



BROADWATER ROAD, THAMESMEAD LONDON BOROUGH OF GREENWICH

Archaeological Watching Brief

CONSULTATION DRAFT

**BROADWATER ROAD, THAMESMEAD
LONDON BOROUGH OF GREENWICH**

ARCHAEOLOGICAL WATCHING BRIEF

Prepared for:

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by

Wessex Archaeology in London

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**Museum of London Site code
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LONDON BOROUGH OF GREENWICH**

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Non-technical Summary

Wessex Archaeology was commissioned by David Wilson Homes (the Client) to carry out an Archaeological Watching Brief during pile location probing at the site of the former Woolwich Arsenal, Broadwater Road (centred on NGR 544612 179539).

The work was undertaken in response to a brief for archaeological works issued by Mark Stevenson of the Greater London Archaeological Advisory Service and was specifically aimed at recording any details, revealed during pile probing, of the former military works and structures, specifically the Pilkington Canal.

This report details the results of this Watching Brief, which was undertaken between August - September 2004.

No remains of archaeological import, outside observations of the possible relict course of the Pilkington Canal, were observed during the Watching Brief. This report concludes that demolition and groundwork associated with the remediation of the site in the 1960s and 1980s, has significantly truncated any remains, associated with the Royal Arsenal, from the Site.

Acknowledgements

Wessex Archaeology would like to thank; Brian Sutherland and Andrew Fisher of David Wilson Homes for commissioning the project. Wessex Archaeology would also like to thank Mark Stevenson of GLAAS for monitoring the work. Last but not least Wessex Archaeology would like to thank Colin Dickson of Merebrooke Ltd, as well as Dave Hiddlstone, and John Morrison and the rest of the team from BACTEC International for all their assistance during the project.

The project was managed for Wessex Archaeology (London) by Reuben Thorpe (Project Manager). The fieldwork was carried out initially by Kirsten Egging (Project Supervisor) and Becky Fitzpatrick, and latterly by Gary Evans (Project Supervisor) and Mark Ingram. Gary Evans and Reuben Thorpe prepared this report. The illustrations are by Mark Roughley.

1 INTRODUCTION

1.1 Project Background

- 1.1.1 Wessex Archaeology (London) was commissioned by David Wilson Homes Ltd to carry out an Archaeological Watching Brief on the site of the former Woolwich Arsenal, Broadwater Road, London Borough of Greenwich (the Site), centred on NGR 544812/179539. This report details the results of fieldwork undertaken during August and September 2004.
- 1.1.2 The Watching Brief was carried out to comply with an Archaeological Condition attached to outline planning consent by the Local Planning Authority (LPA). This was in accordance with the Department of Environment Planning Policy Guidance Note 16 (1990).
- 1.1.3 Archaeological works were undertaken in accordance with the Institute of Field Archaeologists' Standard and Guidance for Archaeological Watching Briefs (revised 1999). A Written Scheme of Investigation (W.A. 2004a report reference T8914) was prepared prior to the commencement of works, which was approved by Mark Stevenson, Archaeology Advisor of the Greater London Archaeology Advisory Service (GLAAS) and the Local Planning Authority (LPA).

1.2 Site Location Topography and Geology

- 1.2.1 The Site is broadly rectangular in plan and is bounded by Tom Cribb Road to the south, Broadwater Road to the east and Marshgate Path to the west. To the north the Site is bounded by modern residential units which front onto Carronade Place and Temple Close (**Figure. 1**).
- 1.2.2 The Site is presently open ground, with a small number of mature poplar trees in the Southeast corner. Areas of raised ground exist on the eastern border with Broadwater Road and along the western boundary. A disused, east-west aligned, metalled road cuts across the northeast corner of the Site leading to Broadwater Road.
- 1.2.3 Modern street level, adjacent to the Site (Broadwater Road), is at 5.50m aOD. The present ground levels vary from 5.08m aOD, in the northeast corner, to 5.72m aOD in the northwest corner.
- 1.2.4 Various phases of work have taken place on the Site with the intention of removing or sealing contaminated ground and preparing the Site for redevelopment.
- 1.2.5 In the early 1980s foundations on the Site were removed and the Site remediated. It must be assumed that these operations have resulted in the substantial movement and mixing of earth and soils across most of the Site.

- 1.2.6 Following geotechnical investigations in 1985 the Site was capped with a layer of clean sand (Carpenter and Lowe Ltd, 2001).
- 1.27 Geotechnical investigations in 1985 showed that the made ground beneath the Site consists of two distinct layers. A layer of orange-brown, clayey-sand, which varied in thickness from 0.10m to 0.80m. was seen to overlay a thick layer of ‘old’ made ground. This was typically a soft to firm, dark grey/black, sandy clay containing brick and concrete rubble as well as loose gravel and clinker. This layer was recorded to a depth of up to 5m below contemporary ground level (Carpenter and Lowe Ltd, 2001).
- 1.2.6 Beneath the “old” made ground, lay superficial drift deposits of alluvium. These consisted of horizontal bands of stiff green clay, up to 6.90m thick, overlying deposits of sand and gravel. Occasional bands of fibrous peat, of varying thickness, were also observed. The underlying solid geology consists of Thanet Sands overlying Cretaceous Upper Chalk.

1.3 Archaeological Background

- 1.3.1 There is limited evidence for human activity in the area of the Site from the Prehistoric period and later periods.
- 1.3.2 The Site itself seems to have initially been developed in the early 19th century when an extension of the ordnance factory, known as the Royal Arsenal, was created from what was marshland.
- 1.3.3 This development was associated with a canal (the Pilkington canal) constructed in 1812–14. The canal acted both as the eastern defensive boundary of the Arsenal, as well as providing a transport link between the depot and the Thames (**Figure. 2**). The original canal was extended soon after 1814 and a western branch of this canal, constructed in 1814–16, is shown on the Ordnance Survey map of the Arsenal in 1866 (**Figure. 2**).
- 1.3.4 Various buildings, timber yards and a large rectangular shaped “Pond”, all associated with the ordnance factory and canals, subsequently covered much of the Site.
- 1.3.5 The Royal Arsenal Railways, which crossed the Site, were built in 1873 to connect all departments of the factory and to provide transportation for personnel.
- 1.3.6 The canal, railway and all the associated buildings and structures have been filled in, removed, or demolished in several poorly documented occasions over the course of the 20th century, most recently in the 1980s.
- 1.3.7 A preliminary risk assessment of the Site, as well as a desk-based assessment (Wessex Archaeology 2004a), identified the possibility that the infill and

remediation of the Pilkington Canal may have resulted in the re-deposition of unexploded ordnance, or components used in the production of munitions which may still pose a danger of explosion.

- 1.3.8 To minimise risk, pile probing was undertaken at each pile location. This schedule of pile probing also afforded archaeological examination of the buried sequence.

2 WATCHING BRIEF AIMS

- 2.1.2 The principal aim of the Watching Brief was to determine the exact location of the 1812 and 1814-1816 canals, through the observation of the depths and character of deposits revealed during ordnance probing, in advance of pile construction.
- 2.1.3 Archaeological works also endeavoured to establish, as far as reasonably possible, the nature and date of any other archaeological deposits exposed during ordnance probing, in advance of pile construction.

3 METHODOLOGY

3.1 Fieldwork

- 3.1.1 The Watching Brief was carried out on 233 test pits, these were excavated by the Unexploded Ordnance Contractor (BACTEC International), to investigate each “refusal” to their Intrusive Magnetometry survey probe.
- 3.1.2 The Watching Brief comprised archaeological attendance and monitoring of all pile probing locations and test pits, the locations of which were determined by the Unexploded Ordnance Contractor, who for reasons of Health and Safety dictated much of the working policy and strategy.
- 3.1.3 Regular breaks in the drilling/excavation of the pile probe pits, by the site contractor, were built into the work programme of drilling. These breaks allowed the examination, by Wessex Archaeology, of the revealed archaeological sequence.
- 3.1.4 The excavation of the test pits was carried out by a 21 ton tracked excavator fitted with a toothed bucket.
- 3.1.5 The test pits varied in size. Their width was usually 1.40m however variation in width did occur and was between 0.70m and 2.90m. The length of the test pits also varied from between 2.40m to 5.40 m, with one test pit (**100**) being 12m long. The depth of the test pits ranged from 1.90m to 5.10m depending upon the depth of the obstacle encountered by the BACTEC magnetometry survey probe.

- 3.1.6 Recording of the archaeological sequence in each test pit consisted of a scaled photographic record, complimented by measured sketch drawings (at a scale of 1:50) along with written observation recorded on Wessex Archaeology standard Trench Record Sheets and in the Site Supervisors day book. Representative artefacts were collected, depending on their intrinsic nature, age, quality, preservation, rarity, monetary and or artistic/technological value.
- 3.1.7 All heights provided in the text refer to height above Ordnance Datum (aOD) and refer to the top of each deposit.
- 3.1.8 All works were undertaken in accordance with the guidance and standards outlined the Institute of Field Archaeologists' *Standard and Guidance for Archaeological Watching Briefs* (revised 1999).

3.2 HEALTH AND SAFETY

- 3.2.1 Health and Safety considerations were of paramount importance in conducting all fieldwork. Safe working practices overrode archaeological considerations at all times.
- 3.2.2 All works were undertaken within the safe working framework established by the Site Contractors and set out in '*Explosive Ordnance Disposal Services, Intrusive Magnetometry Survey (BXP). Method Statement*' (BACTEC 2001, updated 2004).
- 3.2.3 All works were carried out in accordance with the Health and Safety at Work Act (1974) and the Management of Health and Safety regulations (1992) as well as all other current and relevant Health and Safety legislation and regulations and codes of practice.
- 3.2.4 A risk assessment was prepared by Wessex Archaeology prior to the commencement of fieldwork.

4 RESULTS

4.1 General Information

- 4.1.1 The following section provides a brief summary of the findings. These are divided into the following sections:

Area A.	Test Pits across or along the former line of the former northern canal.
Area B	Test Pits between the two former canals.
Area C	Test Pits across or along the former line of the former southern canal.

Area A: Line of Northern Canal

Test Pits: **1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 55, 56, 58, 60, 61, 62, 63 64, 65, 67 68, 69, 70, 71, 72, 73, 74, 76, 77, 78, 80, 91, 92, 93, 95, 100, 111, 112, 119, 120, 122, 129, 135, 136, 138, 139, 141, 142, 143, 144, 145, 146, 147, 148, 150, 151, 152, 153, 154, 155, 156, 157, 158, 162, 163, 168, 169, 174, 182, 183, 184, 185, 186, 188, 190, 191, 192, 193, 194, 201, 204, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215,, 216, 217, 225, 228, 231, 232 and 233.**

were excavated close to, or within, the line of the former northern canal (**Area A. Figure. 3**).

- 4.1.3 A layer of clean sand was observed at the top of all of the test pits. This layer was between 0.20m and 1.30m thick.
- 4.1.4 In all the test pits, the capping layer overlay a series of dumps and fills, which formed the made ground on this part of the Site. These deposits were made up of various layers of ashy clayey silts and demolition rubble, all contained varying quantities of red brick and yellow stock brick fragments, as well as roofing slates, clinker, coal, iron slag and substantial fragments of concrete.
- 4.1.5 Several test pits were seen to contain quantities of broken corrugated blue crylolite fencing. The made ground in this part of the Site was up to 4.00m thick and was observed to a height of 1.60m aOD.
- 4.1.5 None of the observed deposits appeared to represent occupation layers or former ground surfaces.
- 4.1.6 All of the deposits observed in the test pits appear to be modern, dating from the middle of the 19th century at the earliest, with most dating from the later half of the 20th century.
- 4.1.7 A series of horizontal timber beam/planks were found at 3.94m aOD in Test Pit **43** and at 2.75m aOD in Test Pit **27**. A similar layer of wooden planks was observed at a height of 2.34m aOD in Test Pit **233**, 2.40m aOD in Test Pit **112**, at 3.00m aOD in Test Pit **69** and 2.10m a OD in Test Pit **111**. These, along with three substantial, vertical timber piles found in Test Pit **28** (at 2.50m aOD) along with an upright timber in Test Pit **135** and a further upright timber in Test Pit **129** are the only putative structural remains observed in this part of the Site.
- 4.1.8 The timbers observed in Test Pits **43, 69, 110, 111 129 and 233** would, if *in situ*, almost certainly represent structures connected with the canal.
- 4.1.9 Vertical cuts were observed in the exposed sections of Test Pits: **19, 26, 32, 38, 37, 45, 72, 91, 93, 95, 100, 146, 216, 217 and 228**. These were up to 4.00m deep, and were filled with similar fills. If the lines of the cuts in Test Pits **19**,

26, 100 and 32 are extrapolated they form two discrete east-west edges, which almost certainly represent the robbed out, northern and southern, edges of the former canal.

4.1.10 In the majority of the test pits, the made ground was observed to lie directly above mid-dark blue grey alluvium. This deposit was observed in Test Pits **3, 9, 10, 11, 19, 22, 39, 34, 40, 44, 120, 129, 182, 188, 213, 214, 215, 216** 228, at a height of 3.83m aOD –1.63m aOD.

4.1.11 A coarse sandy gravel was found at the base of Test Pits **43, 168** and **141** at a height of 2.94 m aOD, 2.60m aOD and 2.43m aOD respectively. At the base of Test Pit **169** a layer of coarse sand was observed at a height of 2.52m aOD.

4.1.12 Coarse orange sand was also found at the base of Test Pit **145** at a height of 1.50m aOD.

Area B: Area Between the Canals

Test Pits: **54, 59, 66, 79, 81, 82, 84, 85, 86, 88, 89, 90, 94, 97, 101, 102, 103, 106, 107, 108, 109, 110, 113, 114, 117, 118, 126, 127, 137, 140, 149, 159, 160, 161, 164, 165, 167, 176, 177, 178, 179, 180, 181, 187, 189, 193, 195, 198, 199, 200, 202, 203, 205, 218, 220, 221, 222, 223, 224, 226, 227, 229** and **230** were excavated in the area between the two former canals (**Area B. Figure 3**).

4.1.13 A layer of clean sand was observed at the top of all of the test pits. This layer was between 0.40m and 0.75m thick.

4.1.14 In all of the test pits, this capping layer overlay a series of dumps and fills, which formed the made ground on this part of the site. The made ground was up to 4.20m thick and was observed down to a height of 1.27m aOD.

4.1.15 These deposits were made up of various layers of ashy and clayey silts and demolition rubble. These deposits contained varying quantities of red brick and yellow stock brick fragments, as well as roofing slates, clinker, coal, iron slag and substantial fragments of concrete. Several pits contained quantities of corrugated blue asbestos fencing.

4.1.16 None of these deposits appeared to represent occupation layers or former ground surfaces.

4.1.17 All of the deposits observed in the test pits, appear to be modern, dating from the Victorian era at the earliest, with most dating from the later half of the 20th century.

4.1.18 A series of horizontal, timber beams/planks were found at 1.69m aOD, in Test Pit **114**. No other structural remains were observed in any of the test pits.

4.1.19 In the majority of the test pits, the made ground lay directly above a deposit of dark blue grey alluvial clay. This was observed in Test Pits: **59, 85, 102, 107, 108, 110, 113, 114, 126, 127, 140, 177, 178, 179, 180, 181, 182, 187, 189, 199, 203, 205, 218, 220, 222, 223, 224, and 226** at a height of between 3.30m aOD – 1.48m aOD.

4.1.20 In Test Pit **86** a layer of sand was observed at a height of 2.59m aOD.

Area C: Line of Southern Canal

Test Pits: **53, 54, 66, 81, 82, 83, 87, 96, 98, 99, 103, 104, 105, 106, 115, 116, 117, 118, 121, 123, 124, 125, 128, 130, 131, 132, 133, 134, 164, 165, 166, 167, 171, 172, 173, 175, 176, 197, 219 and 221**. Were excavated close to, or within, the line of the former southern canal (**Area C. Figure 3**).

4.1.21 A layer of clean sand was observed at the top of all of the test pits. This layer was between 0.20m and 1.30m thick.

4.1.22 In all the test pits, this capping layer overlay a series of dumps and fills, which formed the made ground on this part of the site.

4.1.23 These deposits were made up of various layers of ashy clayey silts and deposits of demolition rubble and contained varying quantities of red brick and yellow stock brick fragments, as well as roofing slates, clinker, coal, iron slag and substantial fragments of concrete.

4.1.24 Several pits contained quantities of corrugated blue asbestos fencing. Test Pits **128, 130 and 131** produced large amounts of loose foundry waste, occasionally up to 1.50 m in diameter, as well as frequent fragments of vitrified copper and iron.

4.1.25 The made ground, in this part of the Site, was up to 4.10m thick and its base was observed at a depth of between 4.14m aOD and 1.56m aOD.

4.1.26 None of these deposits appeared to represent occupation layers or former ground surfaces. All appeared to be modern, dating from the Victorian era at the earliest, with most dating from the later half of the 20th century.

4.1.27 A series of horizontal timber beam/planks were found at 2.30m aOD in Test Pits **221** and at 3.31.m aOD in Test Pit **169**. These were the only structural remains observed in this part of the Site. If still *in situ*, they are almost certainly associated with the southern canal.

4.1.28 No other structural remains were observed in any of the test pits in this part of the Site.

- 4.1.29 In most of the test pits, the made ground layer lay directly above a layer of grey blue, alluvial clay. This was observed at heights of between 2.55m and 2.30m aOD
- 4.1.31 At the base of Test Pits **115** and **125**. Layers of coarse sandy gravel were observed at a height of 1.97m OD and 2.00m aOD respectively.

5 CONCLUSION

- 5.1.1 The Watching Brief found no *structural evidence* of the canal or “Pond” marked on the 1866 map. However, the deep vertical cuts seen in Test Pits **19**, **26**, **32**, and **100**, almost certainly represent the *robbed out* edges of the former canal.
- 5.1.2 Alluvial clay was observed across most of the Site. This natural layer was seen to slope down from 3.83m aOD at the northern edge of the Site, to 3.67m aOD at the southern edge of the Site.
- 5.1.3 Deposits of what are possibly natural sandy gravels were observed at 2.43m aOD and 2.97m aOD at the northern end of the Site at a depth of between 1.97m and 2.00m aOD at the southern end of the Site. A layer of coarse sand was observed at a depth of 1.50m aOD at the northern end of the Site and 2.52m aOD at the southern end of the Site.
- 5.1.3 The absence from the Watching Brief of remains or artefacts of archaeological interest suggests that archaeological remains have been significantly truncated by previous groundworks associated with the demolition and remediation of the site in the late 20th century.

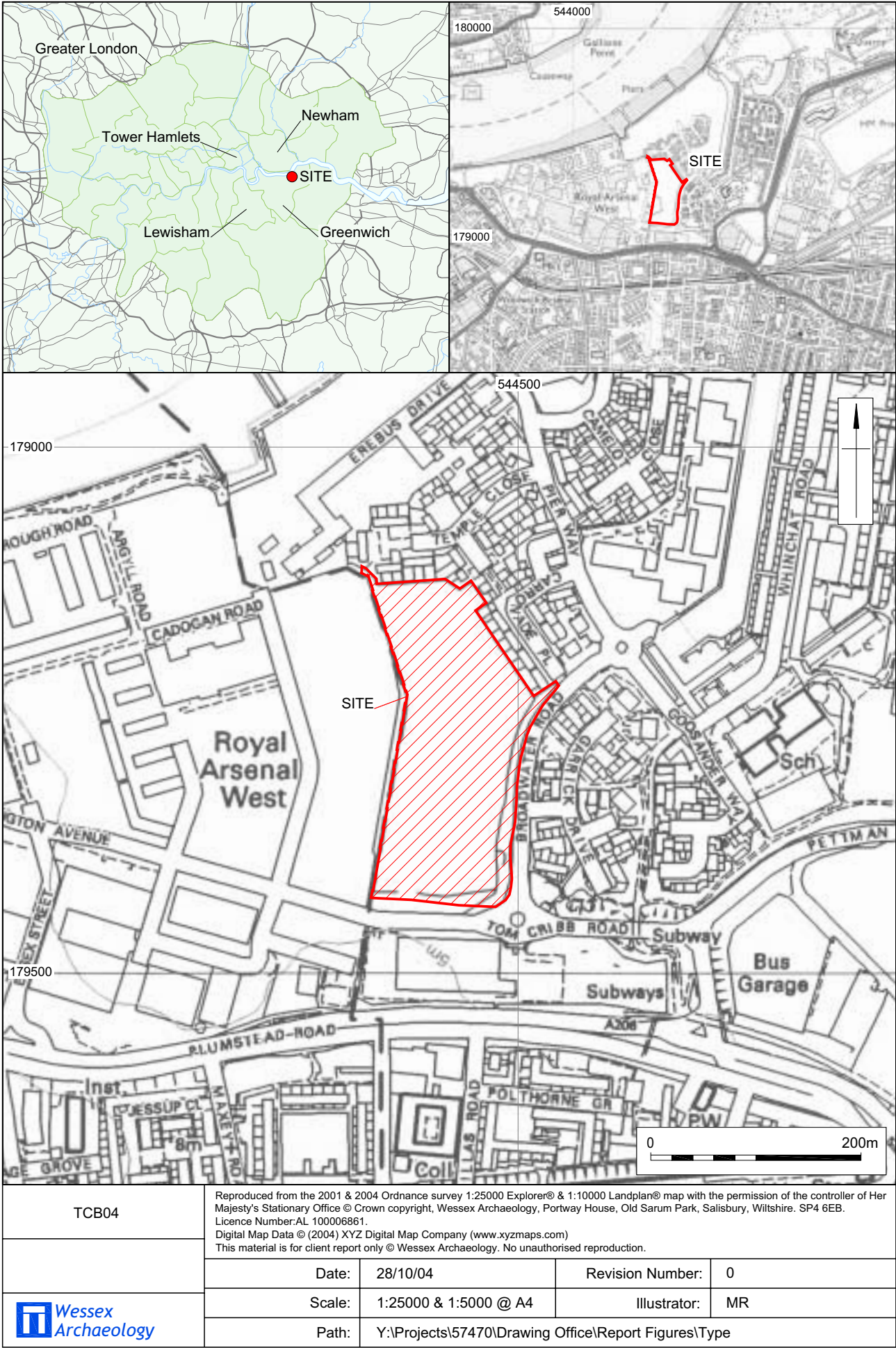
6 THE ARCHIVE

- 6.1.1 The project archive is held at the offices of Wessex Archaeology at Old Sarum, Salisbury, under the Wessex project code 57407. Following conclusion of the project it will be deposited at the appropriate museum or storage facility. The London SMR code for the site is **TCB04**.

7 BIBLIOGRAPHY

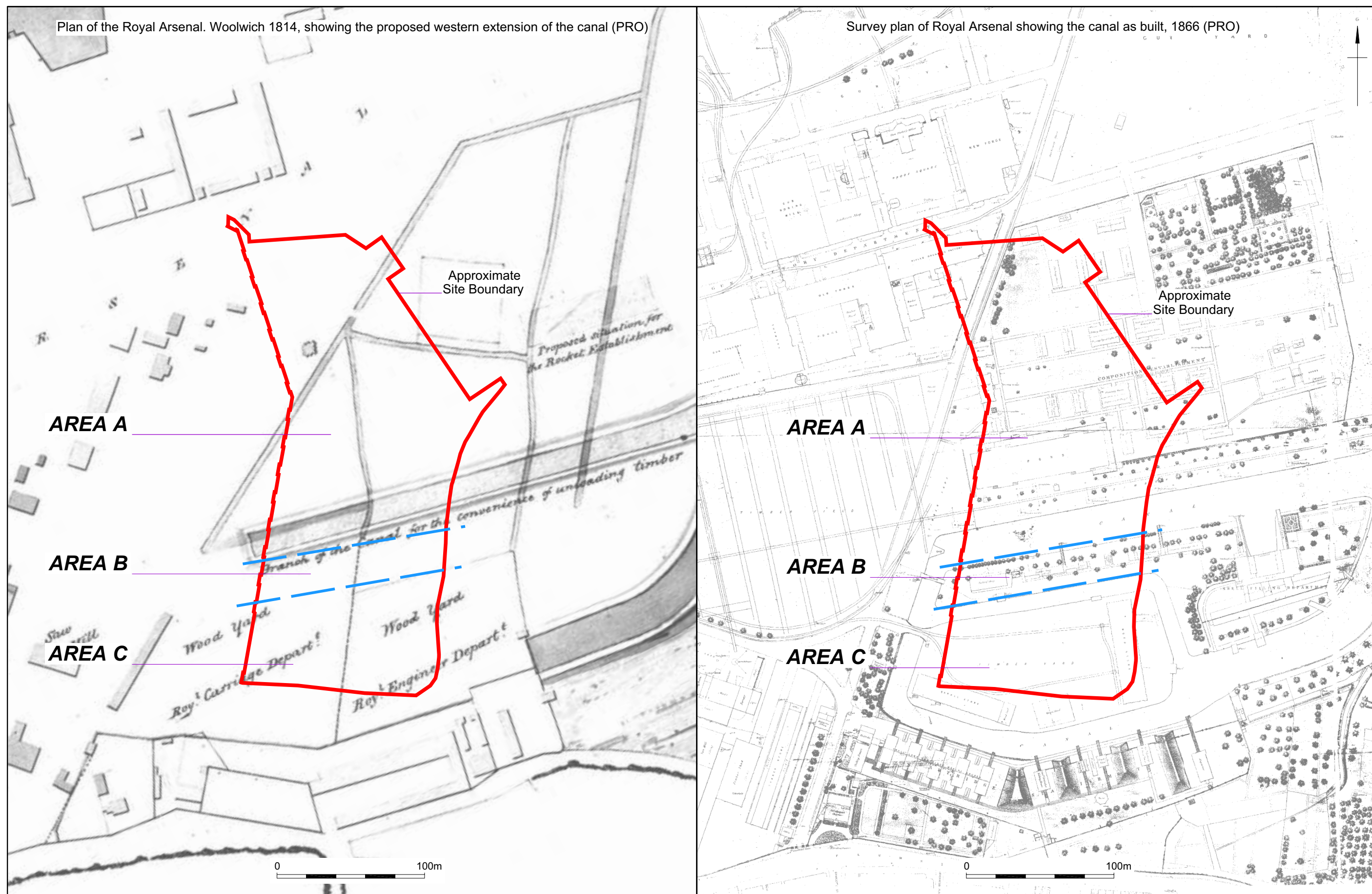
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Site Location Map

Figure 1



MOL#: TCB04



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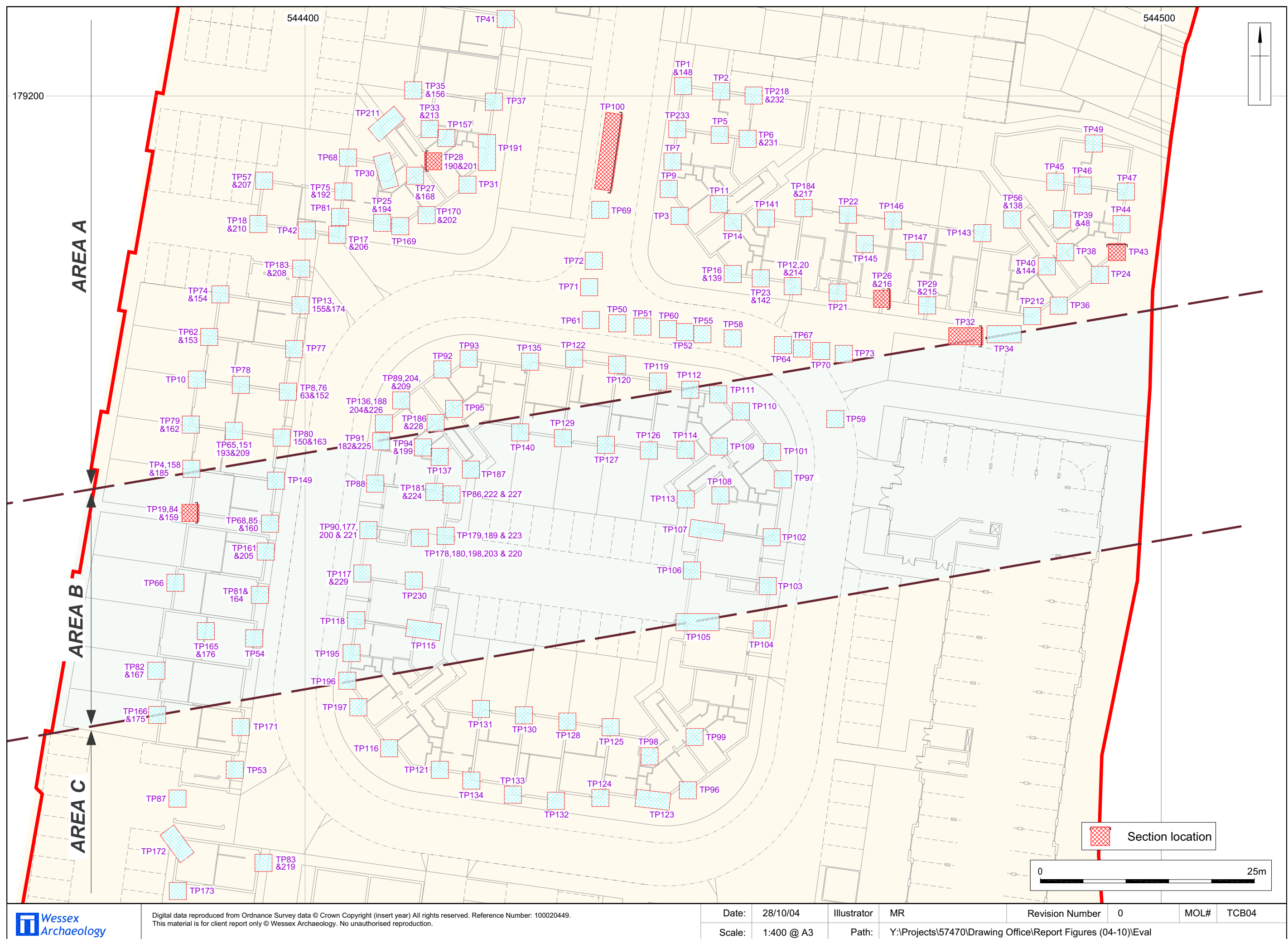
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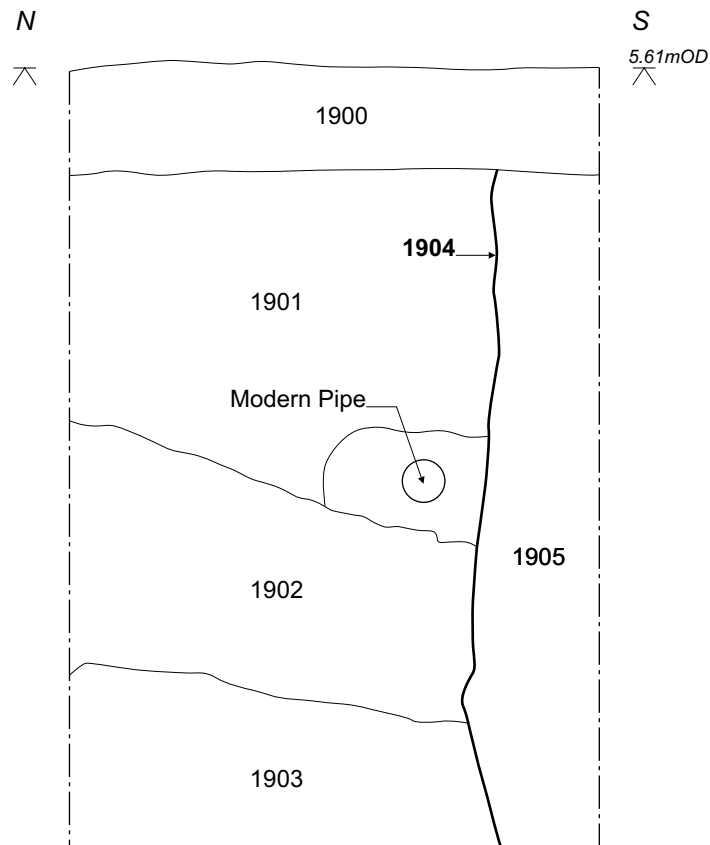
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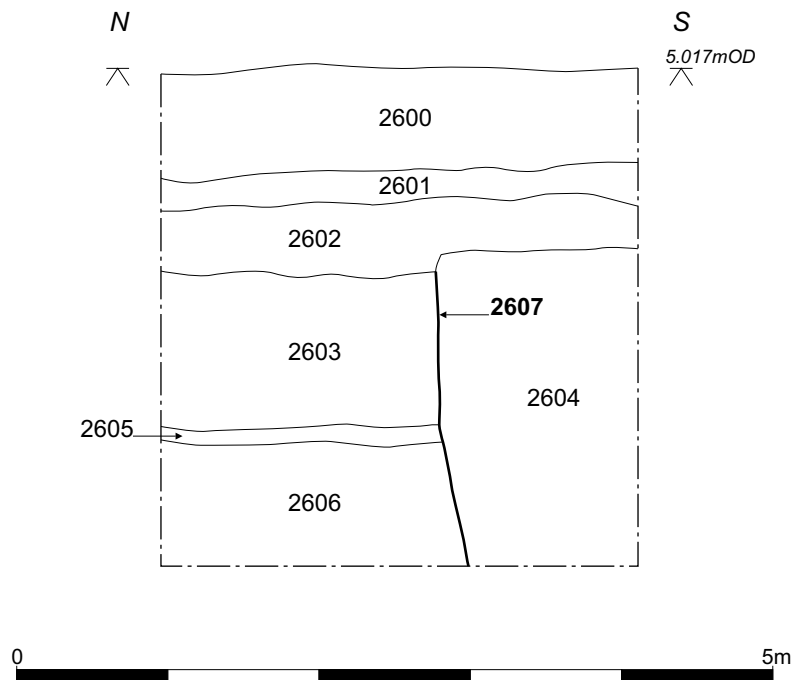
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Test Pit 19 - Section



Test Pit 26 - Section



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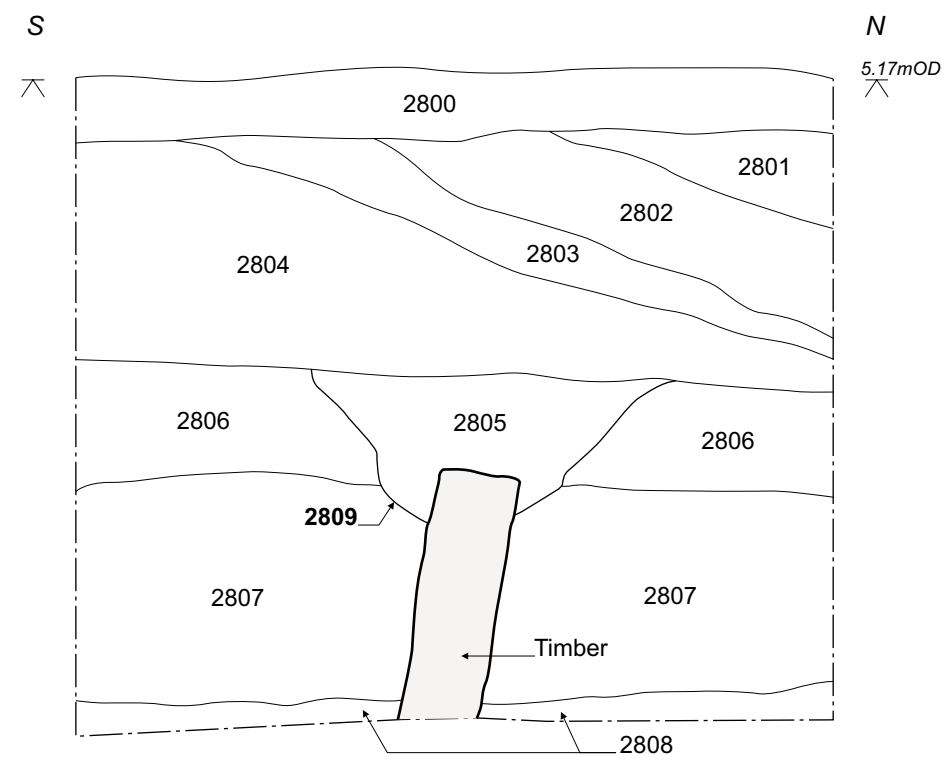
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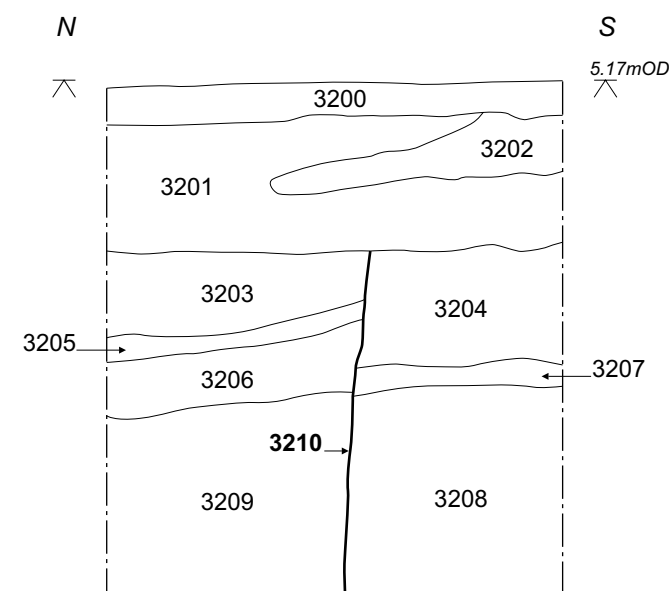
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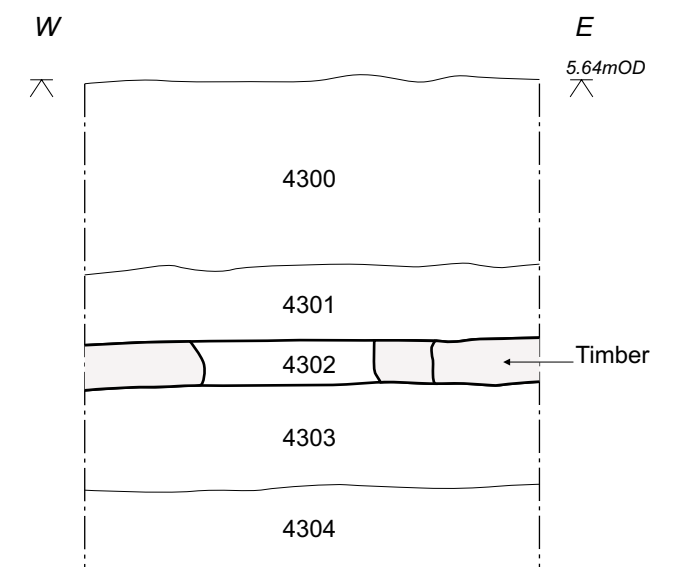
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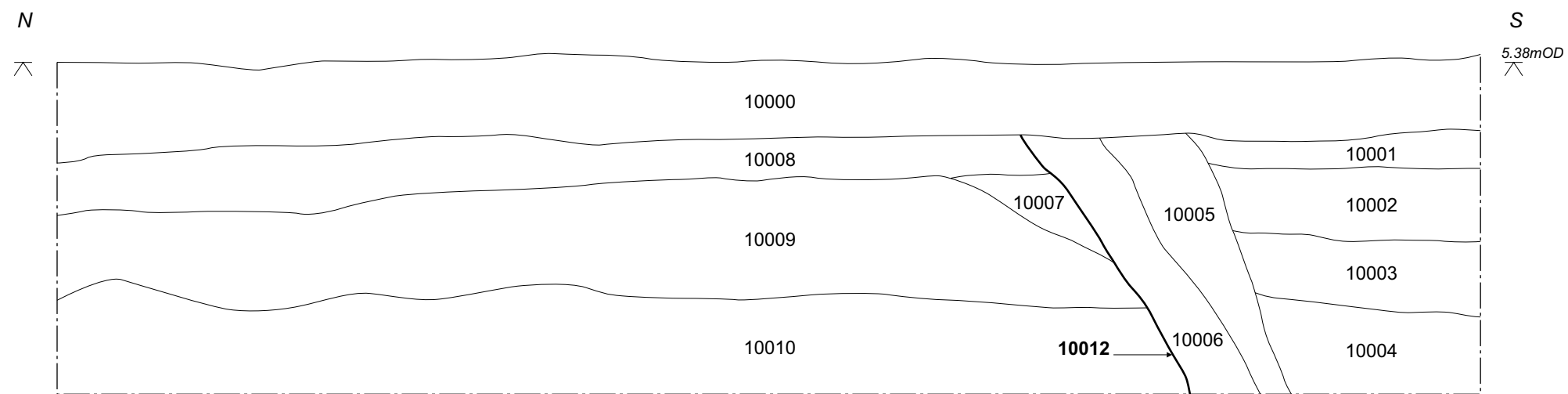
Test Pit 32 - Section



Test Pit 43 - Section



Test Pit 100 - Section



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