to each side. Its maximum height was 50.07m OD, sloping down to 49.37m OD on the north-eastern edge and 49.52m OD on the south-western edge. This feature is interpreted as a deliberately raised bank, using re-deposited natural clay, upon which a waggonway ran from SE-NW across this part of the site. However, no *in situ* elements of the track remained.

5.2.2.2 The central, and highest, part of the waggonway embankment was overlain by a deposit, [237], comprising compact, mid orange yellow clay which varied in thickness from 0.10m to 0.15m and extended in section for a length of c. 1.50m. This is interpreted as packing and bedding material for the waggonway track.

5.2.2.3 Part of a NW-SE aligned linear feature, [232], was recorded running alongside the north-eastern edge of the waggonway bank. It had a maximum recorded width of 2.0m, continuing to the north-east beyond the limit of excavation, and its maximum depth was 0.28m. Its single fill, [231], comprised firm, brownish black silty clay with frequent patches of crushed coal and redeposited natural clay throughout, as well as occasional small stones. Although any interpretation can only be tentative as such a small portion of this feature was exposed within the limits of the trench, its location and alignment suggests that it represents a trackside ditch bounding the waggonway. This is further supported by the composition of its fill, which probably represents material that accumulated within the ditch whilst the waggonway was in use.

5.2.3 Phase 4: Early modern? (post-use of waggonway)

5.2.3.1 A deposit, [216], up to 0.30m thick, comprising a loose mixture of clay, ash and clinker, with frequent fragmented brick, tile and glass throughout. It was recorded overlying the south-western side of the waggonway bank and extended to the south-west for a total distance of 3.50m. This is interpreted as waste material deposited after the waggonway went out of use, and possibly originates from the time when the track was dismantled.

5.2.3.2 Clay bedding layer [237] was truncated by a series of distinctive linear NW-SE aligned features. Feature [220], which also truncated the edge of deposit [216], extended across the width of the trench and was 0.29m wide and 0.10m deep. The top of this feature was recorded at a maximum height of 49.92m OD. Running parallel and adjacent to the eastern side of this feature, next to the north-eastern limit of excavation, was feature [222], which was recorded for a distance of 0.70m and was 0.20m wide by 0.14m deep. Two further parallel features were recorded c. 1m to the north-east. Feature [224], which was slightly irregular curvilinear in plan, extended across the width of the trench, continuing beyond the limits of excavation, and measured 0.23m wide by 0.16m deep. Feature [226] ran parallel and adjacent to the eastern side of [224] and was 0.50m in length, continuing beyond the north-eastern limit of excavation, and 0.27m wide by 0.20m deep. These features are interpreted as 'robber' cuts representing the removal of rails, either entirely of timber or more likely timber with metal additions or entirely metal, from the waggonway track. Although the features most likely correspond very closely with the original features into which the rails were placed, they are not interpreted as representing original construction cuts since feature [220], to the south-west, truncated deposit [216], which almost certainly post-dated the phase of waggonway use.

5.2.3.3 A small circular feature, [234], was recorded adjacent to the south-western side of feature [222], near to the south-western limit of excavation. This measured 0.10m in diameter by 60m deep and in profile tapered to a pointed base. The feature probably originally housed a timber stake, but, as it cut through dump [216], it cannot be considered an element of waggonway construction or usage.

5.2.3.4 A substantial deposit, [230], comprising clay and crushed coal, was recorded to the north-east of the waggonway bank, extending for a distance of 2.83m and overlying the trackside ditch. It was up to 1m thick and extended across the trench, continuing beyond the limits of excavation. This deposit is interpreted as a dump deposit, presumably utilising colliery waste, laid down in order to consolidate and level the area after the waggonway had fallen into disuse.

5.2.3.5 An extensive levelling deposit, [215], was recorded overlying deposit [216] and extending, to the south-west of the waggonway, along the remainder of Trench 2. It comprised silty clay with moderate inclusions of coal and was recorded for a total distance of c. 18m, continuing beyond the limits of excavation. It was generally 0.10-0.20m in thickness, although it increased significantly, to 0.80m thick, towards the waggonway bank. Deposit [203], comprising crushed stone and brick up to 0.40m in thickness, overlay deposit [215] and extended along the trench for a distance of 12m in section.

5.2.4 Phase 5: Early modern or modern

5.2.4.1 Several features of early modern or modern origin but unknown function were recorded in section in the north-eastern half of Trench 2. Feature [229] was situated close to the north-eastern limit of excavation and only its western edge was visible. It was exposed for a maximum width of 1.60m and was 0.90m deep and filled by crushed coal. To the south was feature [214], which measured 2.40m wide by 0.60m deep. The north-eastern edge of this feature had been truncated by a linear feature, [218], which was 3.0m wide by 0.80m deep. Its fill comprised silty clay with crushed coal with moderate pebbles and occasional crushed and fragmented brick throughout. While this feature corresponded with the central, upper part of the waggonway embankment, along which the tracks would have run, it was not possible to ascertain whether this was by design or was simply a coincidence. South-west of feature [214] was another linear feature, [211], 1.40m wide by 0.80m deep.

5.2.4.2 An extensive deposit, [202], comprising silty clayey sand with frequent fragmented stone throughout, was recorded intermittently across Trench 2, presumably representing a levelling dump. Its overall purpose may have been to raise and consolidate the ground level in this part of the site, possibly ahead of use of the former waggonway route as a road in the modern era. To the north-east this material overlay feature [229] and to the south-west it overlay deposit [203]. It varied in thickness from 0.10m to 0.70m, being at its thickest towards the centre of the trench. A concrete surface, [238], was noted on the south-eastern side of the trench (so not appearing in the drawn section) and this probably represents the aforementioned roadway, which was recorded in section (surface [431]) in Trench 4, to the south-east. In section, layer [202], was truncated by another feature, [207], of unknown function, which was 2.70m wide by 0.90m deep.

5.2.5 Phase 6: Modern (topsoil)

5.2.5.1 The uppermost deposit recorded in Trench 2 comprised topsoil, [201], which survived only intermittently in section along the length of the trench following clearance of ground level vegetation. It was up to 0.34m in thickness and the level at which it was encountered fell away down from 50.77m OD at the north-eastern end of the trench to 49.95m OD at the south-western end.

5.3 Trench 3 (Figure 5)

5.3.1 Phase 1: Natural sub-stratum

5.3.1.1 Natural boulder clay, [317], comprising firm, brownish orange clay was encountered across the extent of Trench 3. The highest and lowest levels at which this was recorded were 48.72m OD, recorded at the north-eastern end of the trench, and 48.32m OD, recorded at the south-western end, although the upper surface of the material undulated significantly due to the remains of ridge and furrow agricultural activity, as described below.

5.3.2 Phase 2: Post-medieval (ridge and furrow agriculture)

5.3.2.1 A group of four linear features, group number [318], aligned broadly NW-SE, was recorded in Trench 3, cutting into the natural sub-stratum. These are interpreted as the remains of ridge and furrow agriculture. The best-preserved furrow was located towards the south-western end of the trench, where in section it displayed a broad, shallow profile and was up to 2.50m wide and 0.24m deep. Although no dating evidence was recovered from any of the furrows, their relatively close-spacing, less than 5m apart, broadly indicates that they are of post-medieval origin.

5.3.2.2 The four furrows were filled with similar deposits of light brown clayey silt, numbered [311], [320], [321] and [322].

5.3.3 Phase 4: Early modern? (post-use of waggonway)

5.3.3.1 Towards the centre of Trench 3, furrow fill [320] was overlain by a 0.38m thick deposit, [314], comprising friable, greyish black crushed coal, with occasional coarse sandy lenses and fragments of brick throughout. This was recorded across the width of the trench and in section extended 2.10m NE-SW. The maximum height at which it was recorded was 48.92m OD.

5.3.3.2 To the west, deposit [314] had been truncated by a linear feature, [326], up to 1.70m wide by 0.40m deep, which was filled by a deposit, [319], comprising sand and crushed coal. In turn this had been truncated to the west by another linear feature, [325], 1.30m wide by 0.40m deep, filled by a deposit, [312], comprising greyish black sandy clay with frequent crushed and fragmented coal throughout.

5.3.3.3 Although any interpretation of these remains must remain tentative, due to the limited extent to which it was possible to examine them in section, the composition of deposit [314] and the fills of the two linear features suggest that this activity may be related to the branch waggonway that the trench was sited to test for. While no surviving evidence for any structural elements of the waggonway was recorded in Trench 3, it is possible that these remains represent abandonment and dismantling of the route.

5.3.4 Phase 5: Early modern or modern

5.3.4.1 Several deposits and features of early modern or modern origin were recorded throughout Trench 3. A group of ground levelling and consolidation deposits, [302], [306-309] and [316], were encountered across the north-eastern half of the trench and these had a combined maximum thickness of c. 0.80m. The latest deposit in this sequence, [302], a silty clay deposit with frequent coal fragments throughout, was also recorded at the south-western end of the trench, where it directly overlay the natural sub-stratum. Deposits [307], [308] and [316] contained varying quantities of crushed and fragmented coal, whilst the remaining deposits essentially comprised re-deposited natural clay.

5.3.4.2 Towards the central portion of Trench 3, the levelling deposits were truncated by a linear feature, [305], aligned roughly NW-SE and measuring 1.20m wide by 0.52m deep. Two ceramic drainage pipes, [323] and [324], remained *in situ* on the base of the feature, which had been backfilled with a silty clay deposit, [303], with a clayey silt deposit, [304], overlying the northern side of the feature. Deposit [303] yielded two coins, one a Queen Victoria penny dated 1897 and the other a King George V half crown dated 1924. In addition, the deposit contained a corroded cast-iron rail, probably a complete (*i.e.* unbroken) section, c. 915 mm/3 feet in length. The rail was flat-topped (c. 75mm/3 inches wide) and of the 'fish-bellied' type, with its centre (c. 13mm/5^{1/8} inches) deeper in section than the ends (c. 85mm/3^{1/2} inches). Due to its corroded state, no evidence of fixings or attachments could be distinguished at either end of the rail. This object, along with the two coins, is considered residual in context, although the rail certainly attests to the presence of a waggonway in the vicinity.

5.3.5 Phase 6: Modern (topsoil)

5.3.5.1 The uppermost deposit in Trench 3 comprised topsoil, [301], up to 0.24m thick, which was encountered at a maximum height of 49.40m OD at the north-eastern end of the trench but fell away to a height of 48.62m OD at the south-western end.

5.4 Trench 4 (Figures 6 and 8)

5.4.1 Phase 1: Natural sub-stratum

5.4.1.1 Natural sub-stratum, [452], comprising firm, mid yellowish brown clay, was recorded in the base of the north-easternmost two-thirds of Trench 4. The level at which this boulder clay was encountered fell away down from a height of 48.52m OD in the south-west to 47.60m OD in the north-east.

5.4.2 Phase 3: Late post-medieval? (construction of waggonway)

5.4.2.1 A group of timbers, [444], laid horizontal and aligned approximately NE-SW, were recorded lying upon natural boulder clay towards the centre of Trench 4. These timbers are interpreted as crude wooden sleepers onto which the rails of a waggonway track would have been secured. The timbers ran across the width of the trench, in plan extending for a distance of c. 2.50m. The largest timber was a slightly curved tree branch that measured 1280mm in length by 130mm wide and 120mm thick.

- 5.4.2.2 Two small rectangular features were positioned either side of the north-eastern end of the largest timber, cutting into the natural boulder clay. The first, [449], measured 80mm by 50mm and the second, [451], measured 60mm by 50mm. These features probably represent fixing points where the timber was held in place. However, it was evident that the timber itself had been somewhat disturbed, lying some distance to the south-west of its original, secured, position.
- 5.4.2.3 On the eastern side of and running parallel to the largest timber were three other timbers, the easternmost continuing into the limit of excavation. These largest of these measured 774mm by 143mm by 54mm, and all were, like the larger element already described, essentially unworked sections of tree branches. Another, similar timber lay to the north-west of the largest element of the group, this also continuing into the limit of excavation. The maximum height recorded on the group of timbers was 48.65m OD adjacent to the north-western section, and the minimum height, 48.56m OD, was recorded adjacent to the south-eastern section.
- 5.4.2.4 The timbers were overlain by a 0.27m thick deposit, [443], comprising fine but compact crushed coal, this probably representing ballast deposited over the sleepers to form a bedding/levelling deposit, as well as to protect the timbers. This was recorded across the width of the trench and extended for a distance of 3.56m along the trench, truncated to either side.
- 5.4.2.5 A distinctive and substantial deposit, [429], comprising firm, crushed coal and silt up to 0.44m thick, was recorded to the south-west of the timber sleepers, overlying the natural boulder clay. This was recorded across the width of the trench and extended for a distance of 4.0m along it, truncated at both sides. This material could represent a consolidated pathway running alongside the waggonway. On the north-eastern side of the timbers, again overlying natural clay was a similar deposit, [424], comprising firm, crushed coal and silty clay up to 0.36m thick. This extended along the trench for a distance of 6.40m in section, truncated at each end. An overlying deposit, [423], was of similar composition and up to 0.40m thick. This extended along the trench for a distance of c. 6.0m in section, again truncated at either end. A similar function is proposed as for layer [429] to the south-west, namely that these deposits material possibly represent a deliberately laid, consolidated pathway running alongside the waggonway.
- 5.4.2.6 Layer [429] and deposit [443] were truncated by a linear NW-SE aligned feature, [438], which was 4.30m wide and excavated to a maximum depth of 0.88m, further excavation being hampered by groundwater ingress. The maximum height at which this was recorded was 48.82m OD. This feature is interpreted as a trackside ditch running along the south-western side of the waggonway route. Its earliest excavated fill, [437], comprised clayey silt and crushed coal, which may represent the infilling and silting of the ditch during usage of the waggonway.

5.4.3 Phase 4: Early modern? (post-use of waggonway)

- 5.4.2.7 Several deposits within the vicinity of the waggonway are interpreted as probably having been deposited relatively soon after the waggonway fell into disuse and probably represent levelling and consolidation deposits. On the north-eastern side of the route and overlying layer Phase 3 layer [423] was a 0.17m thick deposit of crushed coal, [422], extending c. 1.30m in section but truncated to either side.

5.4.2.8 To the south-west, and overlying the waggonway itself, was a deposit, [442], comprising crushed coal up to 0.30m thick. This extended c. 1.65m in section, truncated to the north-east and petering out over the north-eastern side of the waggonway deposits to the south-west. On the south-western side of the waggonway, the uppermost fill, [436], of the trackside ditch comprised compact, crushed coal and silt up to 0.21m deep. The preferred interpretation is that this material was deposited after the waggonway had fallen into disuse for the purposes of ground levelling, in similar fashion to deposits [442] and [422], as previously described.

5.4.4 Phase 5: Early modern or modern

5.4.4.1 Numerous dump deposits, [406], [417], [421], [425-428], [432], [435] and [439-441], were recorded in section across Trench 4, these comprising mixed deposits with much crushed coal and brick rubble present. The overall purpose of activity must have been to raise and consolidate the ground level in this part of the site. A thin concrete surface, [431], extending c. 6.50m in section probably represents a crude roadway set out along the former waggonway route in the modern era. It was overlain by another dump deposit, [430].

5.4.4.2 Several substantial modern features were recorded in Trench 4. Towards the north-eastern end of the trench was a substantial linear feature, [412], 3.20m wide by at least 1.80m deep, housing a wide-bore iron sewage pipe, [411]. For the purposes of archaeological interpretation this feature could not have been more inconveniently located since it had evidently obliterated all remains of a trackside ditch on the north-eastern side of the waggonway - if such a ditch had ever been present.

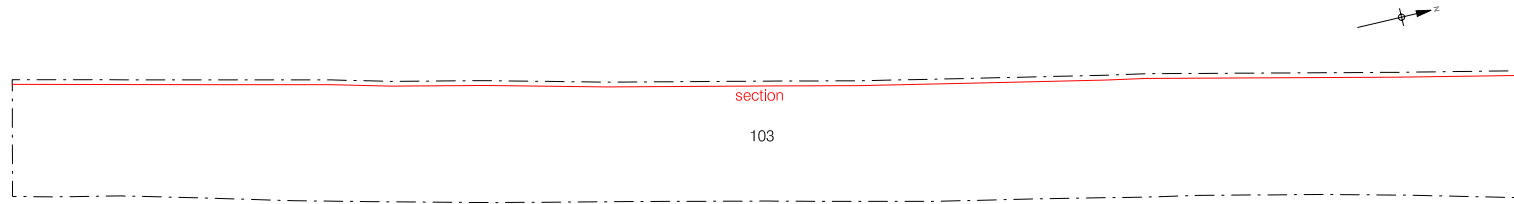
5.4.4.3 Further to the north-east was another pipe trench, [416], this truncated close to the north-eastern end of the trench by a linear feature, [447], at least 2.30m wide by 1.25m deep, but of unknown function. The latter feature was of some note due to the presence of what appeared to be a timber railway sleeper within its backfill, [446].

5.4.4.4 The south-western end of Trench 4 was dominated by a substantial linear feature, [405], which was 7.50m wide and was excavated to a maximum depth of 1.50m, with groundwater ingress preventing full excavation. A distinctive fill, [403], of firm, pinkish brown clay up to 0.45m thick appeared to have been used to suppress flooding of the feature prior to infill with a loose sandy rubble deposit, [404], more than 1.20m thick.

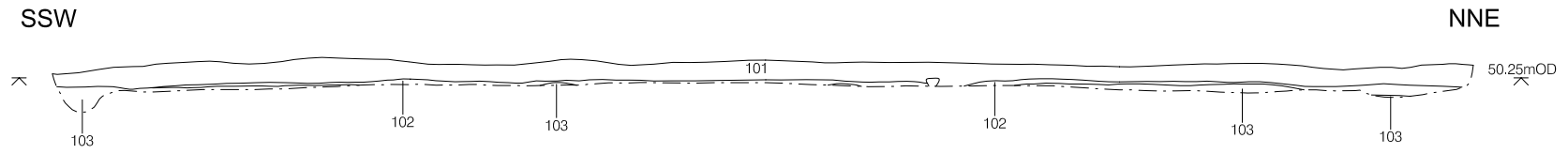
5.4.5 Phase 6: Modern (topsoil)

5.4.5.1 The uppermost deposit recorded in Trench 4 was topsoil, [401], up to 0.40m in thickness. This was recorded at a maximum height of 49.96m OD at the south-western end of the trench and was at a fairly consistent height along the remainder of the trench, with the exception of the north-eastern end where ground level fell away, this probably a result of landscaping at the time of the construction of the tyre factory.

30



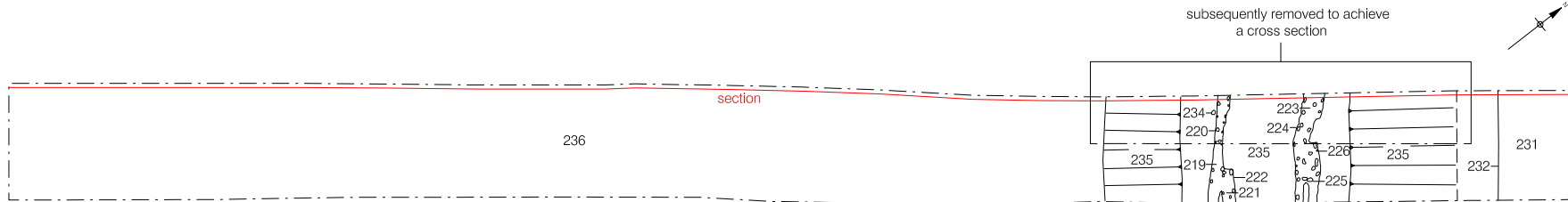
Trench 1. Plan.



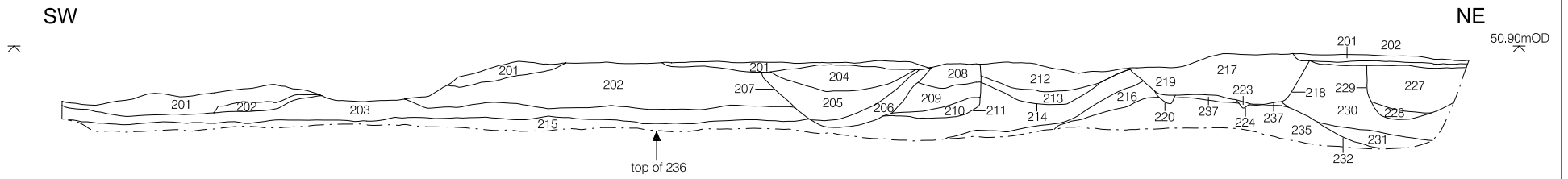
Trench 1. ESE facing section.



Figure 3. Trench 1, plan and section
Scale 1:100



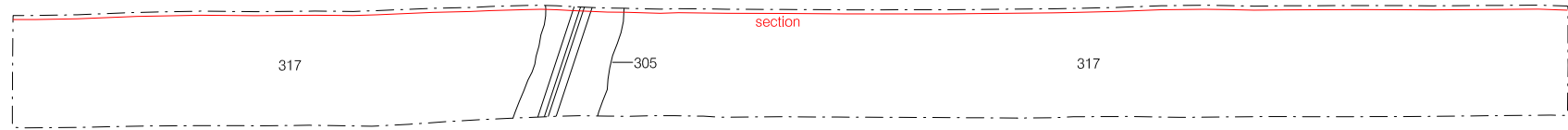
Trench 2. Plan.



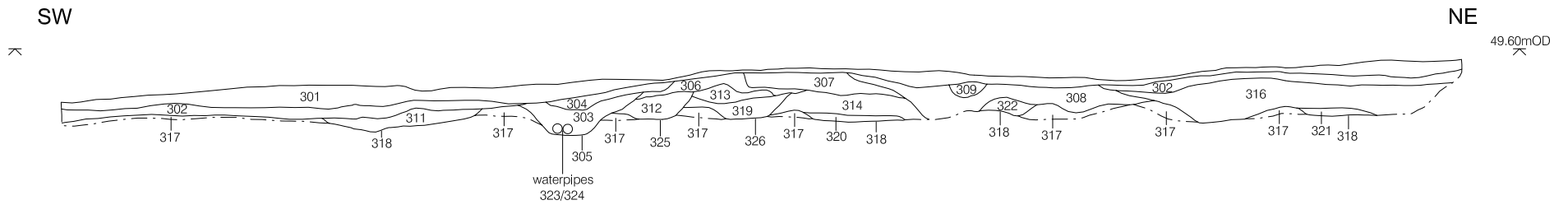
Trench 2. South-east facing section.



Figure 4. Trench 2, plan and section
Scale 1:100



Trench 3. Plan.



Trench 3. South-east facing section.

318 = group no. for furrows



Figure 5. Trench 3, plan and section
Scale 1:100



Plate 1. Trench 2, view looking south-west.



Plate 2. Trench 2, waggonway embankment [235], looking north-west (*1m scale*).



Plate 3. Trench 4, view looking north-east.



Plate 4. Trench 4, waggonway timbers [444], looking north-west (1m scale).

Figure 8.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

6.1.1 Archaeological remains recorded during the evaluation have been assigned to six phases of activity:

- Phase 1. The natural sub-stratum recorded in all trenches and of geological origin.
- Phase 2. Evidence for ridge and furrow agriculture of likely post-medieval date, recorded only in Trench 3.
- Phase 3. Remains associated with the construction and use of two colliery waggonways, recorded only in Trenches 2 and 4. These are essentially undated but broadly of later post-medieval or early modern industrial date. Their date of origin is proposed as the late 18th century.
- Phase 4. Remains associated with the dismantling of the waggonways and their immediate post-use, also recorded only in Trenches 2 and 4.
- Phase 5. Remains of early modern or modern origin, including ground levelling and consolidation deposits, as well as several service runs and other cut features of unknown function, recorded in Trenches 1, 2 and 4.
- Phase 6. Topsoil recorded in all trenches.

6.1.2 **Phase 2** remains - of likely post-medieval date - survived in poor condition. These remains are therefore considered to be of **low** archaeological significance.

6.1.3 **Phase 3** remains are considered to be of **high** archaeological significance, despite the lack of dating evidence recovered during the evaluation. Documentary and cartographic evidence for the site indicates that colliery waggonways were in place there by the late 18th century. By the time of the Tithe map in 1847, Fatfield Waggonway, running from south-east to north-west, entered the site along its southern boundary before dividing into three branches, each serving outlying workings of Harraton Outside Colliery, namely Hall Pit (located just beyond the north-western corner of the site), Anna Bella Pit (located to the north-west of the site and c. 0.5km distant) and, through further branching, Ayton/Noel/Judith/Engine Pits (all located to the north of the site and within 1km). By the time of the Ordnance Survey 2nd edition in the 1890s probably all of these workings were disused, although the waggonway routes which served Anna Bella Pit and Ayton Pit, *etc.*, possibly remained in use as pathways or crude roads.

6.1.4 The evaluation demonstrated good-excellent survival of remains of the waggonway route serving Anna Bella Pit (in Trench 2) and Fatfield Waggonway (in Trench 4). Although no convincing evidence of the Ayton Pit, *etc.* branch waggonway was encountered in Trench 3, which it had been sited to target, a raised earthwork running southwards of Trench 3, towards Trench 4, possibly represents a better preserved section of the feature. Trench 1, sited to test for the branch waggonway serving Hall Pit, contained no archaeological evidence of note. The portion of the site in which this trench was located has been certainly been landscaped in the modern era, and the evaluation indicates that this activity has destroyed all archaeological remains, including evidence of the waggonway, in this area.

- 6.1.5 Trench 4 contained the best-preserved waggonway evidence. A group of timbers interpreted as sleepers from the waggonway track were exposed upon natural boulder clay. Roughly trimmed branches had been utilised as sleepers, as is typically seen in 18th century waggonways since it was only necessary to square the extremities of the timbers.³⁶ The best-preserved sleeper measured 1280mm in length by 130mm wide and 120mm thick (c. 4 feet long by c. 5 inches square). Such dimensions are typical of North-East gauges in the late 18th to 19th centuries, with sleepers 4-8 inches square (100-200 mm) made from branches and generally trimmed only at the ends being well documented.³⁷ Similar sleepers were recorded at the well-preserved waggonway excavated at Lambton D Pit.³⁸ Here the sleepers comprised sections of oak tree branches, generally irregular in form and 1700-2000mm in length. A few sleepers also survived from the waggonway excavated at Rainton Bridge South and these also comprised roughly trimmed oak branches up to 1900mm in length and 180mm wide.³⁹
- 6.1.6 In general, sleeper length depended largely on the gauge of the waggonway rails, but as most gauges in the North-East were in the range 4 feet to 4 feet 6 inches (1230-1380mm), a length of around 6 feet (1820mm) was probably average for sleepers. There was considerable variation in the intervals at which sleepers were laid and this seems to have been dependant on the type of traffic that the waggonway was to carry. In two-track systems, main ways carried full vehicles to the staithes and bye ways returned the empty wagons. Main ways were the most solidly built and tended to have sleepers laid with their centres 1 foot 6 inches (450mm) apart, whilst bye ways and small branch tracks could have sleepers up to 3 feet (910mm) apart, although 2 feet (610mm) was more common. It was not possible to accurately determine the distance between the sleepers in Trench 4 as there had been some disturbance of the track, with the most substantial timber evidently no longer *in situ*, but the two timbers situated close to the north-eastern limit of excavation were 450mm apart. This spacing is broadly similar to that seen on the Lambton D Pit trackway which had sleepers set at variable distance, 400-850mm, due to the irregularity of the branches, and on the trackway at Rainton Bridge South which had sleepers set 400-600mm apart. The gauge of the track in Trench 4 could not be precisely determined from the surviving evidence.
- 6.1.7 The timber sleepers in Trench 4 were overlain by a layer of crushed coal, a typical construction technique for late post-medieval and early modern industrial era waggonways. This ballast performed several functions; it carried the weight of the traffic, drained water away from the wood, bound the framework together and protected the timbers from the elements and from the horses' hooves.⁴⁰ Crushed coal was also used as trackway ballast at Rainton Bridge South.

³⁶ Lewis 1970, 163.

³⁷ *ibid*, 164.

³⁸ Ayris *et al* 1998, 11.

³⁹ Glover 2005, 241.

⁴⁰ Lewis 1970, 163-4.

- 6.1.8 Trench 4 contained a NW-SE aligned linear feature running along the south-western side of the waggonway track, interpreted as a trackside drainage ditch. Such features were installed alongside waggonways to delineate the wayleave as well as to provide essential drainage, particularly necessary throughout the North-East given the widespread boulder clay natural sub-stratum. The ditch in Trench 4 appears particularly wide, at 4.30m, compared to trackside ditches recorded at Rainton Bridge South, which were up to only 1.50m wide. No evidence was recorded for a trackside ditch along the north-eastern side of the waggonway, but a substantial modern intrusion is likely to have removed all traces of it. To the south-west of the trackside ditch was a deposit of crushed coal and silt, extending at least 4.0m along the trench, which has been tentatively interpreted as representing a pathway running alongside the waggonway. With 14 yards (12.8m) documented as being the maximum permissible width for a waggonway at Harraton Outside Colliery in the late 18th century, a feature of such dimension seems entirely possible.
- 6.1.9 Trench 2 contained less well-preserved, but still significant, waggonway remains, these representing the Anna Bella Pit branch. A mound of redeposited boulder clay was recorded towards the north-eastern end of the trench, overlying the undisturbed sub-stratum. This represents a NW-SE aligned embankment along which the waggonway ran. It was 5.70m in width with a c. 2.50m wide central level part and was up to 0.54m high, tapering out to each side. The purpose of the embankment is proposed as being to maintain a consistent, suitable gradient for the waggonway. The pit head of Anna Bella Pit lay c. 0.5km to the north-west of the site and the waggonway crossed the site running south-eastwards to join Fatfield Waggonway, which continued on to staites on the River Wear. Localised topographical variations would have been evened out by in-cutting or embanking, as necessary. In the area of Trench 2 embanking was required; the level of the waggonway track there can be estimated as c. 50.10m OD. In Trench 4, c. 135m to the south-east, the waggonway timbers lay at c. 48.45m OD, some 1.65m lower. A deposit of clay overlying the central portion of the embankment is interpreted as the remnants of bedding material onto which timber sleepers would have been placed, although no timbers actually survived. Running alongside the north-eastern edge of the embankment was a NW-SE aligned linear feature, interpreted as the trackside ditch. This was at least 2m wide, continuing beyond the limit of excavation, and crushed coal within its fill was probably ballast disturbed from the trackway.
- 6.1.10 **Phase 4** activity comprised remains interpreted as being associated with abandonment and dismantling of the waggonways. As such, these features and deposits are considered to be of **moderate to high** archaeological significance as they have the potential to provide additional important evidence for the waggonways. Although no waggonway timbers survived *in situ* in Trench 2, a series of narrow NW-SE aligned linear features recorded on the clay embankment are interpreted as 'robber' trenches for the removal of waggonway rails.

- 6.1.11 No evidence for timber sleepers was encountered in Trench 2, which is somewhat curious, as the rails would have almost certainly been laid with sleepers. A possible explanation is that, in this area, the sleepers were spaced more than 1.50m apart. If true, this would have been an unusual arrangement, since the maximum known distance between waggonway sleepers in the North-East is 3 feet (910mm).⁴¹ If the rails had been without sleepers, simply bedded into the ground, this would have also been unusual - no such examples have been yet been excavated in the North-East. Further excavation of the waggonway could resolve this matter.
- 6.1.12 The 'robber' trenches for the waggonway rails, which presumably closely followed the original slots into which the rails were placed, lay c. 1.30m/4 feet 3 inches apart, which indicates a gauge of around this width, this falling within the average gauge for waggonways in the area, as previously discussed. Short sections of robber trench on the inside of the main south-western robber trench and on the outside of the main north-eastern robber trench could represent inner check rails to prevent wheels from leaving the tracks. Such features were recorded at Lambton D Pit, although interpretation at this site must remain tentative due to the limited degree to which it was possible to examine the features in the evaluation.
- 6.1.13 **Phase 5** activity comprised extensive ground levelling and consolidation dumps and a variety of cut features, including service trenches. All these remains are interpreted as being of late 19th century or later date and are of **very low** archaeological significance.
- 6.1.14 **Phase 6**, existing topsoil recorded in each trench, is of **negligible** archaeological significance.

6.2 Recommendations

- 6.2.1 The results of the trial trenching evaluation undertaken at the site demonstrate that further archaeological work is warranted at the site ahead of the proposed development. Significant new build is proposed in the south-eastern portion of the overall site and this could impact upon significant archaeological remains as recorded in Trenches 2 and 4. However, precise details of any proposed remediation and new build groundworks in this part of the site should be examined to determine whether or not there is a case for preservation *in situ* of important archaeological remains. Where this cannot be achieved, the remains must be recorded through the process of preservation by record, that is archaeological excavation, assessment of the site data and dissemination of the result in suitable format, in this case probably a published paper in an appropriated outlet, suggested as *Industrial Archaeology Review*.
- 6.2.2 This recommendation is supported by the comments of Jennifer Morrison, the Tyne and Wear Archaeology Officer, and Ian Ayriss, the County Industrial Archaeologist, both part of the Tyne and Wear Specialist Conservation Team, during a site monitoring visit (10 December 2008) during the evaluation herein described. The Conservation Team has responsibility for archaeological development control throughout Tyne and Wear, including in the City of Sunderland.

⁴¹ Lewis 1970, 165.

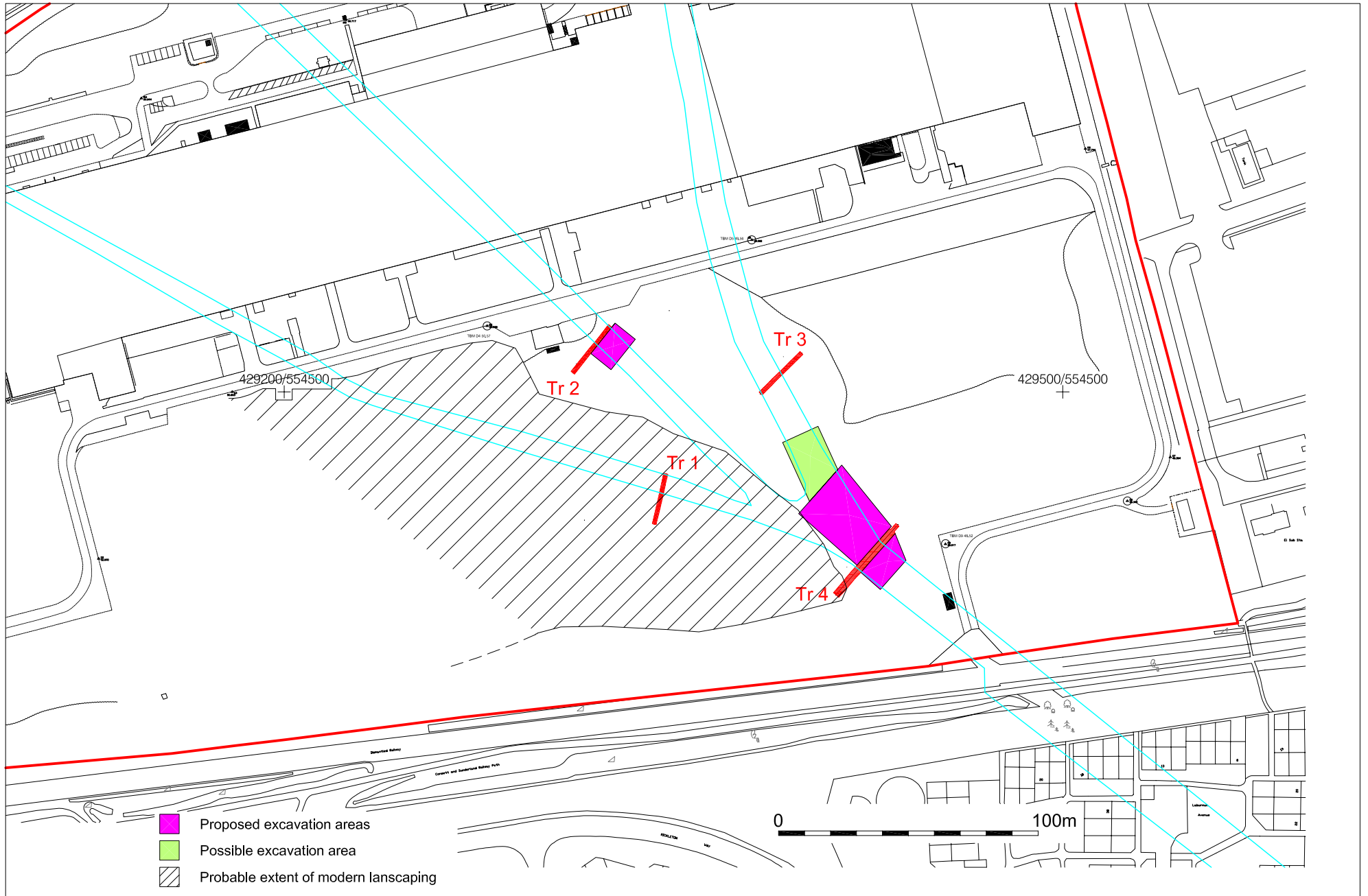


Figure 9. Proposed excavation areas
Scale 1:2,000

- 6.2.3 As discussed above, there have been only a small number of detailed archaeological investigations of colliery waggonways of late 18th century date. Excavation at two sites in Tyne and Wear has previously led to published papers, underlining the significance of such features in terms of later post-medieval and early modern industrial archaeology.
- 6.2.4 Based on the results of the evaluation, and taking into account the previously described on-site discussions with the Tyne and Wear Archaeology Officer and the County Industrial Archaeologist, the following scheme of further archaeological work is proposed for the site (Figure 9):
- Investigation of an open area to the south-east of Trench 2, extending c. 10m along the NW-SE line of the route of the Anna Bella Pit branch waggonway and up to c. 15m wide to take into account the likely maximum width of the waggonway wayleave. The mid point of this width is the centre of the waggonway embankment recorded in Trench 2. The purpose is to further expose the Anna Bella Pit branch waggonway and, through detailed archaeological excavation, recording and sampling, as appropriate, collect data to elucidate its date and form of construction and, if possible, to determine any variation in form through time and its date of abandonment.
 - Investigation of an open area to the south-east of Trench 4, extending c. 10m along the NW-SE line of the route of Fatfield Waggonway. It could be up to c. 15m wide at its south-eastern end to take in the likely maximum width of the waggonway wayleave, but up to c. 20m wide at its north-western end to take into account the convergence of Fatfield Waggonway and the branch running to the NNW. The purpose is to further expose Fatfield Waggonway and, through detailed archaeological excavation, recording and sampling, as appropriate, collect data to elucidate its date and form of construction and, if possible, to determine any variation in form through time and its date of abandonment.
 - Investigation of an open area to the north-west of Trench 4, extending c. 30m along the NW-SE line of the route of branching waggonways. It could be up to c. 20m wide at its south-eastern end to take into account the convergence of Fatfield Waggonway and the branch running to the NNW and up to c. 25m wide at its north-western end to take into account the convergence of Fatfield Waggonway and the two branches running to the NNW and north-west. The purpose is to further expose Fatfield Waggonway and examine the area in which the branch routes commenced and, through detailed archaeological excavation, recording and sampling, as appropriate, collect data to elucidate dates and forms of construction and, if possible, to determine a sequence of construction and any variations in form through time and dates of abandonment.

- Subject to the findings of the largest proposed area above, additional investigation could be undertaken in an open area extending up to c. 25m along the line of the branch route running to the NNW. It could be up to c. 15m wide to take into account the likely maximum width of the waggonway wayleave. The purpose would be to expose the branch waggonway running to the NNW and, through detailed archaeological excavation, recording and sampling, as appropriate, collect data to elucidate its date and form of construction and, if possible, to determine any variation in form through time and its date of abandonment.

6.2.5 Precise details of any further fieldwork and subsequent data assessment, as well as outline requirements regarding an appropriate level of final reporting/publication, should be described in a Specification drawn up by Tyne and Wear Archaeology Officer or - following guidelines set out in *Management of Research Projects in the Historic Environment* (MoRPHE)⁴² - in a Project Design compiled by PCA.

⁴²English Heritage 2006.

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8. ACKNOWLEDGEMENTS AND CREDITS

Acknowledgements

Pre-Construct Archaeology would like to thank Cundall for commissioning the archaeological evaluation herein described. The liaison role of Steven Garcia is acknowledged.

The input of Jennifer Morrison, the Tyne and Wear Archaeology Officer, and Ian Ayris, the Tyne and Wear County Industrial Archaeologist, is acknowledged.

PCA Credits

Project Manager: Robin Taylor-Wilson

Fieldwork: Mick Coates (Site Supervisor), Amy Roberts and Scott Vance.

Report: Jenny Proctor and Robin Taylor-Wilson

Illustrations: Adrian Bailey

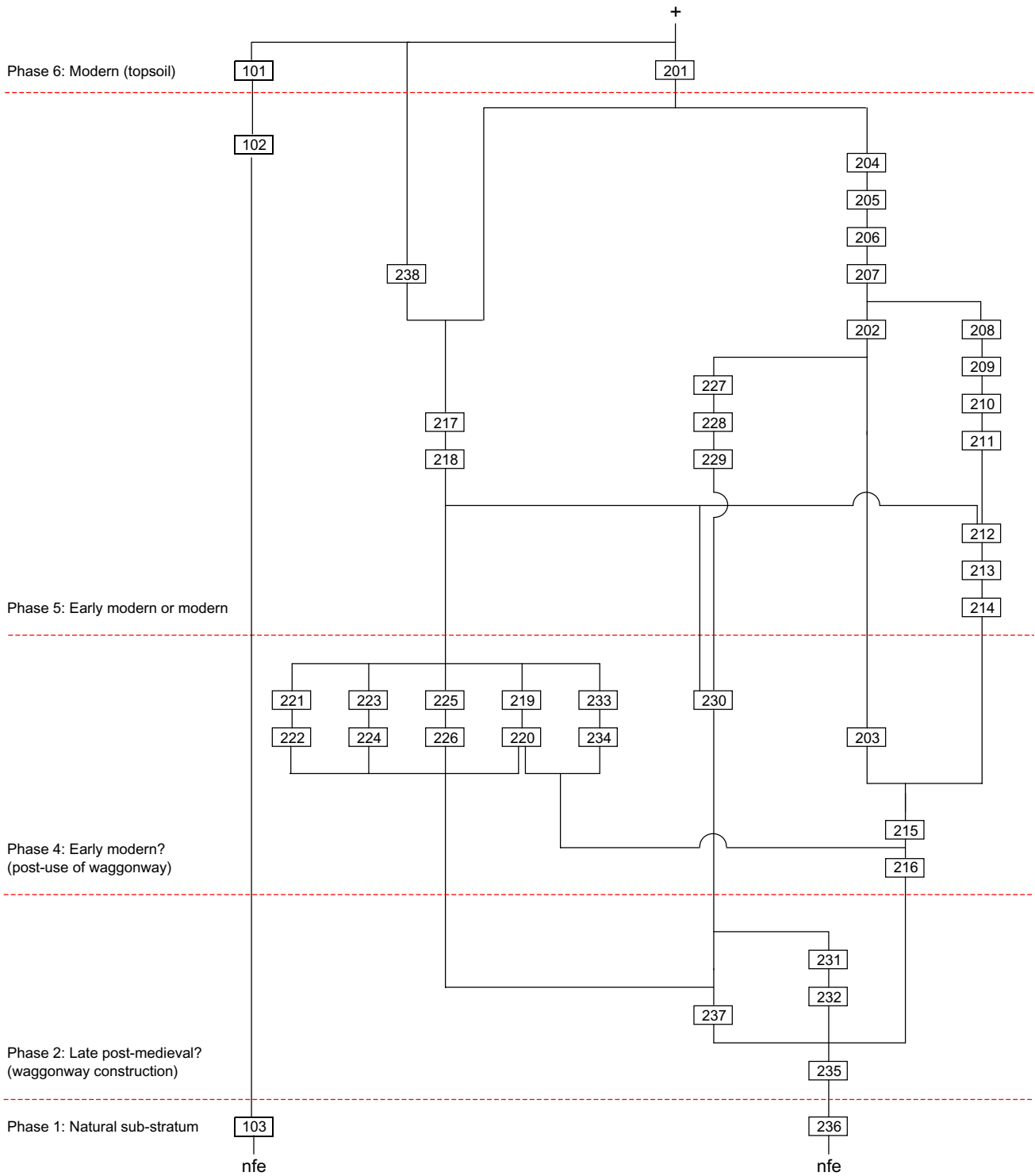
Other Credits

Survey: Jim Wright

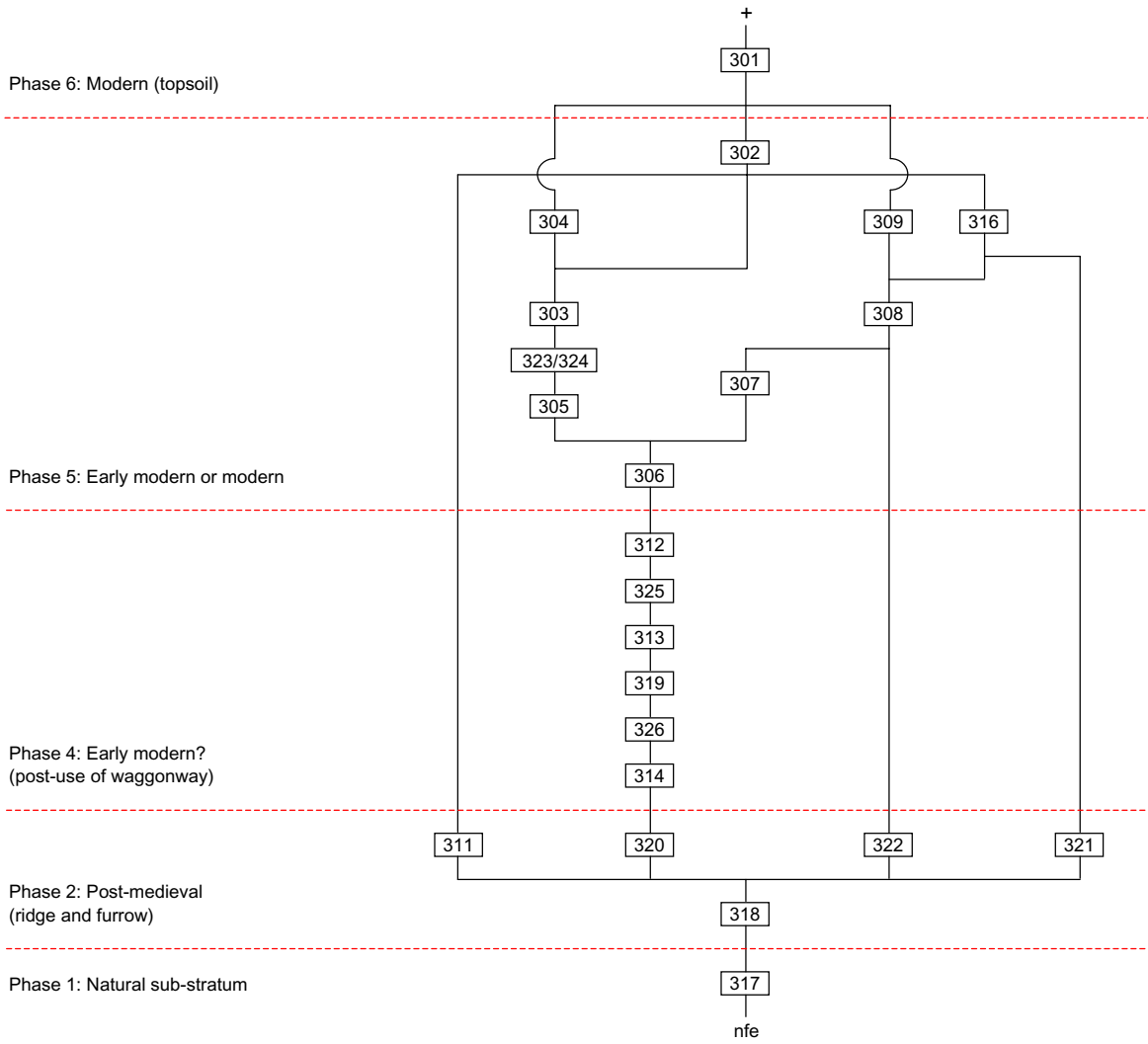
APPENDIX A
STRATIGRAPHIC MATRICES

TRENCH 1

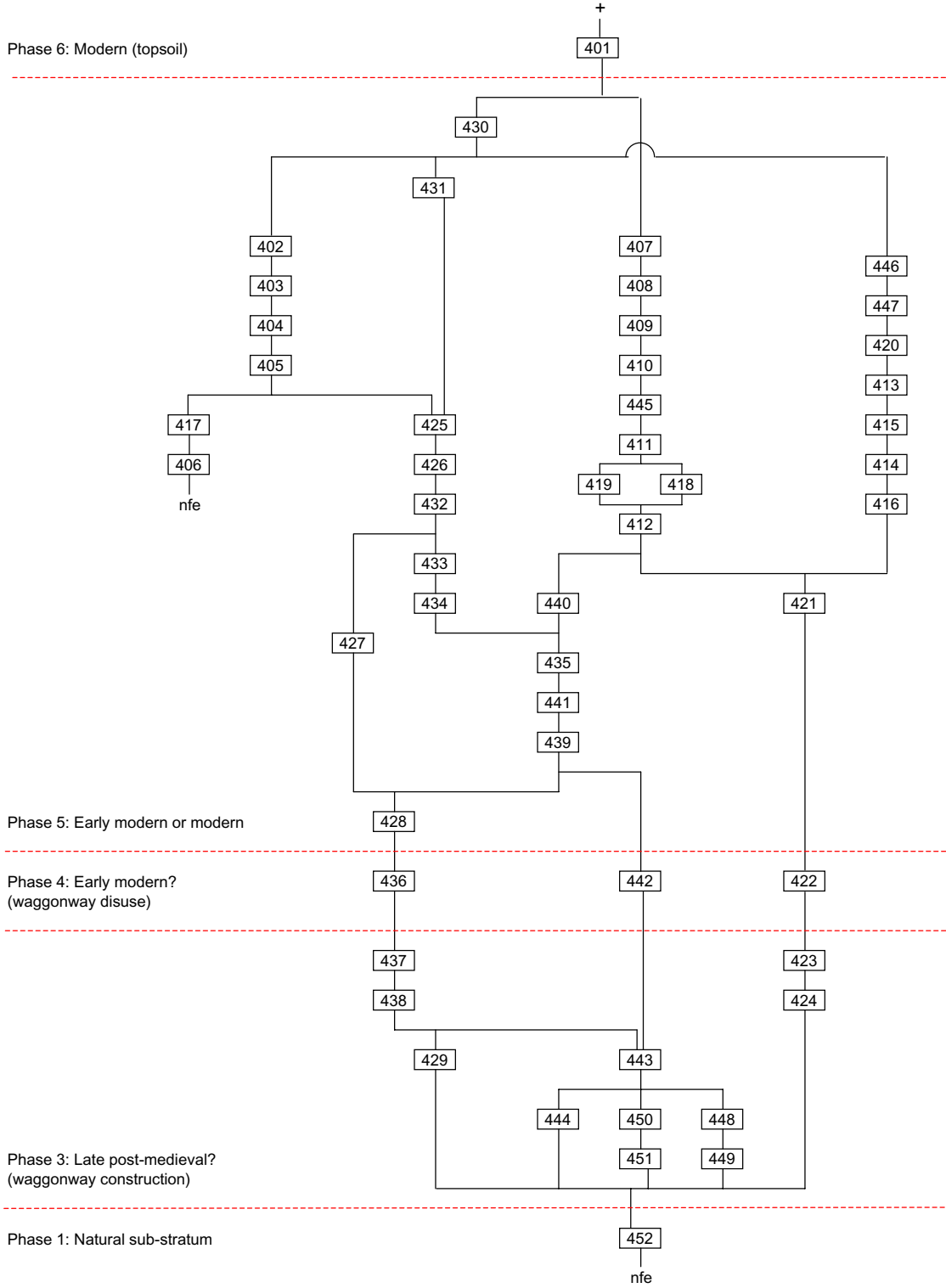
TRENCH 2



TRENCH 3



TRENCH 4



APPENDIX B
CONTEXT INDEX

Context No.	Trench	Phase	Type 1	Type 2	Interpretation
101	1	6	Deposit	Layer	Topsoil
102	1	5	Deposit	Layer	Dump deposit
103	1	1	Deposit	Layer	Natural boulder clay
201	2	6	Deposit	Layer	Topsoil
202	2	5	Deposit	Layer	Dump deposit
203	2	4	Deposit	Layer	Dump deposit
204	2	5	Deposit	Fill	Tertiary fill of [207]
205	2	5	Deposit	Fill	Secondary fill of [207]
206	2	5	Deposit	Fill	Primary fill of [207]
207	2	5	Cut	Linear	Unknown function, filled by [204], [205] and [206]
208	2	5	Deposit	Fill	Tertiary fill of [211]
209	2	5	Deposit	Fill	Secondary fill of [211]
210	2	5	Deposit	Fill	Primary fill of [211]
211	2	5	Cut	Linear?	Unknown function, filled by [208], [209] and [210]
212	2	5	Deposit	Fill	Secondary fill of [214]
213	2	5	Deposit	Fill	Primary fill of [214]
214	2	5	Cut	Linear	Unknown function, filled by [212] and [213]
215	2	4	Deposit	Layer	Dump deposit
216	2	4	Deposit	Layer	Dump deposit
217	2	5	Deposit	Fill	Fill of [218]
218	2	5	Cut	Linear	Unknown function, filled by [217]
219	2	4	Deposit	Fill	Fill of [220]
220	2	4	Cut	Linear	Robber cut for rail, filled by [219]
221	2	4	Deposit	Fill	Fill of [222]
222	2	4	Cut	Linear	Robber cut for rail, filled by [221]
223	2	4	Deposit	Fill	Fill of [223]
224	2	4	Cut	Linear	Robber cut for rail, filled by [223]
225	2	4	Deposit	Fill	Fill of [226]
226	2	4	Cut	Linear	Robber cut for rail, filled by [225]
227	2	5	Deposit	Fill	Secondary fill of [229]
228	2	5	Deposit	Fill	Primary fill of [229]
229	2	5	Cut	Linear	Unknown function, filled by [227] and [228]
230	2	4	Deposit	Layer	Dump deposit
231	2	3	Deposit	Fill	Fill of [232]
232	2	3	Cut	Linear	Waggonway drainage ditch, filled by [231]
233	2	4	Deposit	Fill	Fill of [234]
234	2	4	Cut	Discrete	Stakehole associated with waggonway, filled by [233]
235	2	3	Deposit	Layer	Waggonway embankment
236	2	1	Deposit	Layer	Natural boulder clay
237	2	3	Deposit	Layer	Bedding deposit
238	2	5	Deposit	Layer	Concrete roadway
301	3	6	Deposit	Layer	Topsoil
302	3	5	Deposit	Layer	Dump deposit
303	3	5	Deposit	Fill	Backfill of construction cut [305]
304	3	5	Deposit	Fill	Backfill of construction cut [305]
305	3	5	Cut	Linear	Service trench, filled by [323/324], [303], [304]
306	3	5	Deposit	Layer	Dump deposit
307	3	5	Deposit	Layer	Dump deposit
308	3	5	Deposit	Layer	Dump deposit
309	3	5	Deposit	Layer	Dump deposit
311	3	2	Deposit	Fill	Fill of [318]
312	3	4	Deposit	Fill	Fill of [325]
313	3	4	Deposit	Fill	Fill of [326]
314	3	4	Deposit	Layer	Dump deposit
316	3	5	Deposit	Layer	Dump deposit
317	3	1	Deposit	Layer	Natural boulder clay
318	3	2	Cut	Linear	Group number, furrows
319	3	4	Deposit	Fill	Fill of [326]
320	3	2	Deposit	Fill	Fill of [318]

Context No.	Trench	Phase	Type 1	Type 2	Interpretation
321	3	2	Deposit	Fill	Fill of [318]
322	3	2	Deposit	Fill	Fill of [318]
323	3	5	Structure	Pipe	Ceramic drain pipe in [305]
324	3	5	Structure	Pipe	Ceramic drain pipe in [305]
325	3	4	Cut	Linear	Possible dismantling of waggonway, filled by [312]
326	3	4	Cut	Linear	Possible dismantling of waggonway, filled by [319]
401	4	6	Deposit	Layer	Topsoil
402	4	5	Deposit	Fill	Upper fill of [405]
403	4	5	Deposit	Fill	Secondary fill of [405]
404	4	5	Deposit	Fill	Primary fill of [405]
405	4	5	Cut	Linear	Unknown function, filled by [402], [403] and [404]
406	4	5	Deposit	Fill	Dump deposit
407	4	5	Deposit	Fill	Upper fill of [412]
408	4	5	Deposit	Fill	Fill of [412]
409	4	5	Deposit	Fill	Fill of [412]
410	4	5	Deposit	Fill	Fill of [412]
411	4	5	Structure	Pipe	Iron drain/sewer pipe in [412]
412	4	5	Cut	Linear	Service trench
413	4	5	Deposit	Fill	Fill of [416]
414	4	5	Deposit	Fill	Fill of [416]
415	4	5	Deposit	Fill	Fill of [416]
416	4	5	Cut	Linear	Service trench
417	4	5	Deposit	Layer	Dump deposit
418	4	5	Masonry	Structure	Support for pipe [411]
419	4	5	Masonry	Structure	Support for pipe [411]
420	4	5	Deposit	Fill	Fill of [416]
421	4	5	Deposit	Layer	Dump deposit
422	4	4	Deposit	Layer	Dump deposit
423	4	3	Deposit	Layer	Dump deposit
424	4	3	Deposit	Layer	Dump deposit
425	4	5	Deposit	Layer	Dump deposit
426	4	5	Deposit	Layer	Dump deposit
427	4	5	Deposit	Layer	Dump deposit
428	4	5	Deposit	Layer	Dump deposit
429	4	3	Deposit	Layer	Dump deposit
430	4	5	Deposit	Layer	Dump deposit
431	4	5	Deposit	Layer	Concrete roadway
432	4	5	Deposit	Layer	Dump deposit
433	4	5	Deposit	Fill	Fill of [434]
434	4	5	Cut	Unknown	Unknown function, filled by [433]
435	4	5	Deposit	Layer	Dump deposit
436	4	4	Deposit	Fill	Fill of [438]
437	4	3	Deposit	Fill	Primary fill of [438]
438	4	3	Cut	Linear	Waggonway drainage ditch, filled by [436] and [437]
439	4	5	Deposit	Layer	Dump deposit
440	4	5	Deposit	Layer	Dump deposit
441	4	5	Deposit	Layer	Dump deposit
442	4	4	Deposit	Layer	Dump deposit
443	4	3	Deposit	Layer	Waggonway ballast
444	4	3	Timber	Horizontal	Group number, waggonway sleepers
445	4	5	Deposit	Fill	Fill of [412]
446	4	5	Deposit	Fill	Fill of [447]
447	4	5	Cut	Linear	Unknown function, filled by [446]
448	4	3	Deposit	Fill	Fill of [449]
449	4	3	Cut	Discrete	Waggonway fixing, filled by [448]
450	4	3	Deposit	Fill	Fill of [451]
451	4	3	Cut	Discrete	Waggonway fixing, filled by [450]
452	4	1	Deposit	Layer	Natural boulder clay

APPENDIX C
PROJECT SPECIFICATION

**SPECIFICATION FOR EVALUATION WORK TO RECORD SUSPECTED
ARCHAEOLOGICAL DEPOSITS AT DUNLOP TYRE FACTORY,
WEAR INDUSTRIAL ESTATE, WASHINGTON**

Introduction

An outline planning application has been submitted for a mixed use development (business, industrial and warehouse, hotel, public house and coffee shop) on the above site, following the demolition of the existing factory.

The site is centred on NZ 2926 5453.

An archaeological desk based assessment has been completed (Pre-Construct Archaeology Ltd, September 2008).

The appointed archaeologist must familiarise themselves with the results of previous archaeological work on the site before starting work.

The assessment concludes that a colliery at Harraton had a shaft possibly sunk as early as c. 1590. Harraton Colliery lay to the south of the development site and the general area was known as Harraton Outside Colliery.

Harraton Outside is mentioned in a volume of minutes dated 1727-1730 of the Grand Allies Partnership and in two leases, one dated 1778. These describe the coal workings and waggonways.

Gibson's map of 1788 shows two waggonways running through the area of the development site. Hobson's map of 1839 shows two waggonways and two pits. Bell's plan of 1843 shows three branches of the waggonway.

The Tithe map of 1847 shows Fatfield Waggonway dividing into three branches within the development site. Hall Pit and Engine Pit lie just outside the site boundary. The Stanhope Railway (later Pontop and South Shields branch of the North Eastern Railway) forms the southern boundary of the development site.

Oliver's map of 1851 shows two pits within the site, Milbank and Thorold. The name Milbank comes from Ralph Milbanke, who was associated with coal workings in Harraton Outside in the eighteenth century. Sir John Thorold of Lincolnshire acquired land in Harraton in 1730 on his marriage to Elizabeth Ayton of West Herrington (Ayton Pit lay north of the development site).

Ordnance Survey first edition of 1856 shows woodland in-between two of the branches of the waggonway. This survives today in expanded form. By the second edition of 1896 the outlying workings of Harraton Colliery were disused and the waggonways long abandoned.

Thus the development site has high potential for archaeological remains of the post-medieval and early modern eras, specifically three branches of Fatfield Waggonway that served outlying workings of Harraton Outside Colliery. The waggonways may be of late eighteenth century origin. There is also the potential for former workings of Milbank Pit and Thorold Pit but for health and safety reasons the pits need to be avoided by archaeological trenches.

The north part of the site is thought to have low archaeological potential due to terracing, particularly in the north-west. There is more potential for the survival of remains in the southern part of the site, particularly in the south-east in the woodland which potentially masks the route of two waggonways.

In accordance with PPG16 and UDP Policy B14 a programme of archaeological trial trenching is required.

Research Aims and Objectives

The evaluation should make reference to Regional and Thematic Research Frameworks.

The North-East Regional Research Framework for the Historic Environment (2006) notes the importance of research as a vital element of development-led archaeological work. It sets out key research priorities for all periods of the past allowing commercial contractors to demonstrate how their fieldwork relates to wider regional and national priorities for the study of archaeology and the historic environment. The aim of NERRF is to ensure that all fieldwork is carried out in a secure research context and that commercial contractors ensure that their investigations ask the right questions. The relevant key research themes for this evaluation are PM1 (early coal industry and coal use) and PM2 (early railways).

See <http://www.alqao.org.uk/Association/England/Regions/ResFwks.htm>

Ideally and where possible the evaluation should cross-reference its aims and objectives to national priorities, defined in SHAPE (Strategic Frameworks for Historic Environment Activities and Programmes in English Heritage), and the English Heritage Research Agenda 2005-2010.

Where appropriate note any similar nationwide projects using ADS, internet search engines, ALSF website, HEEP website, OASIS, NMR excavation index.

Other waggonways to be archaeologically excavated in Tyne and Wear include Lambton, Throckley, Rainton Bridge South, Wylam, Seaton Burn Waggonway.

All staff on site must understand the project aims and methodologies.

Methods statement

Five evaluation trenches are needed to inform the Planning Authority of the character, nature, date, depth, degree of survival of archaeological deposits on this site. The excavation must be carried out by a suitably qualified and experienced archaeological organisation. The work will record and environmentally sample any archaeological deposits of importance found on the plot. The purpose of this brief is to obtain tenders for this work. The report must be the definitive record for deposition in the Tyne and Wear HER, and it must contain recommendations for any further work needed on this site before development destroys any archaeological remains.

All staff employed by the Archaeological Contractor shall be professional field archaeologists with appropriate skills and experience to undertake work to the highest professional standards.

The work will be undertaken according to English Heritage Guidelines - Managing Archaeological Projects 2nd Edition ('MAP2') 1991 (www.english-heritage.org.uk/guidance/map2/index.htm) and Management of Research Projects in the Historic Environment (MoRPHE) – The MoRPHE Project Managers' Guide, Project Planning Notes and Technical Guides 2006 (www.english-heritage.org.uk/publications).

The work will be undertaken according to MoRPHE Project Planning Notes 2006 - PPN3 – Archaeological Excavation and PPN6 – Development of Procedural standards and guidelines for the historic environment.

All work must be carried out in compliance with the codes of practice of the Institute of Field Archaeologists and must follow the IFA Standard and Guidance for Archaeological Field Evaluations, revised 2001 www.archaeologists.net

Notification

The County Archaeologist needs to know when archaeological fieldwork is taking place in Tyne and Wear so that he can inform the local planning authority and can visit the site to monitor the work in progress. The Archaeological Contractor must therefore inform the County Archaeologist of the start and end dates of the Evaluation. He must also keep the County Archaeologist informed as to progress on the site. The CA must be informed of the degree of archaeological survival and of any significant finds. The Client will give the County Archaeologist reasonable access to the development to undertake monitoring.

PROJECT INITIATION

PROJECT DESIGN

Because this is a detailed specification, the County Archaeologist does not require a Project Design from the appointed archaeologist. However a health and safety statement and risk assessment, identifying potential risks in a risk log (see template in appendix 2 of The MoRPHE Project Manager's Guide) and specifying suitable countermeasures and contingencies, is required to be submitted to the commissioning client.

The Management of Research Projects in the Historic Environment (MoRPHE) – The MoRPHE Project Managers' Guide 2006 contains general guidance on Risk management (section 2.3.2, Appendix 2).

Risk assessments must be produced in line with legislative requirements and best practice e.g. as set out in the SCAUM (Standing Conference on Archaeological Unit Managers) Health and Safety Manual <http://www.scaum.org/uk>

The Archaeological Contractor must be able to provide written proof that the necessary levels of Insurance Cover are in place.

The Archaeological Contractor must detail measures taken to ensure the safe conduct of excavations, and must consult with the client's structural engineers concerning working in close proximity to the foundations of the surrounding buildings. The Client may wish to see copies of the Archaeological Contractor's Health and Safety Policies.

The Archaeological Contractor must maintain a Site Diary for the benefit of the Client, detailing the nature of work undertaken on a day by day basis, with full details of Site Staff present, duration of time on site, etc. and contact with third parties.

PROJECT EXECUTION

1) Archaeological evaluation

Suggested locations for the trenches are shown on the existing plan.

The trenches need to target the three branches of the waggonways but they can be adjusted for practical or health and safety purposes.

The area of Thorold Pit and Milbank Pit (see figure 17 in the desk based assessment) must be avoided by the trenches for health and safety reasons.

Some clearance of woodland is likely to be required. This will be organised by the commissioning client before the evaluation takes place. The commissioning client has confirmed that the trees are to be felled for the development and that they are not protected trees.

The dimensions of the trenches are in plan **at base**:

Trench One	2m x 20m
Trench Two	2m x 20m
Trench Three	2m x 20m
Trench Four	2m x 35m

Trenches can be widened if feasible in order to step the sides to reach depths over 1.2m where necessary, otherwise shoring will be required.

Trench positions should be accurately surveyed prior to excavation and tied in to the national grid.

The trenches should be excavated to the depth of natural subsoil.

Tasks

Hand excavation, recording and environmental sampling (as stipulated below) of deposits down to the depth specified above.

Any modern overburden or levelling material can be machined-off using a wide toothless ditching bucket under strict archaeological supervision and the remaining deposits are to be excavated by hand.

Excavation is to be carried out with a view to avoid damage to any archaeological features which appear to worthy of preservation in-situ.

Excavation is to be carried out by single context planning and recorded on *pro forma* context sheets. Features over 0.5 m in diameter can be half sectioned.

Environmental sampling (and where relevant scientific dating) are compulsory parts of the evaluation exercise. All tenders will give a price for the assessment, full analysis, report production and publication per environmental and scientific dating sample as a contingency.

Scientific investigations should be undertaken in a manner consistent with “The Management of Archaeological Projects”, English Heritage 1991 and with “Archaeological Science at PPG16 Interventions: Best Practice for Curators and Commissioning Archaeologists”, English Heritage, 2003. Advice on the sampling strategy for environmental samples and samples for scientific dating etc. must be sought from Jacqui Huntley, English Heritage Regional Advisor for Archaeological Science (jacqui.huntley@english-heritage.org.uk or 07713 400387) **before** the evaluation begins. See Appendix 1 for more information.

See Appendix 2 for guidance on procedures relating to human remains.

See Appendix 4 for guidance on Treasure Act procedures.

The spoil can be kept close-by and rapidly backfilled into the trenches at the conclusion of this work.

Recording

A full written, drawn (accurate scale plans, elevations and section drawings) and photographic record (of all contexts in black and white print and colour transparency with clearly visible graduated metric scale) will be made.

Pro-forma context sheets will be used.

All deposits and the base of the trench will be levelled. Levels will be expressed as metres above Ordnance Datum.

Stratigraphy shall be recorded even when no archaeological features have been recognised.

A 'Harris' matrix will be compiled where stratified deposits are recorded.

2) Post-excavation and report production

Finds Processing and Storage

Finds shall be recorded and processed in accordance with the IFA Guidelines for Finds Work

Finds will be assessed by an experienced finds specialist.

Human and animal bone assemblages should be assessed by a recognised specialist (see Appendices 2 and 3 for more information).

The Archaeological Contractor will process and catalogue the finds in accordance with Museum and Galleries Commissions Guidelines (1992) and the UKIC Conservation Guidelines, and arrange for the long term disposal of the objects on behalf of the Client. A catalogue of finds and a record of discard policies, will be lodged with the finds for ease of curation.

Assessment should include x-radiography of all iron objects (after initial screening to exclude recent debris) and a selection of non-ferrous artefacts (including all coins). Refer to "Guidelines on the x-radiography of archaeological metalwork, English Heritage, 2006.

If necessary, pottery sherds and bricks should be recommended for Thermoluminescence dating.

Finds processing, storage and conservation methods must be broadly in line with current practice, as exemplified by the IFA "Standard and guidance for the collection, documentation, conservation and research of archaeological materials", 2001. Finds should be appropriately packaged and stored under optimum conditions, as detailed in the RESCUE/UKIC publication "First Aid for Finds" (Watkinson and Neal 1998). Proposals for ultimate storage of finds should follow the UKIC publication "Guidelines for the Preparation of Excavation Archives for Long-term Storage" (Walker 1990). Details of methodologies may be requested from the Archaeological Contractor.

Other useful guidance – "A Strategy for the Care and Investigation of Finds", English Heritage, 2003, "Finds and Conservation Training Package", English Heritage, 2003.

All objects must be stored in appropriate materials and conditions to ensure minimal deterioration. Advice can be sought from Jacqui Huntley of English Heritage (0191 3341137 or 07713 400387) where necessary.

PRODUCTS

The report

1. The Archaeological Contractor must produce an interim report of 200 words minimum, two weeks after the completion of the field-work, for the Client and the Planning Authority, with a copy for information to the County Archaeologist. This will contain the recommendations for any further work needed on site.
2. The production of Site Archives and Finds Analysis will be undertaken according to English Heritage Guidelines - Managing Archaeological Projects 2nd Edition ('MAP2') 1991 and Management of Research Projects in the Historic Environment (MoRPHE) 2006.
3. A full archive report or post-excavation assessment, with the following features should be produced within six months of the completion of the field-work. All drawn work should be to publication standard. The report must include:

- * Location plans of trenches and grid reference of site
 - * Site narrative – interpretative, structural and stratigraphic history of the site
 - * Plans showing major features and deposit spreads, by phase, and section locations
 - * Sections of the two main trench axes and through excavated features with levels
 - * Elevation drawings of any walls etc. revealed during the excavation
 - * Artefact reports – full text, descriptions and illustrations of finds
 - * Tables and matrices summarising feature and artefact sequences.
 - * Archive descriptions of contexts, grouped by phase (not for publication)
 - * Deposit sequence summary (for publication/deposition)
 - * Colour photographs of trenches and of archaeological features and finds
 - * Laboratory reports and summaries of dating and environmental data, with collection methodology.
 - * A consideration of the results of the field-work within the wider research context (ref. NERRF).
 - * Recommendations for further work on site, or further analysis of finds or environmental samples
 - * Copy of this specification
4. Three bound and collated copies of the report need to be submitted:
- one for the commissioning client
 - one for the planning authority (Sunderland City Council) – this must be given to the commissioning client, as the applicant has to submit this formally to the planning authority with a fee
 - one for deposition in the County HER at the address below. A digital copy of the report on CD is also required by the HER in a plastic case. Please do not attach this to the report.

The report and CD for the HER must be sent by the archaeological consultant or their client directly to the address below. If the report is sent via the planning department, every page of the report will be stamped with the planning application number which ruins the illustrations. The HER is also often sent a photocopy instead of a bound colour original which is unacceptable.

Publication

If significant archaeological features are found during the evaluation, the results may also warrant publication in a suitable archaeological journal. The tender should therefore include an estimated figure for the production of a short report of, for example 20 pages, in a journal such as *Archaeologia Aeliana*, the *Arbeia Journal*, *Industrial Archaeology Review* or *Durham Archaeological Journal*. This is merely to give the commissioning client an indication of potential costs.

Before preparing a paper for publication, the archaeological contractor must discuss the scope, length and suitable journal with the County Archaeologist.

Archive Preparation and Dissemination

The archive should be a record of every aspect of an archaeological project – the aims and methods, information and objects collected, results of analysis, research, interpretation and publication. It must be as complete as possible, including all relevant documents, records, data and objects {Brown, 2007, 1}.

The site archive (records and materials recovered) should be prepared in accordance with *Managing Archaeological Projects*, Second Edition, 5.4 and appendix 3 (HBMC 1991), MoRPHE Project Planning Notes 2006 PPN3 – Archaeological Excavation, “Archaeological documentary archives” IFA Paper No. 1, “Archaeological Archives –

creation, preparation, transfer and curation” Archaeological Archives Forum etc., Guidelines for the Preparation of Excavation Archives for Long Term Storage (UKIC 1990) and “Archaeological Archives – A guide to best practice in creation, compilation, transfer and curation” by Duncan H. Brown, Archaeological Archives Forum, July 2007.

Documentary Archive

The documentary archive comprises all records made during the archaeological project, including those in hard copy and digital form.

This should include written records, indexing, ordering, quantification and checking for consistency of all original context sheets, object records, bulk find records, sample records, skeleton records, photographic records (including negatives, prints, transparencies and x-radiographs), drawing records, drawings, level books, site notebooks, spot-dating records and conservation records, publication drafts, published work, publication drawings and photographs etc.

A summary account of the context record, prepared by the supervising archaeologist, should be included.

All paper-based material must at all times be stored in conditions that minimise the risk of damage, deterioration, loss or theft.

Do not fold documents

Do not use self-adhesive labels or adhesive or tape of any kind

High quality paper (low-acid) and permanent writing materials must be used.

Original drawings on film must be made with a hard pencil, at least 4H.

Do not ink over original pencil drawings.

Use polyester based film for drawings (lasts longer than plastic).

Store documents in acid-free, dust-proof cardboard boxes

Store documents flat

All documents must be marked with the project identifier (e.g. site code) and/or the museum accession number.

All types of record must use a consistent terminology and format.

Use non-metal fastenings, and packaging and binding materials that ensure the longevity of documents.

Copies of reports and appropriate drafts, with associated illustrative material, must be submitted for inclusion with the archive.

Material Archive

The material archive comprises all objects (artefacts, building materials or environmental remains) and associated samples of contextual materials or objects.

All artefacts and ecofacts retained from the site must be packed in appropriate materials.

All finds must be cleaned as appropriate to ensure their long-term survival

All metal objects retained with the archive must be recorded by x-radiograph (except gold or lead alloys or lead alloys with a high lead content and objects too thick to be x-rayed effectively e.t.c.)

All finds must be marked or labelled with the project and context identifiers and where relevant the small-finds number

Use tie-on rot-proof labels where necessary

Bulk finds of the same material type, from the same context, may be packed together in stable paper or polythene bags

Mark all bags on the outside with site and context identifiers and the material type and include a polyethylene label marked with the same information

Use permanent ink on bags and labels

Sensitive finds must be supported, where appropriate, on inert plastic foam or acid-free tissue paper. It is not advisable to wrap objects in tissue as the unwrapping could cause damage.

The archive will be placed in a suitable form in the appropriate museum (typically Museum of Antiquities for Newcastle and Tyne and Wear Museums for the rest of Tyne and Wear (check with these institutions) with the landowner's permission.

A letter will be sent to the County Archaeology Officer within six months of the report having been submitted, confirming where the archive has been deposited.

Digital Archive

See MoRPHE Technical Guide 1 – Digital Archiving & Digital Dissemination 2006.

SIGNPOSTING

OASIS

The Tyne and Wear County Archaeologist supports the Online Access to the Index of Archaeological Investigations (OASIS) project. This project aims to provide an online index/access to the large and growing body of archaeological grey literature, created as a result of developer-funded fieldwork.

The archaeological contractor is therefore required to register with OASIS and to complete the online OASIS form for their evaluation at <http://www.oasis.ac.uk/>. Please ensure that tenders for this work takes into account the time needed to complete the form.

Once the OASIS record has been completed and signed off by the HER and NMR the information will be incorporated into the English Heritage Excavation Index, hosted online by the Archaeology Data Service.

The ultimate aim of OASIS is for an online virtual library of grey literature to be built up, linked to the index. The unit therefore has the option of uploading their grey literature report as part of their OASIS record, as a Microsoft Word document, rich text format, pdf or html format. The grey literature report will only be mounted by the ADS if both the unit and the HER give their agreement. The grey literature report will be made available through a library catalogue facility.

Please ensure that you and your client understand this procedure. If you choose to upload your grey literature report please ensure that your client agrees to this in writing to the HER at the address below.

For general enquiries about the OASIS project aims and the use of the form please contact: Mark Barratt at the National Monuments Record (tel. 01793 414600 or

oasis@english-heritage.org.uk). For enquiries of a technical nature please contact: Catherine Hardman at the Archaeology Data Service (tel. 01904 433954 or oasis@ads.ahds.ac.uk). Or contact the Tyne and Wear Archaeology Officer at the address below.

The tender

Tenders for the work should contain the following:-

1. Brief details of the staff employed and their relevant experience
2. Details of any sub-contractors employed
3. A quotation of cost, broken down into the following categories:-
 - * Costs for the excavation, incl. sub-headings of staff costs on a person-day basis, transport, materials, and plant etc.
 - * Post-excavation costs, incl. storage materials
 - * Cost of Environmental analysis and scientific dating per sample
 - * Estimated cost for full publication of results in an archaeological journal
 - * Overheads
4. An indication of the required notification period (from agreement to start date) for the field-work; the duration of fieldwork and the expected date for completion of the post-excavation work (a maximum of 6 months after completion of the fieldwork)

Monitoring

The Archaeological Contractor will inform the County Archaeologist of the start and end dates of the excavation to enable the CA to monitor the work in progress.

Should important archaeological deposits be encountered, the County Archaeologist must be informed. If further archaeological evaluation is required on this site, then the archaeological contractor must submit a written scheme of investigation for approval by the CA before extending the size of the trenches.

APPENDICES

1 Environmental Sampling and Scientific Dating

This is a compulsory part of the evaluation exercise.

Scientific investigations should be undertaken in a manner consistent with “The Management of Archaeological Projects”, English Heritage 1991 and with “Archaeological Science at PPG16 Interventions: Best Practice for Curators and Commissioning Archaeologists”, English Heritage, 2003.

Aims of environmental sampling – to determine the abundance/concentration of the material within the features and how well the material is preserved, to characterise the resource (the site) and each phase, to determine the significance of the material and its group value, what crop processing activities took place on the site? What does this tell us about the nature of the site? Is there any evidence for changes in the farming practice through time? How did people use this landscape? Can we place certain activities at certain locations within the site? Function and date of individual features such as pits, hearths etc. Are the charred assemblages the result of ritual deposition or rubbish? Is the charcoal the result of domestic or industrial fuel?

Advice on the sampling strategy for environmental samples and samples for scientific dating etc. must be sought from Jacqui Huntley, English Heritage Regional Advisor for Archaeological Science (0191 3341137 or 07713 400387) **before** the evaluation begins. The sampling strategy should include a reasoned justification for selection of deposits for sampling.

Deposits should be sampled for retrieval and assessment of the preservation conditions and potential for analysis of biological remains (English Heritage 2002). Flotation samples and samples taken for coarse-mesh sieving from dry deposits should be processed at the time of fieldwork wherever possible. Sieving recovers fish, amphibian, small bird and mammal bone, small parts of adult mammals and young infused bones which may be under-represented otherwise. However it is noted that clay soils in this region make sieving difficult. Discuss the potential for sieving with Regional Advisor for Archaeological Science.

Environmental samples (bulk soil samples of 30 litres volume, to be sub-sampled at a later stage) will be collected by the excavator from suitable (i.e. uncontaminated) deposits. It is suggested that a large number of samples be collected during evaluation from which a selection of the most suitable (uncontaminated) can be processed. All tenders will give a price for the full analysis, report production and publication per sample.

Deposits will be assessed for their potential for radiocarbon, archaeomagnetic (guidance is available in the Centre for Archaeology Guideline on Archaeometallurgy 2001) and Optically Stimulated Luminescence dating. Timbers will be assessed for their potential for dendrochronology dating. Sampling should follow procedures in "Dendrochronology: guidelines on producing and interpreting dendrochronological dates", Hillam, 1998. All tenders will quote the price of these techniques per sample.

The following information should be provided with the environmental samples to be processed – brief account of nature and history of the site, aims and objectives of the project, summary of archaeological results, context types and stratigraphic relationships, phase and dating information, sampling and processing methods, sample locations, preservation conditions, residuality/contamination etc.

Laboratory processing of samples shall only be undertaken if deposits are found to be reasonably well dated, or linked to recognisable features and from contexts the derivation of which can be understood with a degree of confidence.

A range of features, and all phases of activity, need to be sampled for charred plant remains and charcoal. Aceramic features should not be avoided as the plant remains from these features may help to date them. Deep features should be sampled in spits to pick up changes over time. Part, or all of each of the contexts should be processed. In general samples should be processed in their entirety. All flots should be scanned, and some of the residues.

Pollen samples can be taken from features such as lakes, ponds, palaeochannels, estuaries, saltmarshes, mires, alluvium and colluvium, and from waterlogged layers in wells, ditches and latrines etc. Substances such as honey, beer or food residues can be detected in vessels. Activities such as threshing, crop processing and the retting of flax can be identified. When taken on site, pollen samples should overlap. Your regional science advisor can advise on the type of corer or auger which would be most appropriate for your site. Samples need to be wrapped in clingfilm and kept dark and cool. Make a description of the sediments in which the pollen was found, and send this with the sample to be assessed.

Coastal or estuary sites (even those which are now well drained) are suitable for sampling for foraminifera. Diatoms can also be found on marine sites, but also in urban settings (sewers, wells, drains, ditches etc). They only survive in waterlogged conditions. These aquatic microfossils are used as proxy indicators of the former aquatic ecological conditions on site, changes in sea levels and temperature, salinity, PH and pollution. Forams are taken from cores, monolith tins or bulk samples. Diatoms are cut from monolith tins or cores or taken as spot samples.

Insects, which are useful as palaeoenvironmental indicators, survive best in waterlogged deposits such as palaeochannels and wells. They can provide information on climate change and landscape reconstruction as some species are adapted to particular temperatures, habitats or even particular trees. Certain insects can indicate the function of a feature or building (eg. Weevils, which were introduced by the Romans, often indicate granary sites, parasites will indicate the presence of

particular animals such as sheep or horse, latrine flies survive in the mineral deposits in latrines, or in the daub of medieval buildings etc). Samples need to be sealed (eg. in a plastic box).

Where there is evidence for industrial activity, macroscopic technological residues should be collected by hand. Separate samples should be collected for micro-slugs (hammer-scale and spherical droplets). Guidance is available in the English Heritage "Archaeometallurgy" guidelines, 2001.

Buried soils and sediment sequences should be inspected and recorded on site by a recognised geoarchaeologist. Procedures and techniques in the English Heritage document "Environmental Archaeology", 2002 and "Geoarchaeology", 2004 should be followed.

Sampling strategies for wooden structures should follow the methodologies presented in "Waterlogged wood. Guidelines on the recording, sampling, conservation and curation of waterlogged wood" R. Brunning, 1996. If timbers are likely to be present on your site, contact a wood specialist beforehand. Pre-excavation planning – determine questions to ask, agree on a sampling strategy, allocate reasonable time and budget. Soil samples should be taken of the sediments surrounding the timber. Keep the timbers wet! Record them asap on-site – plan, photograph, record the size and orientation of the wood (radial, tangential, transverse), any toolmarks, joints, presence of bark, insect damage, recent breaks, and if another piece of wood was on top of or below the piece sampled. Both vertical and horizontal positioning of wood must be recorded. Wood samples can provide information on woodland management such as medieval coppicing, type of taxa (native or foreign), conversion technology (how the wood was turned into planks), building techniques and type of tools used.

Waterlogged organic materials should be dealt with following recommendations in "Guidelines for the care of waterlogged archaeological leather", English Heritage and Archaeological Leather Group 1995.

2 Animal Bone

Animal bone can explore themes such as hunting and fowling, fishing, plant use, trade network, seasonality, diet, butchery, animal husbandry, food procurement, age structures, farrowing areas, species ratios, local environment.

Domestic animal bone was used in prehistoric and Roman cremation rituals.

Post medieval cattle bones – small cow bones invariably represent animals which produced high quality buttermilk for cheese. Big 'improved' cattle with large bones were produced for large quantities of meat and poorer quality milk. Large and small cattle bones are often found together on post medieval sites, usually with less of the small bones.

Animal bone assemblages should be assessed by a recognised specialist.

The specialist will need to know a brief account of the nature and history of the site, an account of the purpose, methods (details of sampling) for recovery of animal bones, and the main aims and results of the excavation, details of any specific questions that the excavator wants the animal bone specialist to consider, information about other relevant finds from the excavation (e.g. bone tools, fishing equipment, weaving equipment), specific information about each context that has produced significant quantities of animal bone (recovery method, phase, context type, position in relation to major structures, contamination by more recent material, some indication of the amount of bone (by weight or by container size). See "Ancient Monuments Laboratory Advisory Note, "Assessment of animal bone collections from excavations", Sebastian Payne, 1991 and "The Assessment of a collection of animal bones", S. Davis, n.d., Ancient Monuments Laboratory.

Fish bone – there was some herring exploitation in the early medieval period. Christian fasting from around 970 allowed fish to be eaten on Fridays which led to a

huge demand for fish. There was an increase in marine fishing, fish trade and fish consumption (cod, haddock, ling, herring etc) around 1000 AD. Middens provide evidence of commercial fishing. There was a decline in freshwater fish (cyprinid or carp, salmon, smelt, eel, pike) from the eleventh century.

Smoking fish is a recent practice. They were previously air dried and salted.

Newcastle was a major port. Samples should be sieved to retrieve fish and bird bones along with small parts of other animal skeletons and young infused bones.

A crane bone was recovered from excavations at Tuthill Stairs, Newcastle – a rare find.

Herring bones are so small that they can only be retrieved by 2mm sieving.

Clay soils are difficult to sieve, hot water can help.

Acidic soils mean poor preservation of bone.

See English Heritage 2002, "Environmental Archaeology – a guide to the theory and practice of methods from sampling and recovery to post excavation", Centre of Archaeology Guideline 1.

Isotope analysis can determine where the fish were coming from – North Sea, Scandinavia, Newfoundland, Iceland etc.

There is an excellent reference collection of fish bone at York.

Fish bones should be archived to museums for future dating and isotope analysis where this is not undertaken as part of the post-excavation process.

www.fishlab.org

3 Human Remains

Human remains must be treated with care, dignity and respect.

Excavators must comply with the relevant legislation (essentially the Burial Act 1857) and local environmental health concerns. If found, human remains must be left in-situ, covered and protected. The archaeological contractor will be responsible for informing the police, coroner and County Archaeologist. If it is agreed that removal of the remains is essential, the archaeological contractor will apply for a licence from the Home Office and their regulations must be complied with.

Site inspection by a recognised osteologist is desirable for isolated burials and essential for cemeteries. The remains will be recorded in-situ and subsequently lifted, washed in water (without additives). They will be marked and packed to standards compatible with "Excavation and post-excavation treatment of cremated and inhumed human remains", McKinley and Roberts, 1993. After excavation, the remains will be subject to specialist assessment.

Analysis of the osteological material should take place according to published guidelines "Human Remains from Archaeological Sites, Guidelines for producing assessment documents and analytical reports, English Heritage, 2002.

Some of the potential benefits from the study of human skeletons – demography, growth profiles, patterns of disease, genetic relationships, activity patterns, diet, burial practices, human evolution. New scientific techniques available include DNA and stable isotope analyses.

Diseases which yield ancient DNA – leprosy, syphilis, tuberculosis, mycobacterium bovis (animal form of TB passed to humans when they shared a living space from Neolithic period onwards).

Cremation destroys the crown of the tooth so it cannot be dated (the closure of the cranium vault can be used in adults for dating instead). Cremation also fragments bone, distorts it due to lack of water, shrinks the bone, causes microstructural alteration and destroys organic components (so DNA analysis not possible).

The final placing of the remains after scientific study and analysis will be agreed beforehand.

Further guidance is available in:

“Guidance for best practice for treatment of human remains excavated from Christian burial grounds in England”, The Church of England and English Heritage, 2005 (www.english-heritage.org.uk/upload/pdf/16602_HumanRemains1.pdf)
“Church Archaeology: its care and management”, Council for the Care of Churches, 1999

The Advisory Panel on the Archaeology of Christian burials in England can provide free well-informed advice with consideration of relevant religious, ethical, legal, archaeological and scientific issues. Panel’s website:
<http://www.britarch.ac.uk/churches/humanremains/index.html>
or email the secretary simon.mays@english-heritage.org.uk

4 Treasure

Defined as:

- Any metallic object, other than a coin, provided that at least 10% by weight of metal is precious metal and that is at least 300 years old when found
- Any group of two or more metallic objects of any composition of prehistoric date that come from the same find
- All coins from the same find provided that they are at least 300 years old when found, but if the coins contain less than 10% gold or silver there must be at least ten
- Any object, whatever it is made of, that is found in the same place as, or had previously been together with, another object that is Treasure
- Any object that would previously have been treasure trove, but does not fall within the specific categories given above. Only objects that are less than 300 years old, that are made substantially of gold or silver, that have been deliberately hidden with the intention of recovery and whose owners or heirs are unknown will come into this category

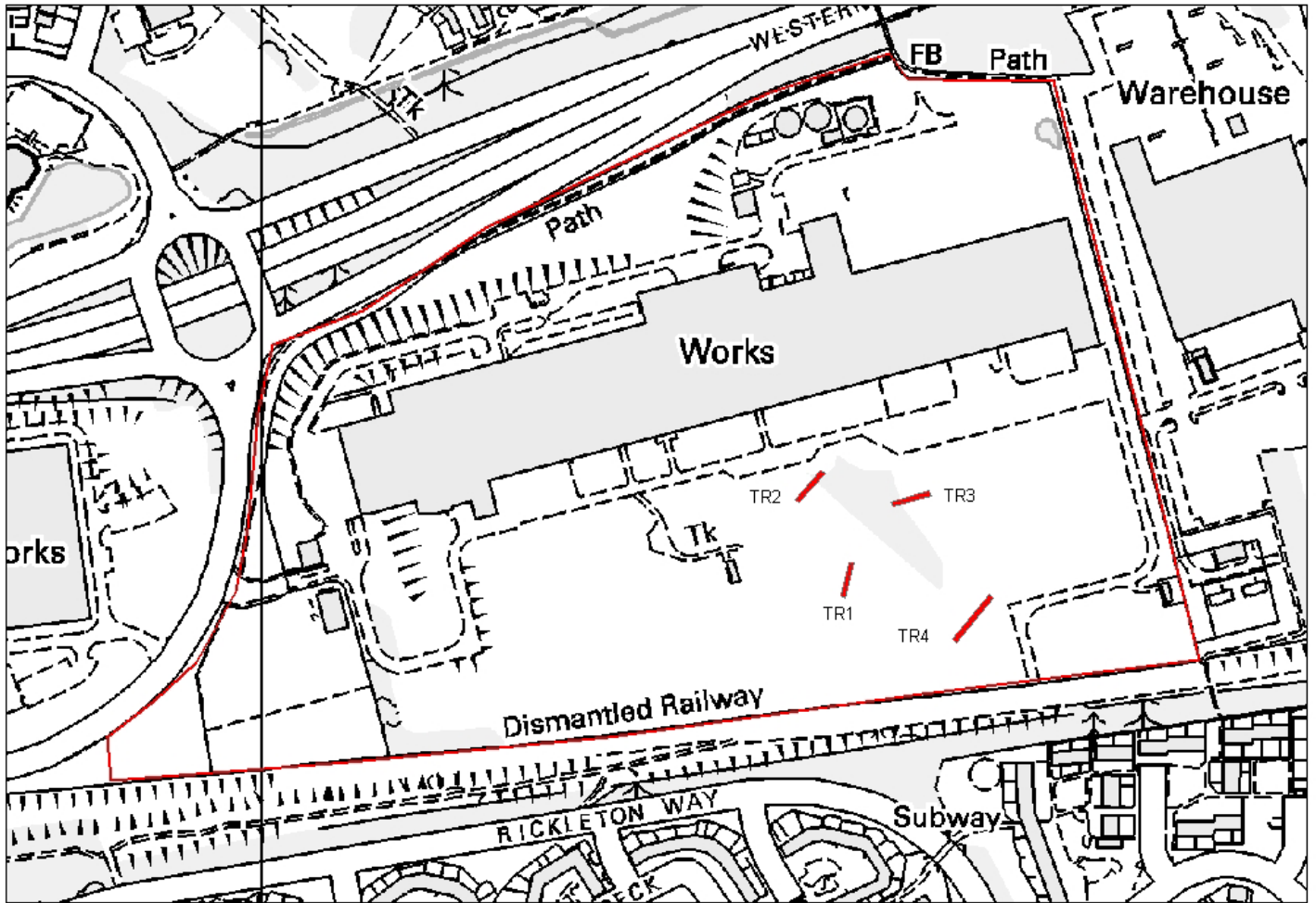
If anything is found which could be Treasure, under the Treasure Act 1996, it is a legal requirement to report it to the local coroner within 14 days of discovery. The Archaeological Contractor must comply with the procedures set out in The Treasure Act 1996. Any treasure must be reported to the coroner and to The Portable Antiquities Scheme Finds Liaison Officer, Rob Collins (0191 2225076 or Robert.Collins@newcastle.ac.uk) who can provide guidance on the Treasure Act procedures.

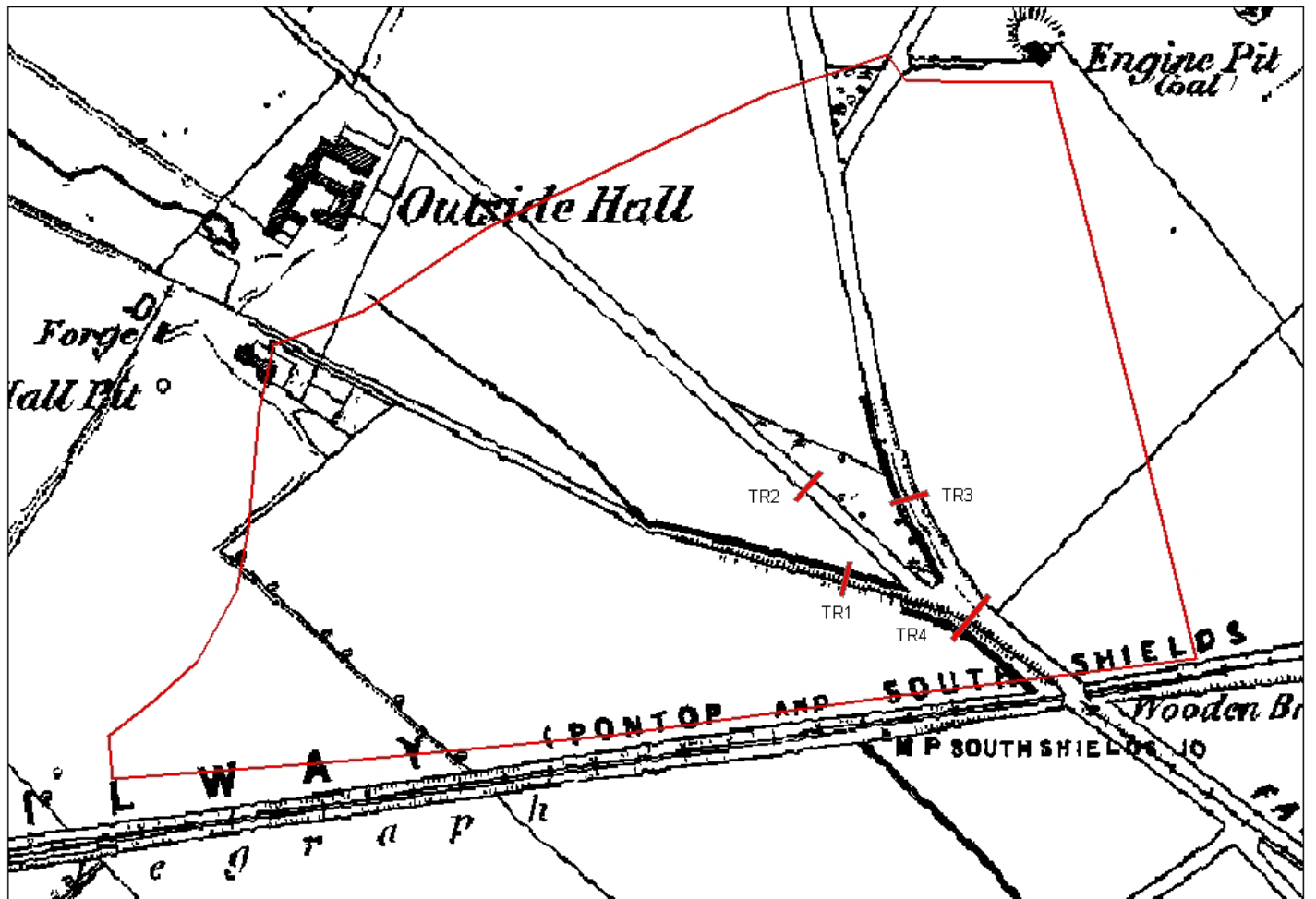
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Ref: MON6742
11 November 2008

Planning Application: 08/03879/OUT





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LA.076244

Suggested location of archaeological trenches at
Dunlop Tyre Factory, Washington

1:3,000

OS first edition 1856