



WILLOWHOLME WASTEWATER TREATMENT WORKS, CUMBRIA

Archaeological Desk- Based Assessment



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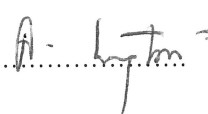
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Prepared by: Kelly Clapperton
Position: Supervisor
Date: December 2012

Checked by: Alan Lupton
Position: Operations Manager
Date: December 2012

Signed.....

Approved by: Alan Lupton
Position: Operations Manager
Date: December 2012

Signed.....

Oxford Archaeology North

Mill 3, Moor Lane Mills
Moor Lane
Lancaster
LA1 1GF
t: (0044) 01524 541000
f: (0044) 01524 848606

w: www.oxfordarch.co.uk
e: info@oxfordarch.co.uk

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Janus House
Osney Mead
Oxford
OX2 0EA
t: (0044) 01865 263800
f: (0044) 01865 793496

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SUMMARY

United Utilities propose to put in an application for an extension of the Willowholme Wastewater Treatment Works, Carlisle, Cumbria, including the construction of trickling filters, humus tanks, a sludge storage tank and pumping station, odour control units, and associated pipelines, access roads, and structures. The proposed development is situated to the immediate north of the current sewage works, and within an area of archaeological sensitivity. To the south, and skirting across the south-west corner of the current works, runs the line of Hadrian's Wall (Site **01**; SAM **CU2819**). Its significance is reflected by its designation as a World Heritage Site, and it is protected as a Scheduled Ancient Monument. Associated features have often been found to the north and the south of the wall, often outside the Scheduled area. As well as the potential for Roman archaeology, recent excavations for the CNDR, further east along the River Eden, have revealed extensive prehistoric remains, indicating potential for other similar remains in the proposed development area. The area also contains sites dating to the post-medieval industrial growth of Carlisle.

As a result of the high archaeological potential of the proposed development site, it was recommended by the Cumbria County Council Historic Environment Services (CCCHES) that a rapid archaeological desk-based assessment and site visit be undertaken prior to the commencement of any groundworks. In response to a verbal brief issued by the CCCHES, Oxford Archaeology North (OA North) was commissioned to undertake the requested programme of archaeological assessment. The desk-based assessment comprised a search of both published and unpublished records held by the Historic Environment Record (HER) in Kendal, the County Record Office in Carlisle, and the archives and library held at OA North. A site visit was also carried out across the proposed development, in order to relate the landscape and surroundings to the results of the desk-based assessment.

In all, 11 sites were identified in the study area. All have been identified on the HER. These comprise a findspot consisting of several finds dating from the prehistoric to Roman periods (**07**), a second Roman findspot (**02**), Hadrian's Wall (Site **01**), which has been designated a Scheduled Ancient Monument (SAM **CU28196**), and a World Heritage Site; Etterby Wath medieval ford (Site **06**), and seven sites dating to the post-medieval period (**03-05**, **08-11**). Of the 11 sites encountered only three may be directly affected by the proposed development: potential associated features with Hadrian's Wall (Site **01**), including the ditch to the north of the Wall; findspot **02**, Roman Samian ware found in the area would indicate potential unknown Roman activity; and Site **03**, the early sewage treatment works.

A site visit revealed that the area of the proposed development has been heavily truncated over recent years, and was the location of a former sludge-bed. This was annotated on earlier editions of the Ordnance Survey maps, and consultation with an United Utilities employee suggested that the feature could exceed 4m in depth.

This would imply that any sub-surface archaeological remains would not have survived the development of the earlier wastewater works, and that the ground will be heavily contaminated by effluent. It is, therefore, recommended that an archaeological watching brief should take place at the onset of the groundworks to confirm the depth of the previous impact. If, as seems likely, the former sludge-bed is more than 4m in

depth and no archaeological deposits survive, then the monitoring should be suspended.

ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank United Utilities for commissioning the project. Thanks are also due to Jo MacKintosh at Kendal HER, all the staff of the County Record Office in Carlisle, and to Andrew Mack at the Willowholme Wastewater Treatment Works, Carlisle, for their assistance with this project.

The desk-based assessment was undertaken by Kelly Clapperton, with the drawings produced by Anne Stewardson. The project was managed by Alan Lupton, who also edited the report.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF PROJECT

- 1.1.1 United Utilities propose to put in an application for an extension of the Willowholme Wastewater Treatment Works, Carlisle, Cumbria, including the construction of trickling filters, humus tanks, a sludge storage tank and pumping station, odour control units, and associated pipelines, access roads, and structures (Fig 2).
- 1.1.2 The proposed development is situated to the immediate north of the current sewage works, and within an area of archaeological sensitivity. To the south, and skirting across the south-west corner of the current works, runs the line of Hadrian's Wall. Its significance is reflected by its designation as a World Heritage Site, and it is protected as a Scheduled Ancient Monument (SAM **CU2819**). The wall is part of a complex frontier system, and associated features have been found to the north and the south of the wall, often outside the Scheduled area. The entire development sits within the Visual Impact Zone of the Hadrian's Wall World Heritage Site (OA North 2008a). As well as the potential for Roman archaeology, recent excavations for the Carlisle Northern Development Route (CNDR), further east along the River Eden, have revealed extensive prehistoric remains, indicating potential for other similar remains in the proposed development.
- 1.1.3 As a result of the high archaeological potential of the proposed development site, it was recommended by the Cumbria County Council Historic Environment Services (CCCHES) that a rapid archaeological desk-based assessment and site visit be undertaken prior to the commencement of any groundworks. In response to a verbal brief issued by the CCCHES, Oxford Archaeology North (OA North) was commissioned to undertake the requested programme of archaeological assessment.
- 1.1.4 The desk-based assessment comprised a search of both published and unpublished records held by the Historic Environment Record (HER) in Kendal, the County Record Office in Carlisle, and the archives and library held at OA North. In addition to this, a site visit was carried out across the proposed development, in order to relate the landscape and surroundings to the results of the desk-based assessment. This report sets out the results of the desk-based assessment in the form of a short document, outlining the findings, followed by a statement of the archaeological potential and significance, and an assessment of the impact of the proposed development. The scheduling criteria employed by the Secretary of State to understand the importance of a site (Annex 1; DCMS 2010) has been used during this assessment to determine the significance of the archaeological resource and any impact.

1.2 LOCATION, TOPOGRAPHY AND GEOLOGY

- 1.2.1 The proposed development site is located on the south-side of the River Eden, to the north of the current wastewater treatment works, and to the west of Port Carlisle Branch Junction railway (centred NGR NY 38852 56701, Fig 1). It occupies low-lying flat land, at approximately 13m AOD, with the city of

Carlisle to the south and east, flat, arable farmland to the north of the Eden, and the confluence of the rivers Eden and Caldew to the east.

- 1.2.2 Carlisle itself is situated on the Cumbrian Plain, approximately 13km from the Solway Firth, with the historic core located close to the confluence of the Eden and Caldew. The original city grew up on a promontory of land, bounded to the floodplain of the River Eden to the north and north-east, and the scarp of the Caldew to the west. The castle itself has occupied a bluff on this scarp since the twelfth century.
- 1.2.3 The solid geology of the area comprises soft, red Triassic St Bees sandstone of the Sherwood Sandstone Group, which lies above the Permian St Bees shales, which in turn is overlain by the less extensive grey Kirklington sandstone (British Geological Survey 1982; McCarthy *et al* 1990). A section of this sandstone outcrops into a triangular bluff, which is occupied by the medieval castle. The overlying drift geology comprises orange-pink boulder clay. Work done in 1998, to the east of the proposed development site, found a pre-Roman channel of the River Eden located approximately 300m to the south of the current course (OA North 2002). Although the precise location of the earlier river is not known in this area, evidence would suggest that it was further to the south than the current course (OA North 2008a).

2. METHODOLOGY

2.1 PROJECT DESIGN

- 2.1.1 OA North was commissioned to undertake the archaeological desk-based assessment and site visit in response to a verbal brief issued by the CCCHES. The work was consistent with the standards and procedures of the Institute for Archaeologists (IfA 2008 and 2010) and English Heritage (2006), and generally accepted best practice.

2.2 DESK-BASED ASSESSMENT

- 2.2.1 A study area, approximately 300m in radius, was assessed for its archaeological potential. Sources consulted included the Historic Environment Record (HER), published and unpublished documentary evidence, and cartographic data, including historic maps and early editions of the Ordnance Survey. A site visit was also undertaken to put the development site into its physical context. All this information will be collated in gazetteer in *Section 4*. The results were analysed using the set of criteria used to assess the national importance of an ancient monument (DCMS 2010).
- 2.2.2 ***Cumbria Historic Environment Record (HER):*** the Cumbria HER, held in Kendal, is a database of all known archaeological sites within the county, and is maintained by Cumbria County Council. It was consulted to establish which sites of archaeological interest are present within the study area, and to assess their character and extent. A descriptive note of each site was obtained and added to the gazetteer (*Section 4*), then located on a plan (Fig 3).
- 2.2.3 ***County Record Office (CRO), Carlisle:*** the CRO was visited to consult primary sources related to the study area, namely historic maps and plans, including early editions of the Ordnance Survey. These allowed the historical development of the landscape to be studied through a process known as map regression analysis.
- 2.2.4 ***Oxford Archaeology North:*** OA North has an extensive archive of secondary sources relevant to the study area, as well as numerous unpublished client reports on work carried out both as OA North and in its former guise of Lancaster University Archaeological Unit (LUAU). These were consulted where necessary.

2.3 SITE VISIT

- 2.3.1 A site visit of the proposed development area was undertaken, as requested in the verbal brief. An assessment of the physical context was carried out, with results located in relation to the National Grid on a large-scale map, and a digital photographic record was compiled during the visit. A brief synopsis of the results of the visit is detailed in *Section 3.5*.

3. HISTORICAL BACKGROUND

3.1 INTRODUCTION

- 3.1.1 The following section presents a summary of the historical and archaeological background of the general area. This is presented by historical period, and has been compiled in order to place the study area into a wider archaeological context.

Period	Date Range
Upper Palaeolithic	30,000 – 10,000 BC
Mesolithic	10,000 – 4,000 BC
Neolithic	4,000 – 2,500 BC
Bronze Age	2,500 – 700 BC
Iron Age	700 BC – AD 43
Romano-British	AD 43 – AD 410
Early Medieval	AD 410 – AD 1066
Late Medieval	AD 1066 – AD 1540
Post-medieval	AD 1540 – c1750
Industrial Period	cAD1750 – 1901
Modern	Post-1901

Table 1: Summary of British archaeological periods and date ranges

3.2 BACKGROUND

- 3.2.1 **Prehistoric Period:** until quite recently it was thought that there was very little early prehistoric presence around Carlisle, with the majority of material being transient in nature (Caruana and Cherry 1994; Fell 1990; Richardson 2000). Recent excavations for the Carlisle Northern Development Route (CNDR), however, have produced substantial evidence of early prehistoric activity across the area (OA North 2011a and 2011b). Approximately 1km to the west of the proposed development site, across the Eden at Stainton West, a large, complex sequence of deposits, carbon-dated from the Late Mesolithic to Late Bronze Age, was discovered in a palaeochannel on a Holocene terrace (OA North 2011a). Significant quantities of waterlogged wood, some worked, lithics and wood and ceramic artefacts were recovered. Adjacent to the channel was a further large assemblage of lithics, associated with tree-throws, hearths and putative structures, and indicating a possible settlement (*ibid*). Applied dates ranged from the Early Mesolithic to the Early Bronze Age. Along the banks of the channel possible burnt mounds were identified, with pits producing fire-cracked stones, and dates from the Late Neolithic to Early Bronze Age (*ibid*).

- 3.2.2 Further sites dating to the prehistoric period were identified along the CNDR. The majority of these are associated with locales within or adjacent to the floodplain of the Eden, and included a Neolithic hengiform, similar to Mayburgh and King Arthur's Round Table near Penrith (OA North 2011b). Bronze Age activity was identified across the scheme, including roundhouse settlements, field systems, pits and a segmented ditch, suggesting extensive settlement throughout this period (*ibid*). In comparison, however, there is a distinct lack of Iron Age and pre-Roman activity, which corresponds to trends across the region at this time. Nevertheless, there is evidence that some of the field systems continued in use, as a ditch produced material suggesting it had been functioning from the Bronze Age to the time that Hadrian's Wall was being constructed (*ibid*).
- 3.2.3 Some further remains dating to pre-Roman farming activities observed across the city, such as ard-marks (McCarthy 1990; Charlesworth 1979; Zant forthcoming), and a cobbled track and roundhouse, discovered during excavations in the Lanes (Zant forthcoming), are indicative of field systems and putative nearby settlement. A roundhouse settlement dating to the Bronze Age and Iron Age was excavated on the site of the current Cumberland Infirmary, less than 1km to the south-west of the development site (Flynn and McCarthy 1993; McCarthy *et al* 1998). To the south, a number of residual Neolithic finds were recovered from a site on John Street (North Pennines Archaeology 2004).
- 3.2.4 Two sites dating to the prehistoric period have been identified in the study area, the Etterby Wath (Site **06**), is located to the north, and was a ford crossing the River Eden. Although it was first recorded during the medieval period, it is conceivable that it pre-dates this era (Jones 1976). The second site comprises a findspot of a stone hammer (Site **07**), discovered in the general area.
- 3.2.5 **Roman Period:** despite a long interest in Roman Carlisle (*Luguvalium*), the precise location and extent of the Roman Fort was not fully understood until the excavations at Annetwell Street, from 1973-84. These identified the southern rampart and south gate of a turf and timber fort, which extended north under the present day castle (Charlesworth 1979); and a possible annex along the south-side (McCarthy 1991; Caruana 1992).
- 3.2.6 Dendrochronology suggests that the original fort was established between AD 72-3 (Groves forthcoming), with some refurbishment taking place between AD 83-4 (Caruana forthcoming; Zant forthcoming). It was demolished at the beginning of the second century, but then re-built *c* AD 105, and continued in use until the start of the Antonine period (*ibid*). It was then, again, abandoned in the AD 140s, when the northern frontier was expanded to the Forth-Clyde isthmus; there is some evidence of some intermittent occupation during this hiatus, before being intensively re-occupied during the early third century. At this point it was re-built in stone (OA North 2008a). The fort was then inhabited until the end of the Roman Occupation, with coins and pottery extending into the fifth century (*ibid*).
- 3.2.7 Within a short space of time, after the establishment of the original fort, a large extra-mural settlement grew-up to the south and east (McCarthy 1990). It is thought that by AD 223 the town had become the capital for the local tribe,

the Carvetii, with *civitas* being allocated to the settlement by Septimius Severus (Edwards and Shotter 2005). The first stone buildings appeared towards the end of the second and beginning of the third centuries, and it was thought likely that the town was occupied into the early fifth century (OA North 2008a). It is suggested that the suburbs also extended to the north of the fort, but most likely not to the west of the Caldew (North Pennines Archaeology 2004).

- 3.2.8 The precise location of the bridge that would have crossed the Eden remains uncertain, although there is some evidence that large bridges would have traversed the mudflats as well as the river itself, or perhaps combining a mix of bridges and fords (Caruana and Coulston 1987). Cemeteries associated with the fort and settlement are generally situated along modern Botchergate, to the south (Patten 1974), although there is some evidence for burials to the north and the west (Ferguson 1886 and 1893; Hogg 1961; Esmonde-Cleary 1994). Stanwix Fort, less than 1km north-east of the development site, was the largest fort on Hadrian's Wall (Breeze 2006). It was stone-built and dated to the AD160s (Caruana 2000). The Wall itself ran south-west from the fort, passing over the River Eden close to its confluence with the Caldew, where a number of large bridge stones have been dredged up (Hogg 1952; Breeze 2006), and crossing through the south part of the study area (Site 01).
- 3.2.9 The Wall was initially constructed from turf, before being re-built in stone on a slightly different alignment (Breeze 2006). To the north of the wall was a ditch, and to the south the Vallum. This comprised an earthwork consisting of a flat-bottomed ditch flanked by mounds (*ibid*). A frontier road, the Military Way, was constructed south of the Wall, often topping the northern mound. Along this western section, however, it was situated between the Vallum and Wall (*ibid*). Hadrian's Wall was first established between AD 122-23 (Breeze and Dobson 2000), although some have argued for a slightly earlier date (Shotter 2004). Apart from a 20 year break, when Antoninus Pius advanced to the Forth-Clyde isthmus, the wall was in use until the fall of the Roman Empire. It was thought likely that the stone was re-built in stone on the return of the Romans from the north (Breeze 2006).
- 3.2.10 The exact position of the Wall across the development site is unknown, but areas have been exposed nearby. Construction varies from turves laid in courses up to 6m wide, to a rampart built on cobbled foundations up to 5.8m wide (*ibid*). The wall was observed in 1854 during the insertion of a sewer (Ferguson 1886; Simpson 1932), and again in 1886 while the branch line to Port Carlisle was under construction (*ibid*). More recent excavations at Knockupworth, approximately 1.5km to the north-west of the development site, exposed a section of the Wall and Vallum (OA North 2011b).
- 3.2.11 Here two phases were identified. The original turf wall survived to 3.4m in width, but was heavily truncated by the second, stone phase. This later phase was constructed from flat-irregular slabs with a clay-bonded rubble core, and survived to two courses in height and 2.7m in width. None of the north-east face survives, however, having eroded into the Eden below (*ibid*). The Vallum ditch ranged from 4.1m to 5.8m in width, and was 2.7m deep, and was probably backfilled with the mound deposits at the end of the first phase. It

was then re-cut at the same time that the stone phase was constructed, and may well coincide with a return from the Antonine Wall (*ibid*).

- 3.2.12 Other Roman archaeology in the area includes the putative Milecastle 67, which should lie just to the west of the study area, adjacent to the Waverley Viaduct (HER 432). Although no trace of the structure has been found, Roman coins and jewellery unearthed in the vicinity suggest a concentration of activity (OA North 2008a). Cartographic evidence shows the Vallum crossing Willowholme approximately 70m to the south of the Wall (Ordnance Survey 1937), but this has been based on conjecture. A multi-phased settlement was discovered during the excavations at the Cumberland Infirmary (Flynn and McCarthy 1993), and most likely dates to the first and second centuries AD. As well as the line of Hadrian's Wall, two findspots have been identified in the study area, some Samian pottery (Site 02), and a coin and slingshot (Site 07).
- 3.2.13 **Early Medieval Period:** the nature of the immediate Post-Roman settlement in Carlisle is difficult to determine. As it was formerly an administrative hub for the region, it is highly unlikely that it would have been abandoned, although the town would have contracted (OA North 2008a).
- 3.2.14 Although there is a paucity of historical and archaeological evidence, it is thought that Carlisle was part of the Kingdom of Rheged during the sixth century (Kirkby 1962). However, during the first half of the seventh century it was subsumed into the Anglian Kingdom of Northumbria, and from this point on there is documentary evidence. In AD 685 King Ecgfrith gave Carlisle and its large royal estate to St Cuthbert, Bishop of Lindisfarne (Summerston 1993), who in turn established and endowed a nunnery. The town still retained vestiges of its Roman and British heritage, for example it was Waga the *praepositus* who took St Cuthbert on a tour of the town. Waga being a British name, and *praepositus* being the Latin equivalent of a reeve, a magistrate or official (Webb 1998). There was most likely a monastic presence until the late ninth century, as a former abbot of Carlisle, Eadred, is documented as one of a group of dignitaries taking the remains of St Cuthbert on a pilgrimage across northern England in search of a resting place (Tudor 1984).
- 3.2.15 By the late ninth century Carlisle had been amalgamated into the Kingdom of Strathclyde (Summerston 1993). The influence of the Scandinavians was questionable at this point, although Halfden was meant to have razed Carlisle during his conquest of AD 875, but there is no evidence for this (Higham 1986). During the eleventh century the region was increasingly under the rule of Northumbria, but was recovered by Malcolm Canmore of Scotland in 1060 (Summerston 1993). It remained part of Scotland until 1092, when it was taken by William II of England (Earle and Plummer 1892). It was claimed by John of Worcester, in the twelfth century, that Carlisle had been abandoned for 200 years up to the late eleventh century. This is not supported by the evidence, however, with occupation, and a tenth century cemetery, being excavated in the vicinity of the medieval cathedral (Gaimster *et al* 1989; Keevil 1989).
- 3.2.16 In the area to the north and west of Carlisle there has been a relative lack of early medieval activity. Nevertheless, the excavations for the CNDR has produced some evidence for early medieval dispersed settlement and farming

(OA North 2011b). At Knockupworth, there is evidence for Post-Roman activity near the Vallum of Hadrian's Wall. Approximately 1km to the north-west of the development site a large ditch, dating to this period, was discovered, and might relate to early medieval agricultural systems. Further to the north, c 1.5km from the development, a small settlement was excavated. It comprised at least four rectangular timber buildings, and produced radiocarbon dates from the seventh to ninth centuries (*ibid*).

- 3.2.17 In the immediate vicinity of the study area it is possible that Etterby Wath (Site 06), the ford crossing the River Eden, was functioning during the early medieval period, although there is no concrete evidence. There is certainly documentary evidence that it was in use by the Norman period (Jones 1976).
- 3.2.18 **Late Medieval Period:** the Anglo-Saxon Chronicle records that in 1092 William II led an army north and drove the Scots out of Carlisle (Earle and Plummer 1892; Summerston 1993). It is said that he built a castle and brought settlers from the south to establish Carlisle as an English frontier town (Earle and Plummer 1892). No trace of this edifice has been discovered, but it was most likely constructed from earth and timber, and located on the site of the current castle (McCarthy *et al* 1990). The Norman hold on Cumberland was emphasised when Henry I visited in 1122, although the Border was still ill-defined, with Carlisle being described in one Scottish chronicle, as lying 'between England and Scotland' (Sharpe 2006; Kennedy 1973). During his stay, Henry I provided money to strengthen the town's defences, including building walls and towers, and establish an Augustinian priory of St Mary's (Summerston 1993). In 1133 the priory was transformed into a cathedral (Perriam 1987).
- 3.2.19 After the death of Henry I in 1135, large areas of northern England came under Scottish control during the subsequent political vacuum (Kapelle 1979). This was short lived, and by 1157 Carlisle was back under English rule, and was granted a royal charter by Henry II the following year (Summerston 1993). Between the twelfth and thirteenth centuries there was a period of relative stability, and Carlisle grew steadily. By the late twelfth century suburbs are documented outside all three city gates, to the north, south and west. Very little archaeological work has been undertaken in these areas, although excavations on John Street revealed an extensive metal working complex dating to the fourteenth century (North Pennine Archaeology 2004). There is evidence for a water course located below the west city walls, and may be the later post-medieval Corporation Dam that ran along the eastside of Willowholme (Jones 1985). Three water-powered corn-mills are recorded, the Borough Mill, Abbey Mill and Castle Mill (Perriam 1992).
- 3.2.20 The last decade of the thirteenth century spelled the end of this quiet period, when a fire in 1292 destroyed much of the city. This disaster was compounded with the onset of the Anglo-Scottish Wars, during which the city was attacked and besieged (Summerston 1993). A fragile peace was established in the 1320s, but by the mid-fourteenth century this had, again, broken down, and there followed intermittent warfare and skirmishes across the Border regions for the remainder of the medieval period (*ibid*). As a consequence, the city remained under-populated and impoverished into the post-medieval period.

- 3.2.21 It is during the medieval period that the first references to Willowholme are made. A Pipe Roll of 1130 recorded that the land to the south of the Etterby Wath was owned by a Gueri the Fleming, and it is thought that Willowholme derives from *Weryholme*, meaning ‘the flat-land of Gueri’ (Jones 1976). It is suggested that Gueri, and his contemporary to the north of the ford, Etard, were granted the lands to secure the crossing (*ibid*). This was part of a pattern of land allocation at this time, to consolidate the region under Norman rule (*ibid*). Willowholme formed part of the socage manor of Carlisle, with arable, meadow and pasture providing revenue for the Crown (Spence 1984). From 1376 the manor, castle and other royal demesnes were places in the custody of the sheriff of Cumberland at an annual rent (*ibid*), and much of the land was tenanted out. It is thought that much of the land was already tenanted by this point; after the Black Death of 1349 it was recorded that revenue from rent decreased by a third (OA North 2008a).
- 3.2.22 In the late fourteenth century it became common for wealthy inhabitants to obtain grants of royal demesnes. In 1377 a John de Blenkinsop received a 13 year lease of the lands of *Weryholme*, which was renewed twice (Spence 1984), while a clerical poll tax return showed that between 1379-1380 a chaplain, Gilbert Grout, briefly held the farm at *Weryholme* (*ibid*). Even the canons of St Mary’s had obtained lands by 1220.
- 3.2.23 Apart from probable ribbon development along Bridge and Church Street to the south, it is unlikely that there were any buildings constructed in the Willowholme area. Although there are no illustrations dating to the medieval period, early post-medieval maps and plans depict the area as green fields (OA North 2008a). The low-lying nature of the land, at the confluence of two rivers, meant that it was subject to flooding. In 1401 the aforementioned Blekinsop requested that his rent be reduced at *Weryhole*, as the land had been ruined by inundation and Scottish raids (Summerston 1993). No known sites dating to the medieval period are located on the development site.
- 3.2.24 **Post-medieval Period:** during the sixteenth and seventeenth centuries Carlisle began to slowly recover from the long period of warfare and plague that had characterised the medieval period. From 1560 a state of peace had existed between Scotland and England, although the Borderlands were still subject to local unrest, the famous Border Reivers, which probably stunted more rapid growth (OA North 2008a). The Dissolution of the Monasteries in 1530 meant the disappearance of both the city’s friaries and the re-consecration of St Mary’s as a cathedral. The castle was refurbished during the reign of Henry VIII, and a citadel was constructed on the opposite site of the city. In 1571 the Eden flooded spectacularly, and divided into two main channels (Hogg 1952).
- 3.2.25 Within a few years of the James the VI of Scotland ascending the English throne, the Border raids came to an end, and the region’s on either side of the Border enjoyed a period of peace and prosperity (MacDonald 1971). The socage manor on Willowholme had slipped from the grip of the Crown during the sixteenth century (Spence 1984), and attempts to remedy the situation were undertake at the start of the seventeenth. Many individuals were recorded as owning freehold tenures of the land, ranging from minor aristocrats to local craftsmen. In 1611 the manor, demesnes and castle were granted to Francis Clifford, Earl of Cumberland, who subsequently undertook proceedings to

- wrestle back the lands (*ibid*). By 1630 42 acres had been ‘recovered’ and recommended for enclosure, which did not happen. Areas of the Willowholme, nevertheless, were still held by wealthy Carlisle citizens (*ibid*).
- 3.2.26 During the English Civil Wars, however, the threat of trouble returned. In 1644 the city was besieged by the Scots siding with the Parliamentarians, it surrendered in 1645. The city changed hands a couple of times, before finally surrendering to Cromwell himself (OA North 2008a). During this period a large siege-work was constructed on the top of Catcoates Bank, rendering Willowholme ‘useless to the garrison as a grazing ground’ (Ferguson 1891 cited in OA North 2008a, 21). Over subsequent years it remained an area of pasture and meadow.
- 3.2.27 After the end of the Civil Wars, Carlisle’s development was still slow, and as late as the eighteenth century many of the buildings were of timber construction (*ibid*). Nevertheless, it was at this point that stone became a more popular building material, and one of the first stone buildings was the Town Hall, constructed in 1669. Few of the early stone residences survive bar a few on Abbey Street, including that of Thomas Tullie, the Dean of the Cathedral, which was built in 1689 (McCarthy 1991).
- 3.2.28 The poverty of Carlisle was exemplified by the level of disrepair of the city walls during the first half of the eighteenth century, being so dangerous that even the inhabitants were demolishing sections themselves. This meant, however, that the city was left vulnerable during the Jacobite rebellion of 1745, and was easily taken in the November of that year (McCarthy 1990). It was returned, nevertheless, to the Duke of Cumberland shortly after he bombarded the city.
- 3.2.29 In the latter half of the eighteenth century the population of Carlisle was c 4-5000, the majority of which still lived within the medieval walls, though the suburbs along Botchergate, Rickergate and Caldewgate continued to grow. By the 1801 census the population had doubled to 10,000. As a result many of the city walls were demolished to allow expansion, much of which was completed by 1815 (Perriam 1976). The material from the northern Scotch Gate was used in the raised causeway for the new Eden Bridge (MacDonald 1971). The 1841 census reported that the population had reached 35,000, however, even by 1850 the town had hardly moved beyond its medieval footprint. This led to chronic overcrowding, and it was reported by the Carlisle Sanitary Association that there were areas where up to 20 families crowded into a single room (McCarthy 1991). Indicating the prevailing sanitary and health conditions.
- 3.2.30 By the first edition of the Ordnance Survey (1865) the city had expanded significantly beyond its medieval boundaries, and continued to grow well into the twentieth century. To the north, Stanwix was transformed from a small village to a city suburb. The growth of the city can be attributed to several factors: improved communications, including the Carlisle Navigation Canal (Ramshaw 1997) and the Caledonian Railway (Site 09); rapid industrial growth, including the rise of the textile industry in the eighteenth century (Jones 1985), and establishment of clock and brick making, iron-workings, tin-plate manufacturers, and biscuit producers; and finally commercial growth, becoming, and remaining, the main commercial and industrial centre for the region (OA North 2008a).

3.3 MAP REGRESSION ANALYSIS

- 3.3.1 The following section provides an overview of the development of the proposed site through cartographic research, from the earliest to the latest maps retrieved for this area.
- 3.3.2 ***John Speed, 1610:*** this shows the eastern edge of the Willowholme area, it is highly stylised and shows no detail.
- 3.3.3 ***George Smith, 1746:*** depicts the siege of Carlisle in December 1745. The area was occupied by an area of large fields, most likely pasture and meadow, bounded by hedgerows.
- 3.3.4 ***John Wood, 1821:*** although the proposed development site is present, on the map the area is occupied by the title of the plan. 'Willowholme' is annotated, and described as belonging to the Duke of Devonshire. Immediately to the south, adjacent to the corn mills, the land is 'Corporation Property'. The lack of illustration of the area would suggest that it was undeveloped.
- 3.3.5 ***Tithe Map, 1841 (Fig 4):*** the Tithe Map and associated Apportionment recorded 30 fields across the study area. These comprised mainly arable, pasture and meadow. One of the fields (312) is named the Carlisle Corporation, and seems to relate to the leat (Site **11**) running from the steam engine (Site **05**) on the River Eden, to the mills on the Caldew. On the western banks of the River Caldew, Field 340 is described for gravel extraction, and is owned by the Duke of Devonshire. Both of these fields lie outside the actual development site.
- 3.3.6 ***Asquith, 1853:*** the main development in the study area is the construction of the Caledonian Railway (Site **09**), skirting along the eastern edge. The development site itself still largely comprises fields, with the Eden to Willowholme mill leat (Site **11**) to the south. A rough track it annotated crossing the area from the Willowholme Road, and most likely runs to the Etterby Wath (Site **06**). Although no description given to the function of the land, it probably remains arable or pasture.
- 3.3.7 ***First Edition Ordnance Survey, 1865 (Fig 5):*** the study area is bounded by the Caledonian Railway (Site **09**) to the east, the River Eden to the north, the Willowholme Mill Leat (Site **11**) to the south-west, and the Port Carlisle Branch Railway (Site **10**) to the south. To the north of the leat (Site **11**), a bone and manure works (Site **05**) has been established, and to the south a varnish works (Site **04**). The Roman Wall (Site **01**) from Stanwix is annotated, skirting along the southern edge of the present site, and a find site of some Roman coins has been marked to the east of the engine shed (Site **05**). To the north, the Etterby Wath (Site **06**) is illustrated. The development site has hardly altered since the 1853 map, with the area still comprising fields.
- 3.3.8 ***Second Edition Ordnance Survey, 1901 (Fig 6):*** the main alteration to the study area is the establishment of the sewage works (Site **03**) to the south of the development site. It comprises four rectangular sludge beds to the immediate north of the Port Carlisle Branch Line (Site **10**). Outside the study

area, to the south-east, an 'Old Clay Pit' is marked, and seems to coincide with the gravel extraction field recorded on the Tithe Map (1841). Three 'stones' have been marked along the route of Hadrian's Wall (Site **01**), though no further information has been given it is assumed that they related to areas where the wall was observed (see *Section 3.4.1*). North of the sewage works little has changed, although three footpaths have been marked. Two run from the Willowholme Road, one to the west and the second due-north. The third skirts along the banks of the River Eden, forming a triangle with the other two.

3.3.9 **Ordnance Survey, 1925 edition:** the sewage works has expanded, with a number of filter beds created to the west and east. To the north, over the proposed development site are a number of misshapen ponds and marshy-area, bounded to the north by banks. Although not annotated, this may be the start of the sludge-bed recorded on the 1972 edition below. The remaining area around the sewage works remains fields, again probably still pasture and meadow.

3.3.10 **Ordnance Survey, 1972 edition (Fig 7):** this edition resembles the current landscape, with the industrial estate to the south, the sewage works occupies the same site as the current, and an electricity power station (Site **08**) is located to the north. The area of the proposed development site comprises a small pond to the south-west, adjacent to the current road. To the north-east, on the location of the proposed tricking filters, is a large sludge-bed. To the north of the proposed development site is a further set of sludge-beds. The presence of these features would suggest that the area has been heavily disturbed.

3.4 PREVIOUS ARCHAEOLOGICAL WORK

3.4.1 The earliest recorded archaeological observations occurred in 1854, when the stone phase of Hadrian's Wall was identified during the construction of a sewer (Ferguson 1888; Simpson 1932). The wall was exposed in three places in 1886: two during the construction of the Caledonian Railway and Port Carlisle Branch Line junction (Ferguson 1888); the third to the east of the mainline. These interventions were marked with inscribed stones, perhaps relating to the stones marked on the Second Edition of the Ordnance Survey (Ferguson 1888; Simpson 1932; Ordnance Survey 1901). In 1932 a further stretch was observed during the insertion of another sewer near to the original (Simpson 1932), and was buried under thick river deposits.

3.4.2 In 1988 a 40m by 2m trench was excavated by the Central Excavation Unit over the projected line of the Wall in advance of a proposed development (HER **13662**). No archaeological remains were identified, the trench comprising modern ash and clinker overlying natural geology.

3.4.3 To the south-west of the study area large scale excavations took place at Cumberland Infirmary from 1992-3, prior to redevelopment. Here a large prehistoric Bronze Age to Iron Age settlement was investigated, overlain by extensive Romano-British occupation, with further work undertaken in 1997-8 (Flynn and McCarthy 1993; McCarthy *et al* 1998).

- 3.4.4 In 2005 a watching brief was maintained during the installation of a telephone mast adjacent to Willowholme Road (Martin 2005), although close to the Wall, the only deposits observed were modern in nature. Similar deposits were observed in 2007 during work on the Carlisle City Flood Alleviation Scheme (The Archaeological Practice 2007), suggesting that the foundations of Hadrian's Wall may lie 3.9m or more below the current ground surface. One trench excavated as part of the Scheme produced the line of a stake-built fence along the south bank of the Willowholme Mill Leat (Site 11).
- 3.4.5 In 2008 an evaluation was carried out along the length of a proposed sewer route for the Wastewater Treatment Works, two trenches were excavated. Both trenches overlaid earlier sewage pipes, suggesting that the area had been highly disturbed, and produced finds dating to the post-medieval period, particularly the twentieth-century. No archaeological remains were encountered (OA North 2008a). A further watching brief took place in 2008 (OA North 2008b) during the construction of two kiosks at the Wastewater Treatment Works. Excavations reached 1.2m in depth, with the only deposits observed relating to the sewage works (*ibid*).

3.5 SITE VISIT

- 3.5.1 A visit to the Wastewater Treatment Works was undertaken on the afternoon of December 5th 2012, and comprised a tour of the proposed development site by a member of the United Utilities staff.
- 3.5.2 The proposed development is situated between the current filter beds to the south, and the newly constructed sludge-scheme to the north. The ground is made up of rough grass, small trees, bog and large quantities of refuse. The majority of the area comprises the former sludge-bed, which has been used as a dumping ground, and is extremely dangerous to walk near as the precise location of the banks is uncertain (Plates 1 and 2). The exact depth of the bed is unknown, but may exceed 4m (Andrew Mack (UU) *pers comm.*), and went out of use in the 1960s or early 1970s. Much of the area adjacent has been used for depositing 'screenings', the material that gets into sewerage but does not decompose (*ibid*). Towards the north-western end of the site is a large spoil heap more than 2m in height (Plate 3). This material was dumped here in 2008-9 during the works on the new sludge-scheme (*ibid*).
- 3.5.3 The history of the site, combined with its present nature, would suggest that it has been heavily disturbed by groundworks, and is highly contaminated with effluent.

4. GAZETTEER OF SITES

Site number	01
Site name	Hadrian's Wall and Vallum
NGR	NY 38706 56449
HER No	5782
Designation	Scheduled Ancient Monument CU28196 ; World Heritage Site
Site type	Frontier works
Period	Roman
Sources	Ferguson 1888; Simpson 1932; Breeze 2006
Description	Hadrian's Wall (stone phase) and Vallum in Willowholme area. Observed 1854, 1886 and 1932. Found to be 2.36m wide (on a 2.69m wide foundation), robbed to foundation level. They were buried in 2.44m of alluvial silts. No trace of the Vallum, Military Way, Ditch or Turf Wall have been found in the area. Turrets 66a and 66b should be situated in Willowholme, but no trace has been found.
Assessment	Lies near the proposed development site and may be affected

Site number	02
Site name	Samian Pottery findspot
NGR	NY 38850 56450
HER No	17963
Designation	None
Site type	findspot
Period	Roman
Sources	HER
Description	Small, thin fragment of decorated samian ware found close to Willowholme in 1976-7. Allegedly from a hole in the south-west of the sewage works, close to Hadrian's Wall
Assessment	Lies near the proposed development site and may be affected

Site number	03
Site name	Sewerage Treatment Works
NGR	NY 38890 56460
HER No	13667
Designation	None
Site type	Sewage works
Period	Post-medieval
Sources	Second Edition OS 1901; Simpson 1932; HER
Description	The modern sewage works occupies the site of the original works, constructed before 1901
Assessment	Lies in the proposed development site and will be affected

Site number	04
Site name	Willowholme Varnish Works
NGR	NY 38640 56390
HER No	10201
Designation	None
Site type	Varnish works
Period	Post-medieval
Sources	First Edition OS 1865; HER
Description	Site of varnish works on First Edition Ordnance Survey 1865
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	05
Site name	Newton Engine House/Bone and Manure Works
NGR	NY 38436 56484
HER No	10202
Designation	None
Site type	Engine house/bone and manure works
Period	Post-medieval
Sources	Tithe Map 1841; First Edition OS 1865; HER; Ramshaw 1997
Description	The Newton Engine House was built in 1824 to take water to the Carlisle Navigation Canal. A bone manure mill was built above it in 1832, powered by the engine. A steam engine was installed in 1839, but was sold in 1855, the mill went back to being water powered, until 1906.
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	06
Site name	Etterby Wath
NGR	NY 38629 56829
HER No	41754
Designation	None
Site type	Ford
Period	Uncertain, medieval or earlier
Sources	First Edition OS 1865; Jones 1976; Ferguson 1899; HER
Description	A site of a ford, one of many ancient crossing points along the River Eden. First recorded in the medieval period, but may be earlier, and possibly prehistoric. The First Edition Ordnance Survey (1865) illustrated the Willowholme Road heading for the Wath, indicating an early date. Seems to have gone out of use by the late nineteenth century.
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	07
Site name	Various Findspots
NGR	NY 39000 57000
HER No	464, 471, 476, 18946, 19669, 42241
Designation	None
Site type	findspots
Period	Prehistoric to Roman
Sources	HER
Description	464: prehistoric stone hammer find from near Stanwix 471: Roman stone sculpture find, Stanwix 476: Roman bronze statuette find, Stanwix 18946: Vespasian coin find, Etterby 19669: Roman metal sling shot, River Eden 42241: Romano-British ceramic rim fragment of vessel
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	08
Site name	Electricity Power Station, Willowholme
NGR	NY 38541 56520
HER No	41076
Designation	None
Site type	power station
Period	Post-medieval
Sources	Ordnance Survey 1972; HER
Description	In 1925, a new power station was built at Willowholme by Percy Dalton, the City Engineer and Surveyor. It was extended in 1940 and 1942. Demolished in 1988
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	09
Site name	Caledonian Railway, Carlisle
NGR	NY 39485 56265
HER No	42019
Designation	None
Site type	railway
Period	Post-medieval
Sources	Asquith 1853; First Edition Ordnance Survey 1865; HER
Description	The Caledonian Railway Act was passed in 1845. The line was 122 miles long and was the largest construction project of its type up to that time. The first section from Carlisle to Beattock was opened in 1847, with the full opening in 1848. Following the Carlisle Citadel Station Act of 1873, the line north of the station was rebuilt below the West Walls and across the site of the Caledonian engine sheds in 1874-5.
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	10
Site name	Caledonian Railway, Port Carlisle Branch Line
NGR	NY 39084 56580
HER No	42026
Designation	None
Site type	railway
Period	Post-medieval
Sources	First Edition Ordnance Survey 1865; HER, Martin 2011
Description	The Caledonian Railway Act was passed in 1845, with the line opening in 1847. The Port Carlisle Branch connected the Canal Railway with the Caledonian. An evaluation excavation was conducted in 2011 for a proposed redevelopment of Willowholme industrial estate, which would disturb the Port Carlisle Branch railway embankment. Four trenches were excavated to a maximum depth of 2m and evidence of the embankment was recorded in all four (Martin 2011).
Assessment	Lies outside the proposed development site and unlikely to be affected

Site number	11
Site name	Willowholme Leat
NGR	NY 39097 56367
HER No	41078
Designation	None
Site type	Leat
Period	Post-medieval
Sources	Asquith 1853; First Edition Ordnance Survey 1865; Ramshaw 1997
Description	East to west-aligned leat built in 1825 to provide the Carlisle Navigation Canal with additional water. The leat fed a pumping engine (Site 05) to raise water to the canal. It survives to the north of allotment gardens, the banks extends for 150m, 3m-5m in width and up to 1.5m in height.
Assessment	Lies outside the proposed development site and unlikely to be affected

5. SIGNIFICANCE OF THE REMAINS

5.1 INTRODUCTION

5.5.1 The National Planning Policy Framework states that local government *should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise* (NPPF 2012, Section 12.129). Therefore, the following section will determine the nature and level of the significance of the archaeological resource detailed in *Sections 3 and 4*.

5.5.2 In all, 11 sites were identified in the study area. All have been identified on the HER. One site, Hadrian's Wall (Site **01**), has been designated a Scheduled Ancient Monument (SAM **CU28196**), and a World Heritage Site.

Period	No of Sites	Site Type
Prehistoric	1	Findspot (07 - HER 464) stone hammer
Romano-British	1	Findspot (07 - HER 42241) ceramic
Roman	3	Wall (01), findspot (02 , 07 - HER 471 , 476 , 18946 , 19669)
Late Medieval	1	Ford (06)
Post-medieval	7	Sewage treatment works (03), varnish works (04), engine works and bone manure works (05), electricity power station (08), railways (09 , 10), mill leat (11)

Table 2: Number of sites by period

5.2 CRITERIA FOR ASSESSING SIGNIFICANCE

5.2.1 There are a number of different methodologies used to assess the archaeological significance of sites; that to be used here is the 'Secretary of State's criteria for scheduling ancient monuments' (Annex 1; DCMS 2010). The sites previously listed (*Section 4*, above) were each considered using the criteria, with the results below.

5.2.2 **Period:** Hadrian's Wall (Site **01**) is identified as significant in its period as it is unique in Roman Britain. Etterby Wath (Site **06**) is significant as it possibly pre-dates the medieval period, and could provide information on how the rivers and land was traversed. Willowholme Mill Leat (Site **11**) and Newton Engine Works (Site **05**), and the varnish works (Site **04**) are significant as they characterise the post-medieval industrialisation of Carlisle. The two railways (Sites **09** and **10**) are important as they exemplify the transport communications that helped Carlisle's economic growth in the nineteenth century. The sewage works (Site **03**) and the electricity power station (Site **08**)

are important as they typify the growing social, health and welfare movements of the late nineteenth and early twentieth centuries.

- 5.2.3 **Rarity:** Hadrian's Wall (Site **01**) is significant as it is recognised at an international level of designation, as a World Heritage Site. The remainder of the sites cannot be viewed as significant at a national level, but some of the sites (**06**, **05**, **09**, **10** and **11**) can be viewed as of regional/local significance, as they inform on the development of Carlisle since the medieval period.
- 5.2.4 **Documentation:** no contemporary documentation for Hadrian's Wall (Site **01**) exists, and all other documentation relates to observations and excavations along its length. Etterby Wath (Site **06**) is recorded in Norman documents (Jones 1976). All post-medieval sites are recorded cartographically, and in other contemporary documents.
- 5.2.5 **Group Value:** although Hadrian's Wall is recorded here as one site (**01**), it comprises several elements: the wall, the ditch, the Vallum and the Military Way, and should also be viewed in its wider context as associated with Roman Carlisle to the south-east. The complex of features can be viewed as important to our understanding of the development of Roman frontier systems. The group value of the railway lines (Sites **09** and **10**), the Newton Engine Works (Site **05**), Willowholme varnish works (Site **04**) and the Willowholme Mill Leat (Site **11**), is significant as it illustrates the post-medieval development of Carlisle through both transport communications and industrialisation.
- 5.2.6 **Survival/Condition:** where sections of Hadrian's Wall (Site **01**) were exposed during the nineteenth century, in the Willowholme area, it was observed to have been levelled to foundation height. The bank of the Port Carlisle Branch Line (Site **10**) is still extant in sections, especially outwith the current industrial park. The various findspots identified (Sites **02** and **07**) exist only as records in the HER. Little is known about the present sub-surface condition of remains associated with the post-medieval industrial sites (**03**, **04**, **05** and **08**). Site **09**, the Caledonian railway still functions as the present-day West Coast Mainline.
- 5.2.7 **Fragility/Vulnerability:** investigations of Hadrian's Wall (Site **01**) during the late nineteenth and earlier twentieth centuries would suggest that the Wall at Willowholme lies under at least 2.44m of alluvial silts. With the addition of modern material this depth below the current ground surface may have increased. As the majority of modern intrusions do not exceed this depth it is unlikely to be vulnerable except in specific cases. The level of truncation that the wall has been subject to in the past, leaving only the foundations of the feature, would suggest, however, that it is fragile. As the Vallum, Military Way and ditch have not been encountered at Willowholme their fragility/vulnerability is unknown at present. The post-medieval sites across the study area are within the current Willowholme Industrial Park, and are likely to have been disturbed during its creation and development. The fragility/vulnerability of the potential below-ground remains is difficult to determine.
- 5.2.8 **Diversity:** Hadrian's Wall (Site **01**) is significant in its diversity, as it comprises several elements, the Turf and Stones Walls, the Vallum, the ditch

and the Military Way. The Newton Engine Works (Site **05**) is significant in its diversity as it comprised not only a manure and bone works, but also a pump house, drawing water from the River Eden for the Willowholme Mill Leat (Site **11**), indicating how one structure can be used for a variety of functions. The varnish works, the early sewage works, and the electric power station (Sites **04**, **03** and **08** respectively) are important as they each comprise several elements that make up the site.

- 5.2.9 **Potential:** the greatest potential for unknown sites are likely to relate to either features associated with Hadrian's Wall (Site **01**) to the south, or earlier prehistoric activity similar to that found upstream during the CNDR excavations. During the medieval period the low-lying land was subject to flooding, and was probably pastoral in nature. There may be remains associated with a route to Etterby Wath (Site **06**). The majority of the remaining sites relate to post-medieval industrialisation and are well documented. Although there has been the development of the Willowholme Industrial Park, there is still potential for some sub-surface, earlier post-medieval remains to survive.

5.3 IMPORTANCE

- 5.3.1 Using the criteria outlined in Table 3, each of the sites listed in the gazetteer has been assessed in terms of its importance as a site of archaeological interest.

Importance	Examples of Site Type
National	Scheduled Monuments (SMs), Grade I, II* and II Listed Buildings
Regional/County	Conservation Areas, Registered Parks and Gardens (Designated Heritage Assets) Sites and Monuments Record/Historic Environment Record
Local/Borough	Sites with a local or borough value or interest for cultural appreciation Sites that are so badly damaged that too little remains to justify inclusion into a higher grade
Low Local	Sites with a low local value or interest for cultural appreciation Sites that are so badly damaged that too little remains to justify inclusion into a higher grade
Negligible	Sites or features with no significant value or interest

Table 3: Criteria used to determine Importance of Sites

- 5.3.2 Hadrian's Wall is the only site determined to be of *National* importance. The remaining sites (**03** to **06**, and **08** to **11**) are determined to be of *Regional/County* importance as they are all recorded on the HER. Sites **02** and **07** are thought to be of *Local/Borough* value, as they are isolated findspots.

6. IMPACT ASSESSMENT

6.1 IMPACT

6.1.1 Archaeological remains are ‘*a finite, irreplaceable and fragile resource*’ (DCMS 2010). Therefore, it has been the intention of this assessment to identify their significance and potential of the proposed development area, and assess the impact of the proposals, thus allowing the advice of NPPF (2012) to be enacted upon. Assessment of impact has been achieved by the following method:

- assessing any potential impact and the significance of the effects arising from the proposals;
- reviewing the evidence for past impacts that may have affected the archaeological sites;
- outlining suitable mitigation measures, where possible at this stage, to avoid, reduce or remedy adverse archaeological impacts.

6.1.2 The impact is assessed in terms of the sensitivity or importance of the site to the magnitude of change or potential scale of impact during the future redevelopment scheme. The magnitude, or scale, of an impact is often difficult to define, but will be termed substantial, moderate slight, or negligible, as shown in Table 4, below.

Scale of Impact	Description
Substantial	Significant change in environmental factors; Complete destruction of the site or feature; Change to the site or feature resulting in a fundamental change in ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Moderate	Significant change in environmental factors; Change to the site or feature resulting in an appreciable change in ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Slight	Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Negligible	Negligible change or no material changes to the site or feature. No real change in our ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.

Table 4: Criteria used to determine Scale of Impact

6.1.3 The interaction of the scale of impact (Table 4) and the importance of the archaeological site (Table 3) produce the impact significance. This may be calculated by using the matrix shown in Table 5, below.

Resource Value (Importance)	Scale of Impact Upon Archaeological Site			
	Substantial	Moderate	Slight	Negligible
National	Major	Major	Intermediate/ Minor	Neutral
Regional/County	Major	Major/ Intermediate	Minor	Neutral
Local/Borough	Intermediate	Intermediate	Minor	Neutral
Local (low)	Intermediate / Minor	Minor	Minor/ Neutral	Neutral
Negligible	Neutral	Neutral	Neutral	Neutral

Table 5: Impact Significance Matrix

- 6.1.4 The extent of any previous disturbance to buried archaeological levels is an important factor in assessing the potential impact of the development scheme. The low level of archaeological work in the Willowholme area means that it is difficult to determine the impact of previous disturbance on any underlying remains. The observations of the Wall (Site **01**) during the nineteenth and early twentieth centuries would suggest that the Wall now probably lies 3-4m below the current ground-level, providing it with some protection. The post-medieval sites recorded across the study area will have been subject to disturbance during the development of the present Industrial Park, although the extent of this is unknown. Buildings and features may have been removed entirely, or remains may still exist below the surface. The Willowholme Mill Leat (Site **11**) still exists as a functioning watercourse. It is recorded on the early twentieth century Ordnance Survey maps (1925 and 1972) that a sludge-bed was located directly on the proposed development site. This may have exceeded 4m in depth, and it was observed as a large, marshy unstable and contaminated area during the site visit. It is unlikely that any potential unknown sites would have survived the development of these features.

6.2 IMPACT ASSESSMENT

- 6.2.1 Following on from the above considerations, the significance of effects has been determined based on an assumption that there will be earth-moving works associated with the development, and that the present condition of the archaeological assets/sites is known. The results are summarised in Table 6, below, in the absence of mitigation.

Site No	Nature of Impact	Importance	Scale of Impact	Impact Significance
01	Disturbance by groundworks	National	Negligible	Neutral
02	Disturbance by groundworks	Local/Borough	Negligible	Neutral
03	Disturbance by groundworks	Regional/County	Moderate	Major/intermediate

Table 6: Assessment of the impact significance on each site directly affected by the development

7. RECOMMENDATIONS

7.1 INTRODUCTION

- 7.1.1 In terms of the requirement for further archaeological investigation and mitigation, it is necessary to consider only those sites that will be affected by the proposed development. Current legislation draws a distinction between designated heritage assets and other remains considered to be of lesser significance; *“when considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset’s conservation. The more important the asset the greater the weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset, or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notable scheduled monuments, protected wreck sites, battlefields, grade I or II* listed buildings, grade I or II* listed parks or gardens, and World Heritage Sites, should be wholly exceptional”* (NPPF 2012, Section 12.132), and thereby preserved *in situ*. It is normally accepted that non-designated sites will be preserved by record, in accordance with their significance and the magnitude of the harm to or loss of the site as a result of the proposals.

Site No	Site name	Significance	Impact Significance	Recommendations
01	Hadrian’s Wall	National	Neutral	Watching brief
02	Samian Pottery findspot	Local/Borough	Neutral	None
03	Sewage Treatment Works	Regional/County	Major/intermediate	None

Table 7: Summary of site-specific recommendations for further archaeological investigation and provisional mitigation

- 7.1.2 The majority of sites lie outwith the direct scope of the development, with sites **01** to **03** having the most potential for impact. Although the predicted line of Hadrian’s Wall (Site **01**) lies to the south of the development, there is still potential for associated features to be situated at some distance on either side of the structure. The findspot of Samian pottery (Site **02**) though not directly impacted, might suggest further unknown Roman activity in that area. The remains of the early sewage works (Site **03**), however, have the largest scope for associated features. Certainly a sludge-bed was situated directly over the spot of the proposed development. The nature of the remains, being potentially excessive in depth and highly contaminated with effluent, may limit archaeological investigation, nevertheless, it is recommended that an

archaeological watching brief should take place at the onset of the groundworks to confirm the depth of the previous impact. If, as seems likely, the former sludge-bed is more than 4m in depth and no archaeological deposits survive, then the monitoring should be suspended.,

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9. ILLUSTRATIONS

9.1 FIGURES

Figure 1: Site Location Map

Figure 2: Plan of proposed works

Figure 3: Plan of Gazetteer Sites

Figure 4: Tithe Map of 1847

Figure 5: First edition Ordnance Survey 1865

Figure 6: Second edition Ordnance Survey 1901

Figure 7: Ordnance Survey, 1972 edition

9.2 PLATES

Plate 1: View across the former sludge-bed, looking north-east

Plate 2: Close up view of the sludge-bed, looking north-west

Plate 3: View of the modern spoil heap towards the Caledonian Railway (Site **09**), looking north

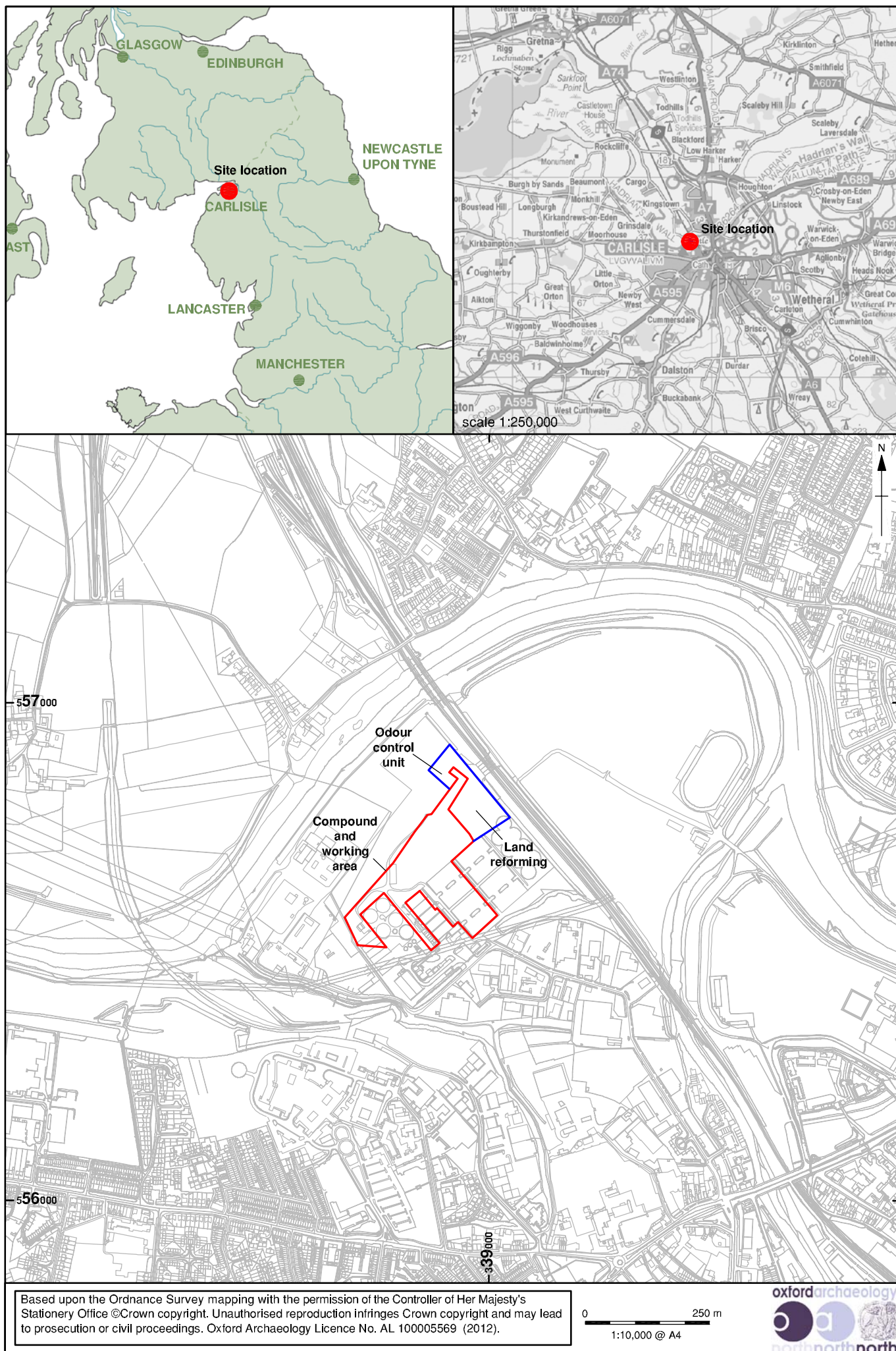


Figure 1: Site location

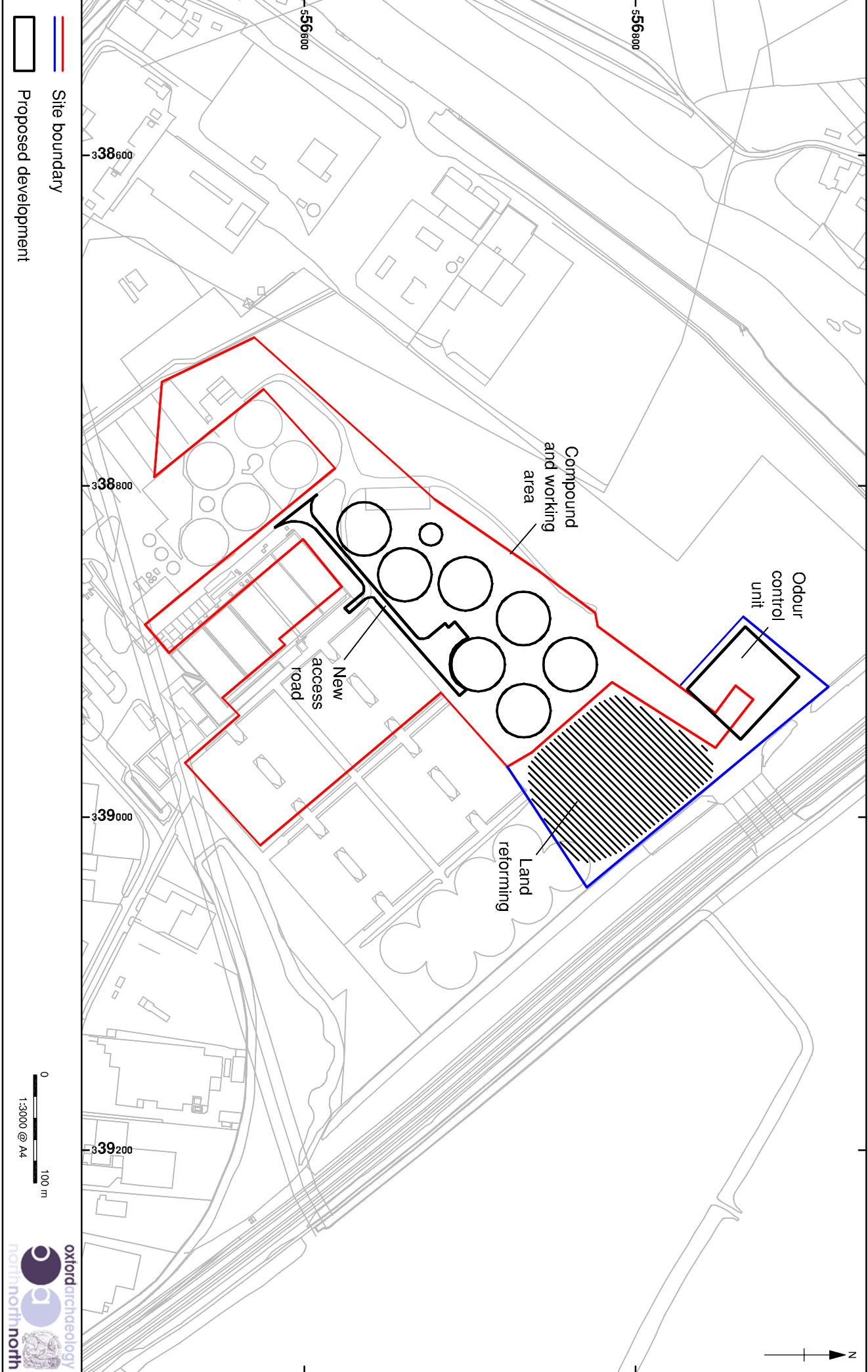


Figure 2: Proposed development

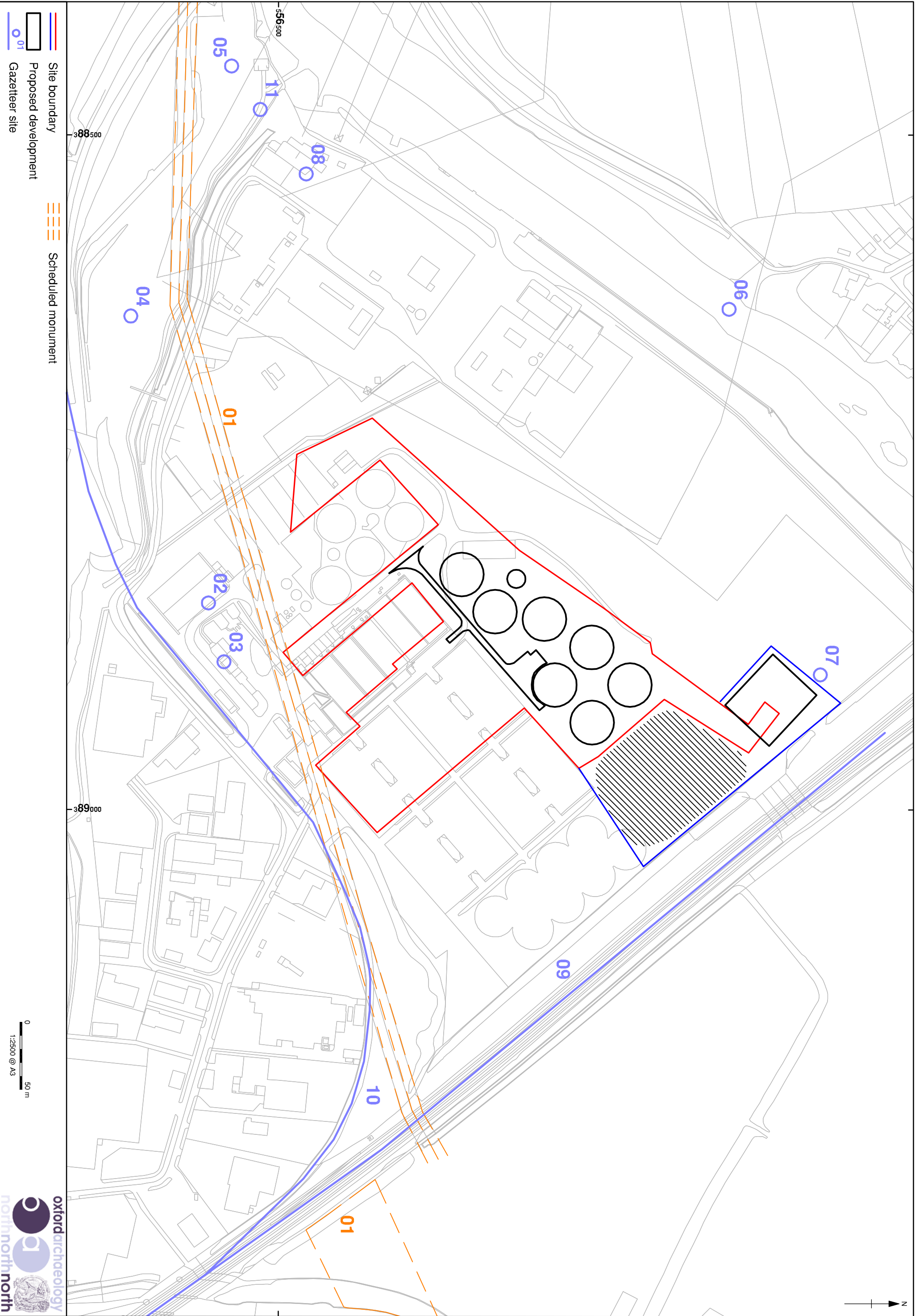


Figure 3: Location of gazetteer sites

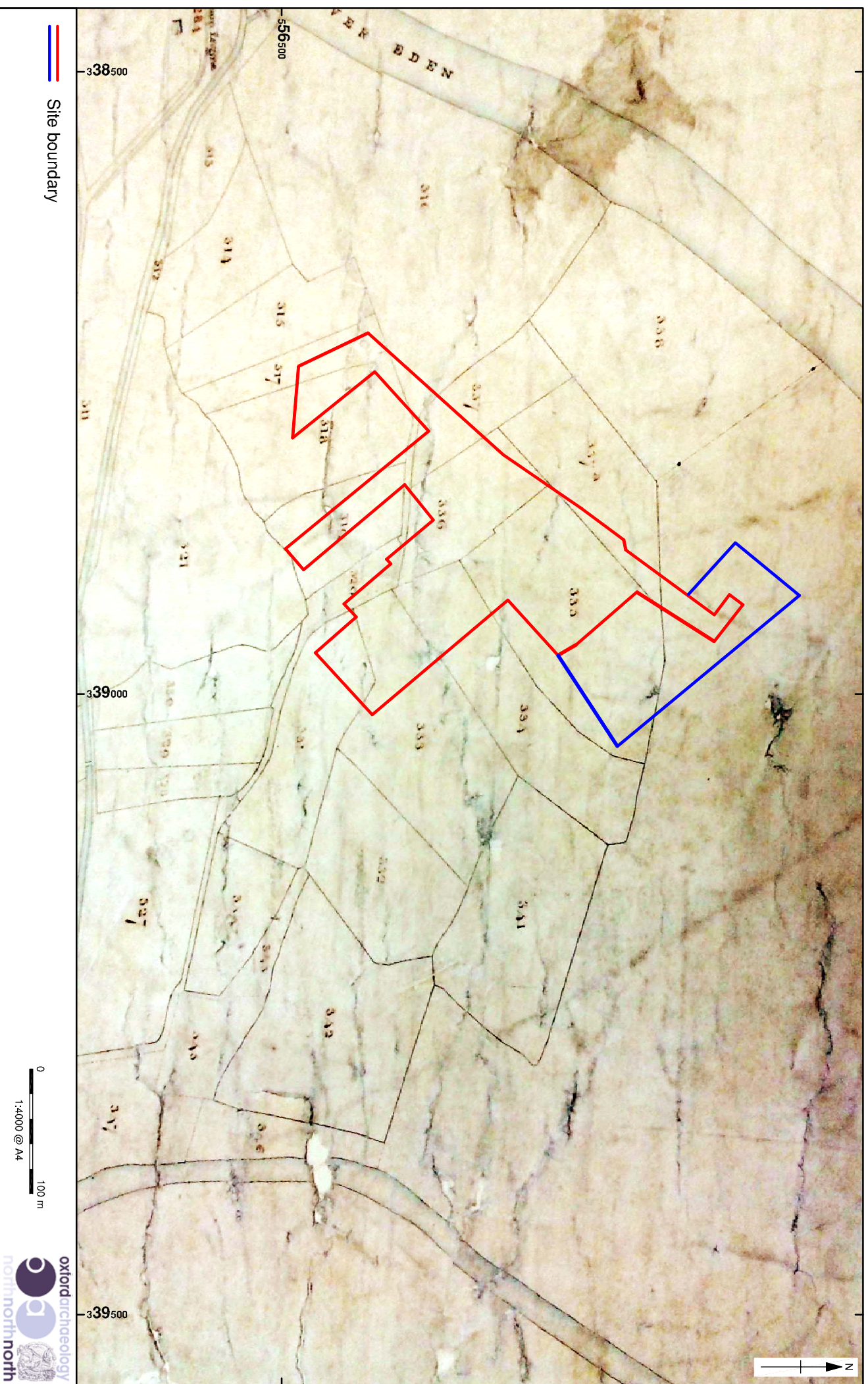


Figure 4: The development area superimposed on the Tithe map of 1841

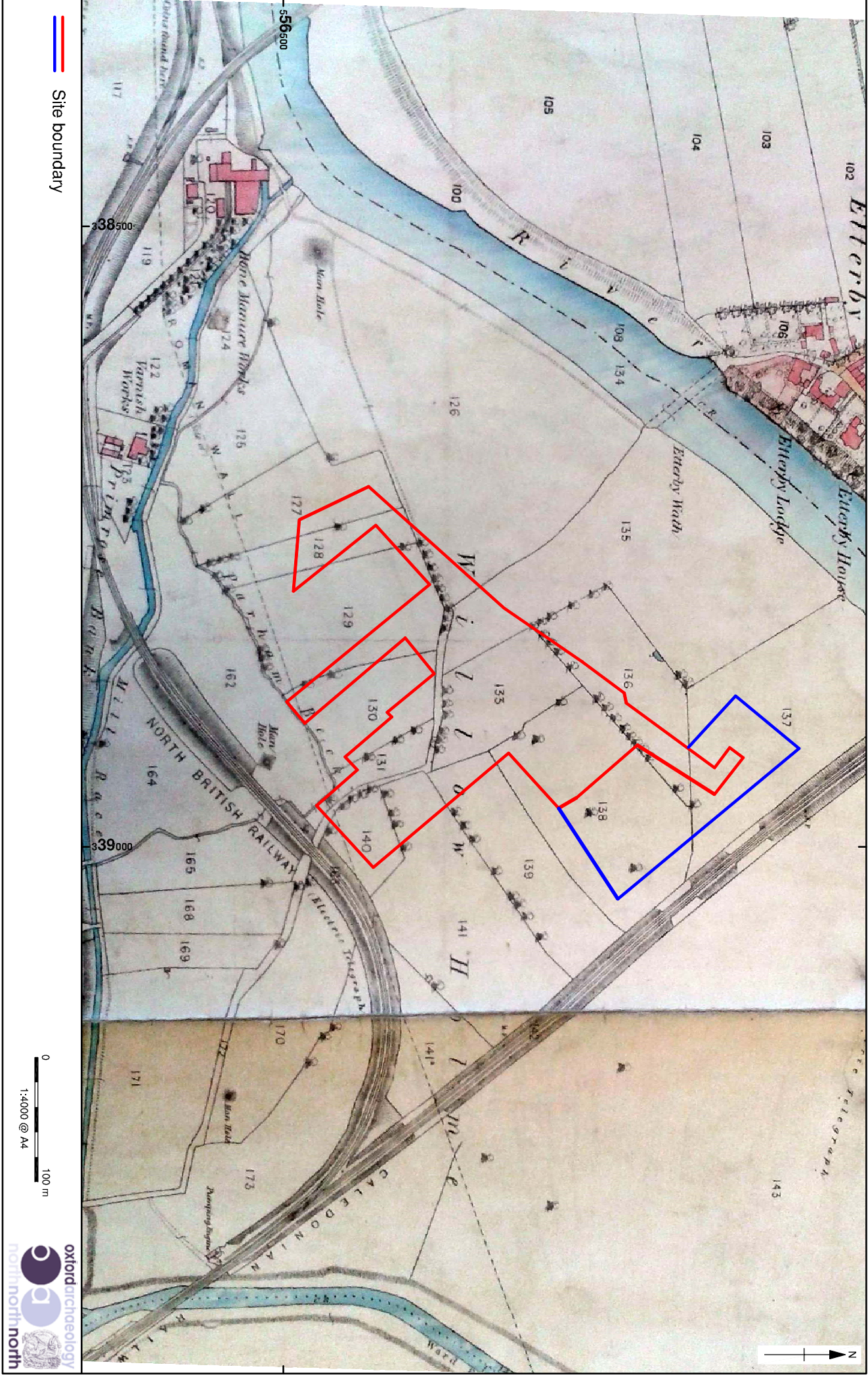


Figure 5: The development area superimposed on the First Edition Ordnance Survey 25" to 1 mile map, 1865

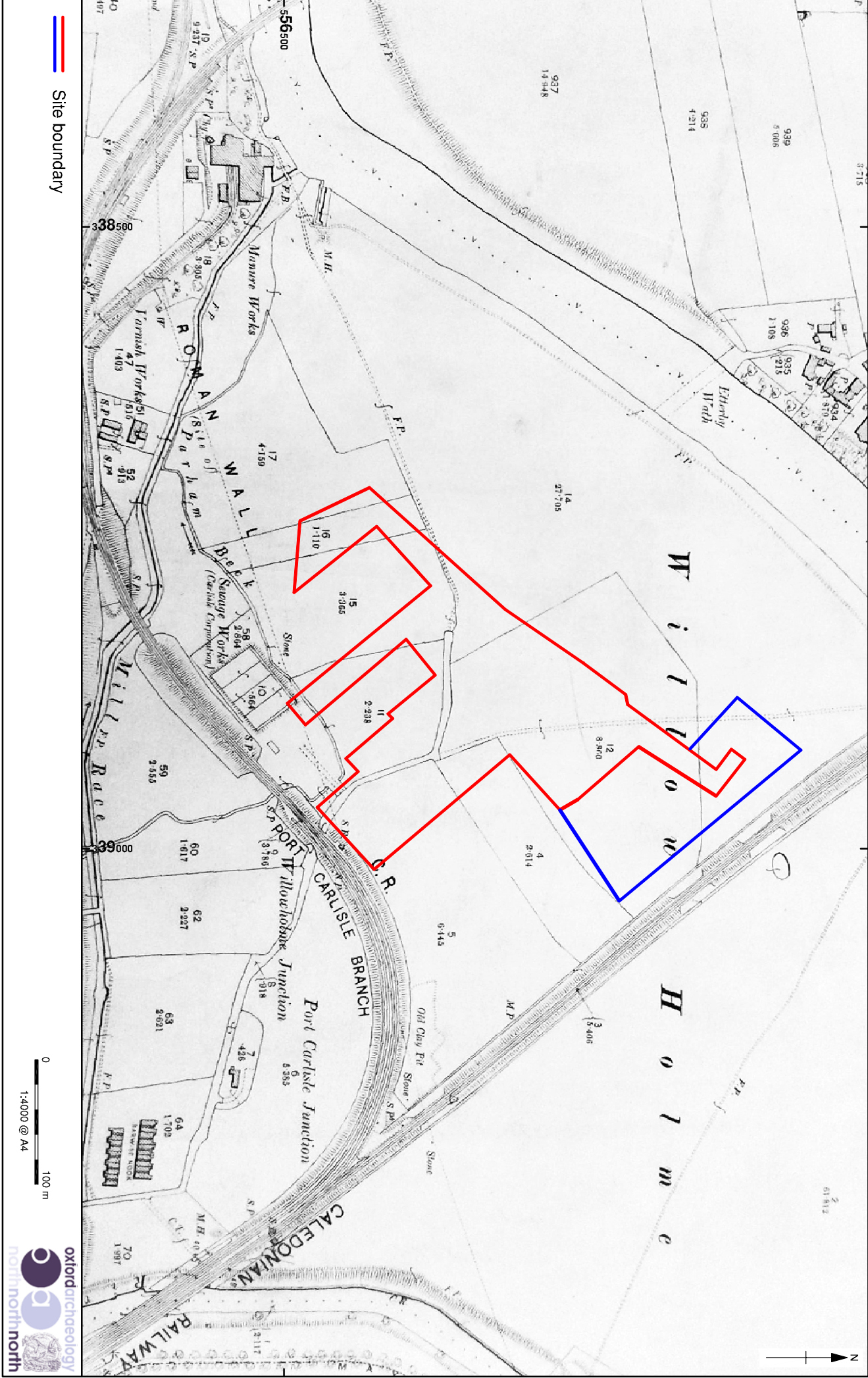


Figure 6: The development area superimposed on the Ordnance Survey 25" to 1 mile map, 1901

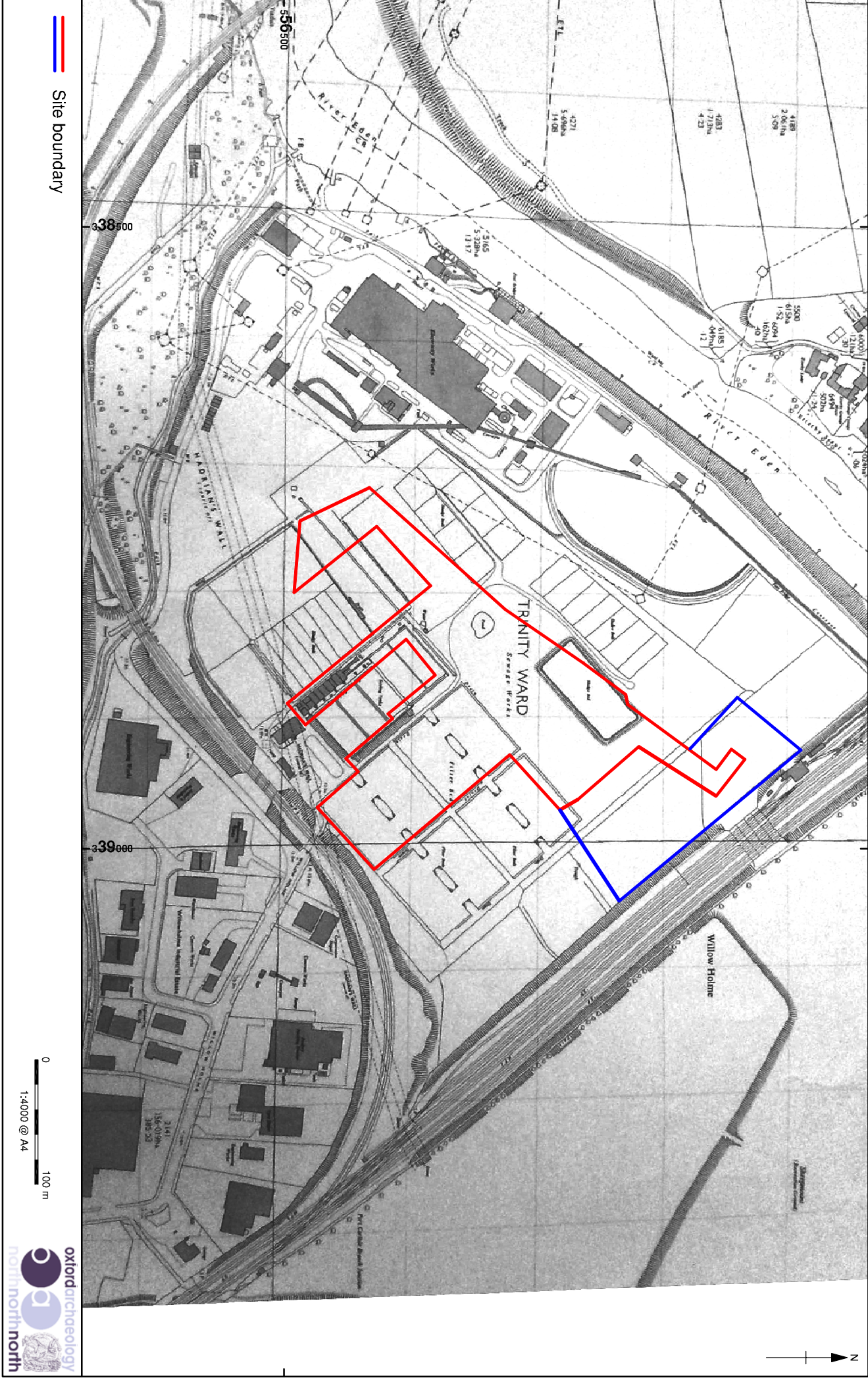


Figure 7: The development area superimposed on the Ordnance Survey 1:10,000 map, 1972

PLATES



Plate 1: View across the former sludge-bed, looking north-east



Plate 2: Close up view of the former sludge-bed, looking north-west



Plate 3: View of the modern spoil heap towards the Caledonian Railway (Site 09), looking north