

***AN ARCHAEOLOGICAL INVESTIGATION OF
DRAKE'S LEAT,
ENDSLEIGH PLACE,
PLYMOUTH***

JANUARY 2007

National Grid Reference: SX 4800 5510

Site Code: AR 2006 500

On behalf of: Scott Wilson Ltd
The Design Innovation Centre
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And

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1 A NON-TECHNICAL SUMMARY

- 1.1 This document summarises the results of an archaeological investigation conducted by AOC Archaeology Group, at Endsleigh Place, Plymouth, on behalf of Scott Wilson Ltd and Cowlin Construction Ltd. The archaeological investigation was carried out during October 2006 and was allocated the site code and accession number AR 2006 500. The excavations uncovered the structural remains of Drake's Leat in the form of a limestone culvert.

2 INTRODUCTION

- 2.1 The site is centred on NGR SX 4800 5510 immediately to the north of Plymouth within the northern extent of Plymouth City centre (Figure 1). The site is currently occupied by Nos 2-12 Endsleigh Place, together with the carriageway and footpaths in front of the properties. Situated within close proximity to the site's eastern boundary is Drake's Reservoir (Figure 2&3).
- 2.2 The site itself comprised a tarmac footpath with planter beds which ran its length either side. The full length of the pathway measured approximately 25m by 5m.

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

- 3.1 The archaeological and historical background of the site has been fully discussed in the Project Design (Scott Wilson, 2006b) and is summarised below:
- 3.2 Scott Wilson Ltd commissioned Geotechnology to carry out a ground penetrating radar survey in May 2006 with the objective of sensing the position of the leat. The methodologies for the survey were developed in consultation with Scott Wilson Heritage, due to the leat's historic nature.
- 3.3 Scott Wilson Ltd carried out an Archaeological Observe and Record exercise of geotechnical investigations at Endsleigh Place, (Scott Wilson, 2006a). These works were undertaken between 18th and 26th May 2006 and were coordinated by Yeandle Geotechnical Ltd. The test pits were excavated either side of the retaining wall of those properties which front onto Endsleigh Place. Those on the eastern side of the wall revealed varying deposits of topsoil, sub-soil and made ground. The underlying slate natural was observed in Test Pit 1. The natural was not encountered in Test Pits 3 and 4 but varying deposits of topsoil and subsoil were found. During the works it was noted that the ground level in the area of Test Pits 3-4 was higher than that in Test Pits 1 and 2. This change in level is attributable to a combination of natural slope and build up.
- 3.4 No archaeological deposits and/or features were observed within the test pits. All that was exposed was a cast iron pipe which is known to feed in to Drake's Leat.
- 3.5 In April 2004 Exeter Archaeology (Best, 2004) monitored a series of geotechnical investigations to the north of Drake's Circus roundabout (SX 4800 5492), approximately 0.3km to the south of Endsleigh Place. These were undertaken by C. J. Associates Geotechnical Ltd and were carried out prior to the construction of a new Faculty of Arts building for Plymouth University.
- 3.6 Within Test Pit 2 a limestone drain/culvert was revealed which may have formed part of Drake's Leat. However, Exeter Archaeology suggested that it may have formed part of a smaller feeder for the leat or be associated with the cattle market which is marked on the 1867 Ordnance Survey map. Wessex Archaeology undertook further investigations within the site in August 2005, (Scott Wilson, 2006b). These works confirmed that the drain/culvert formed part of Drakes' Leat.

POST-MEDIEVAL (1485-MODERN)

- 3.7 Running through the site is the Plymouth Leat, or Drake's Leat. This was constructed between 1589-91 under an act obtained in 1585 by the Mayor and Corporation of Plymouth. The purpose of this was to bring water from the River Meavy to the city. The leat was also referred to as Drake's Leat, due to the efforts by Sir Francis Drake in gaining parliamentary approval for its construction. Initially most of the leat was an open channel which consisted of a ditch between six and eight feet wide and about two feet deep. Over time its sides were lined with stone or slate, and sections were roofed to prevent pollution and contaminated water spilling into the clean leat water. Much remedial work on the city's water supply system was carried out in the 19th century. Subsequently various sections of the leat were modified or rebuilt. This consisted of the construction of a series of reservoirs and pipes in 1852. Subsequently parts of the leat were abandoned. The test pits on the reservoir side of the retaining wall were positioned in order to locate Drake's Leat.

4 AIMS AND OBJECTIVES

- 4.1 The general objectives of the investigations as set out in the Project Design (Scott Wilson, 2006b) were:
- to record in detail the leat prior to its destruction from groundworks and construction works;
 - to determine the condition or state of preservation of the floor of the leat.
- 4.2 The specific objectives of the investigations were:
- to provide a photographic record of the leat in situ;
 - to provide phasing and/or historic context for the feature of interest, where possible.
 - to expose the entire length of the leat which will be impacted upon by the works;
 - to record the fabric and matrix of the leat;
 - to determine whether any remains associated with any previous phase of the leat exist.

5 METHODOLOGY

- 5.1 The investigation of Drake's Leat was carried out in two phases. The first phase was the removal of the tarmac surface and 0.30m of made ground by hand. The surface directly below the made ground was cleaned and recorded. The second phase involved the removal of the leat's arch using a mini digger machine. The exposed walls, sections and floor of the leat were recorded in accordance with the methodology outlined in the Project Design (Scott Wilson, 2006b).
- 5.2 Following advice from John Salvatore (Historic Environment Officer, Plymouth City Council) the floor of the leat was left in situ, as excavating the 1.5m section of the floor would have caused substantial damage to the remaining wall. Furthermore, the construction scheme for the development will preserve a large amount of the leat floor *in situ*.
- 5.3 A full written, drawn and photographic record was made of the leat in accordance with level 3 survey guidelines set by English Heritage. Hand drawn plans of the leat were produced at a scale of 1:20. Sections were drawn at a scale of 1:10 (English Heritage, 2006).
- 5.4 A Survey Station nail established at the western extent of the reservoir was used as the Temporary Bench Mark. The height for the TBM was 45.18mOD.
- 5.5 Photographic recording comprised black and white 35mm format prints, 35mm colour transparency, as well as digital photography. Both forms of photography are accompanied by a register.

6 RESULTS

- 6.1 The lowest deposit recorded on site was the floor of the leat's limestone structure (007) which was composed of a crushed limestone concrete. The surface was relatively flat with a slight gradient towards the southern end, draining the water away in a south-east direction. The floor was recorded at 43.47mOD at the south-eastern end and 43.49mOD at the north-western end.
- 6.2 The investigations demonstrated that the limestone arch and the walls either side of the leat were constructed as one build rather than two parallel walls capped by the limestone arch. The well preserved arch and walls (006) were composed of cut limestone fragments used as rough coursing (Figures 4&5, Plates 1-3). The cut limestone was mortared with a gritty sandy lime mortar similar to the mortar used in deposit (004). The size of fragments used varied from 0.05m-0.20m wide and 0.13m-0.40m long. The side walls measured between 0.40m and 0.50m wide with the arch measuring 0.40m thick. The complete structure measured 1.75m deep, (internally 1.35m) and the internal width measured 2.10m. The western length of the side wall was rendered up to 0.60m from the floor. This was not repeated on the eastern side wall. This may relate to the proximity of the leat to the adjoining buildings, with the render added as a precaution against leakage or damp. Possibly the render was added at a later date as a result of one of the above reasons.

- 6.3 Limestone structure (006) terminated at the southern end of the site. At the terminal end was the remains of a separate structure which comprised an inspection chamber and a large cast iron pipe (008) (Figure 6). The chamber measured 1.10m long by 0.90m wide and 0.90m deep and was constructed with cut limestone blocks varying in size from 0.19m long by 0.07m deep to 0.45m long by 0.17m deep. The western wall of the chamber formed a more substantial wall which curved and continued beyond the limits of excavation to the west. Both walls had rendering approximately 0.25m up the wall from the floor (Figure 6). The pipe laid within the wall and base of the inspection chamber measured approximately 0.75m in diameter and sloped significantly in a south-west direction. An inspection of the pipe suggested that it would have been used to carry water out of the leat culvert and away to the south.
- 6.4 The arch covering the leat was mechanically removed by first breaking through the central keystones and then breaking the remainder of the arch inwardly. The removal of the arch was hampered by the material used as backfill and make up to form the horizontal surface (003) (Figure 5). Backfill deposit (004) was composed of compacted limestone fragments with occasional slate which was mortared into place. Deposit (004) was recorded on the western side of the arch whilst the eastern side of the arch was deposit (005). Although similar in the use of limestone, (005) was not as compacted. Deposit (004) might have been more heavily constructed due to its proximity to the adjoining property, where a less solid deposit might have weakened the structural integrity of the building.
- 6.5 Overlying the arch of the culvert was deposit (003) which comprised a mixture of deposits, varying from deliberately laid stone fragments to the remains of a removed brick floor surface (Figure 7). The stone fragments formed a rough cobbled surface which was probably a path or backyard surface which might have related to an adjoining property before the recent property boundaries were erected. The majority of the remaining area was covered by mortar, stone and brick residue. The mortar and brick residue appeared to be the remains of a brick surface which was probably the original surface laid directly over the leat before a later phase of surfacing (001) was laid. The remaining stone fragments which ran centrally along the length of the site were the top 0.05m of the key stones of the leat's stone arch (Figure 7).
- 6.6 The backfill and madeground deposits described above were mortared, and sealed the stone arch covering the leat. This being the case, it was not possible to remove these deposits to reveal the outside of the arch itself as proposed in the Project Design (Scott Wilson, 2006b).
- 6.7 The entire site was covered by made ground (002) and a tarmac surface and vegetation (001).

7 DISCUSSION

- 7.1 Unlike the remains seen outside Plymouth City Centre, where the leat is still composed of a simple ditch with granite, slate or limestone supported banks, the leat on site ran through a well constructed culvert or culvert constructed from raggedly cut limestone blocks and a hard concrete floor. This structure is very similar to another section of the leat which was revealed during building work on Houndiscombe Road in 1984. The Houndiscombe Road section of the leat, approximately 200m north of the current site, was constructed with the same fabrics and in the same manner. Hawkins (1987) suggests that the Houndiscombe Road section was built in the 1860's. At this time sections, or possibly the entire length the leat which ran through the city, were renovated and improved to protect the water supply from pollution. As both sections of the leat (Houndiscombe Road and the current site) are almost identical, it suggests that the section recorded on site dates to the same period.
- 7.2 The relative chronology of the leat's culvert and the structure (008) recorded at the southern end of the site is unclear. The original course of the leat according to Bush (2000) directed the flow of water into the reservoir which would have then been diverted down towards the docks. The reservoir, located to the south-west of the site, was formerly two separate structures constructed between 1825 and 1828; however, in 1891 they were amalgamated (www.plymouth.gov.uk). At some stage the water appears to have been diverted away from the reservoir and directed through the cast iron pipe, down the North Hill reservoirs and across or around Drake's Place/Garden. This may have been achieved during the 1860's improvement of the leat or during the amalgamating of the two reservoirs in 1891.
- 7.3 The on-site remains of the leat's culvert and structure (008) do not clarify the chronology, as either structure could have been added to the other. It is possible that the limestone culvert could have been added onto the earlier chamber and pipe during the leat's improvements, thus the diversion of the water away from the reservoir would already have been established. However, the limestone culvert could have been partially demolished at its most southerly end to install the later chamber and pipe to divert the leat's flow away from the reservoir. Unfortunately due to the lack of datable artefacts, detailed plans or maps the correct chronology cannot be completely established.

8 STRATIGRAPHIC SITE ARCHIVE

Stratigraphic Site Archive	Quantity
Context Sheets	8
Context Register Sheets	1
Trench Record Sheets	0
Plans	4
Plan Register Sheets	1
Section Sheets	6
Section Register Sheets	1
Levels Sheets	1
Registered Finds Sheets	0
Stratigraphic Matrices	1
Photographic Register Sheets	3
Environmental Sample Register Sheets	0
Photographs, Black & White	20
Colour Slides	20
Digital	42

8.1 WORK CARRIED OUT ON THE STRATIGRAPHIC ARCHIVE

8.1.1 The site records have been completed and checked. Stratigraphic matrices have been compiled for the site. A cross referenced context register has been completed, (Appendix A of this document). Several illustrations have been completed to accompany the results showing the location of the phased work and the archaeology discovered within those phases. The photographic archive has been checked, marked and referenced according to Plymouth City Museum guidelines.

9 ACKNOWLEDGEMENTS

The author and AOC Archaeology Group would like to thank Scott Wilson and Cowlin Construction for commissioning and generously funding the on site investigation and analysis. Thanks are due to Jim MacQueen of Scott Wilson, for his support and guidance throughout the project and to Jon Salvatore, Historic Environment Officer for Plymouth City Council Planning and Regeneration Service, for his advice and support. Thanks are also due to Chris Clarke for his on site assistance. The report illustrations were by Jonathan Moller. The report was internally edited by Ron Humphrey and externally by Jim MacQueen of Scott Wilson.

10 BIBLIOGRAPHY

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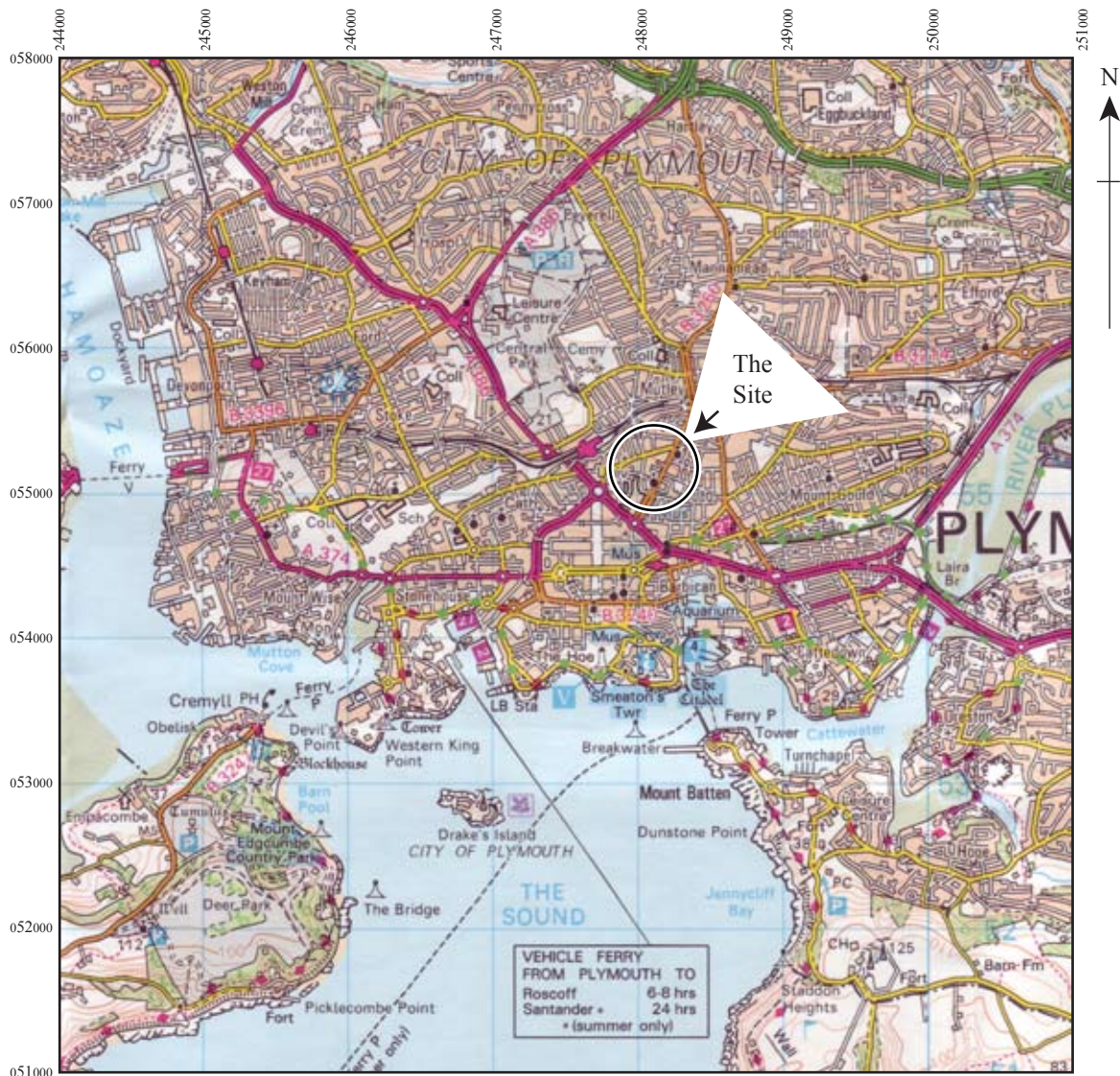
Bush R (2000) Plymouth (Drake's) and Stonehouse Leats

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Figure 1: Site Location

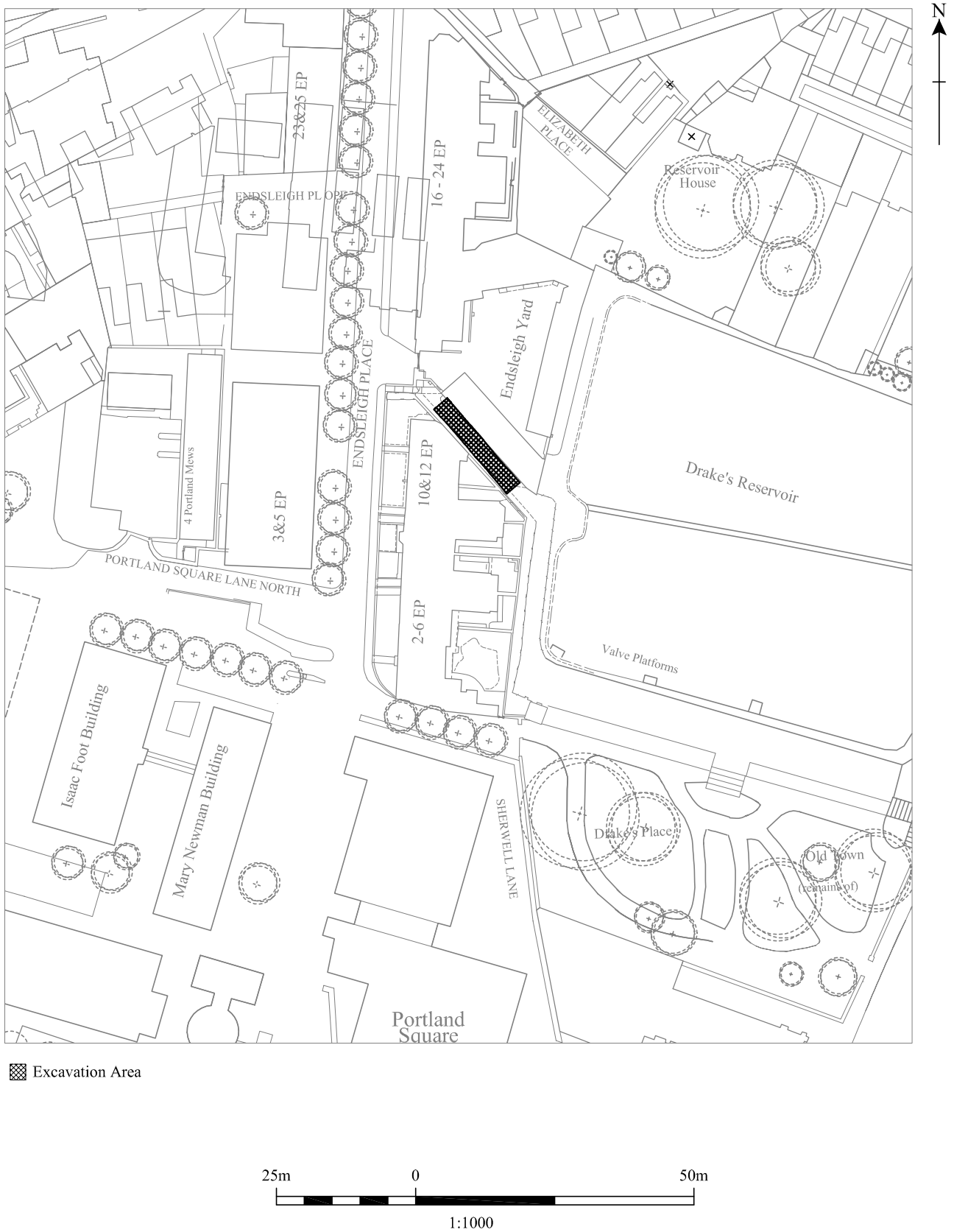
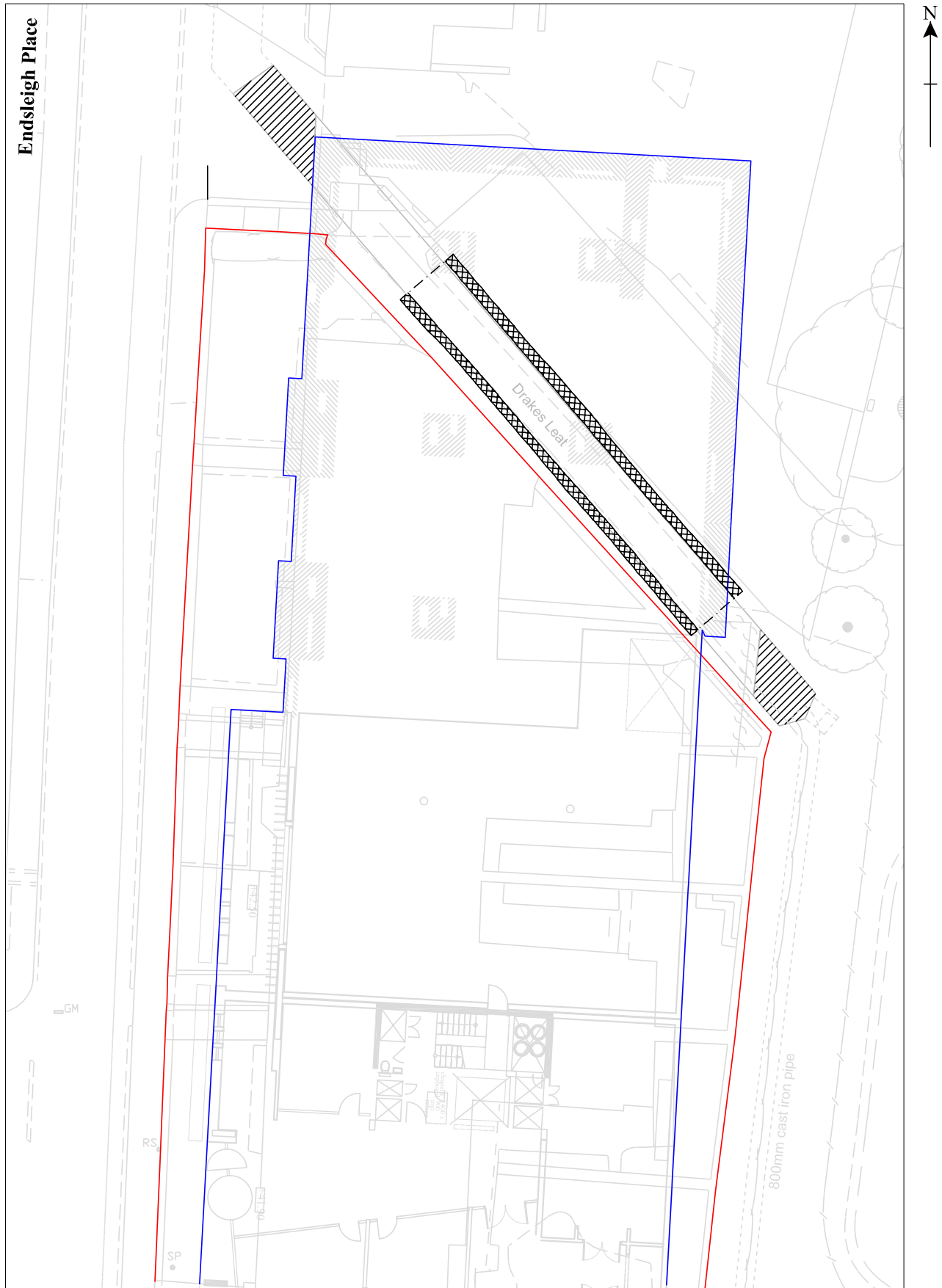


Figure 2: Detailed Site Location



Based on a Plan Provided by Scott Wilson



1:250

- ☒ Side Walls Left in Situ
- ☒ Preserved in Situ
- Current Development
- Proposed Development

Figure 3: Detailed Site Location

South-West Facing Section of Side Wall Showing a 4m Detailed Section

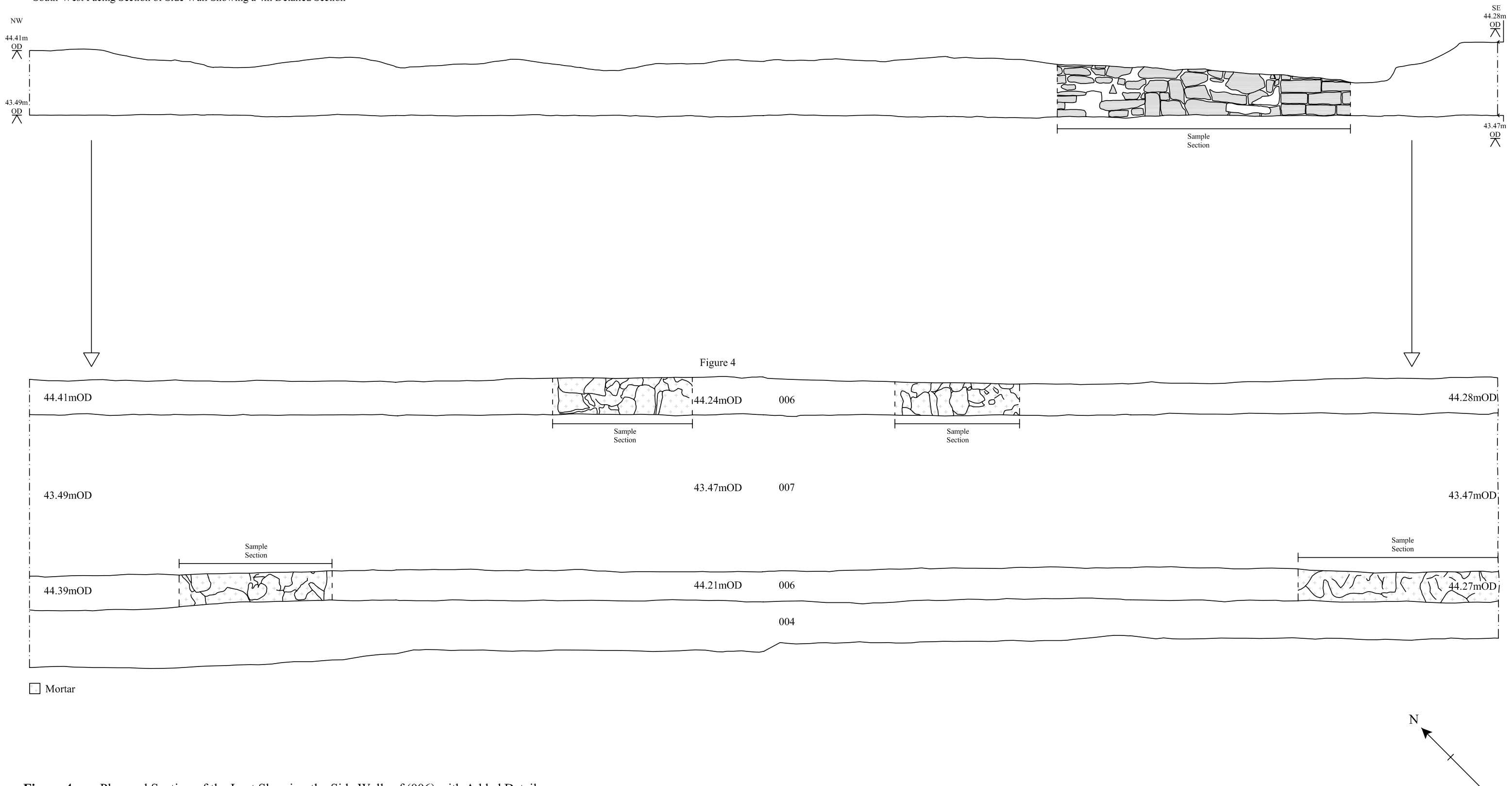
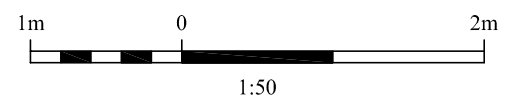


Figure 4: Plan and Section of the Leat Showing the Side Walls of (006) with Added Detail



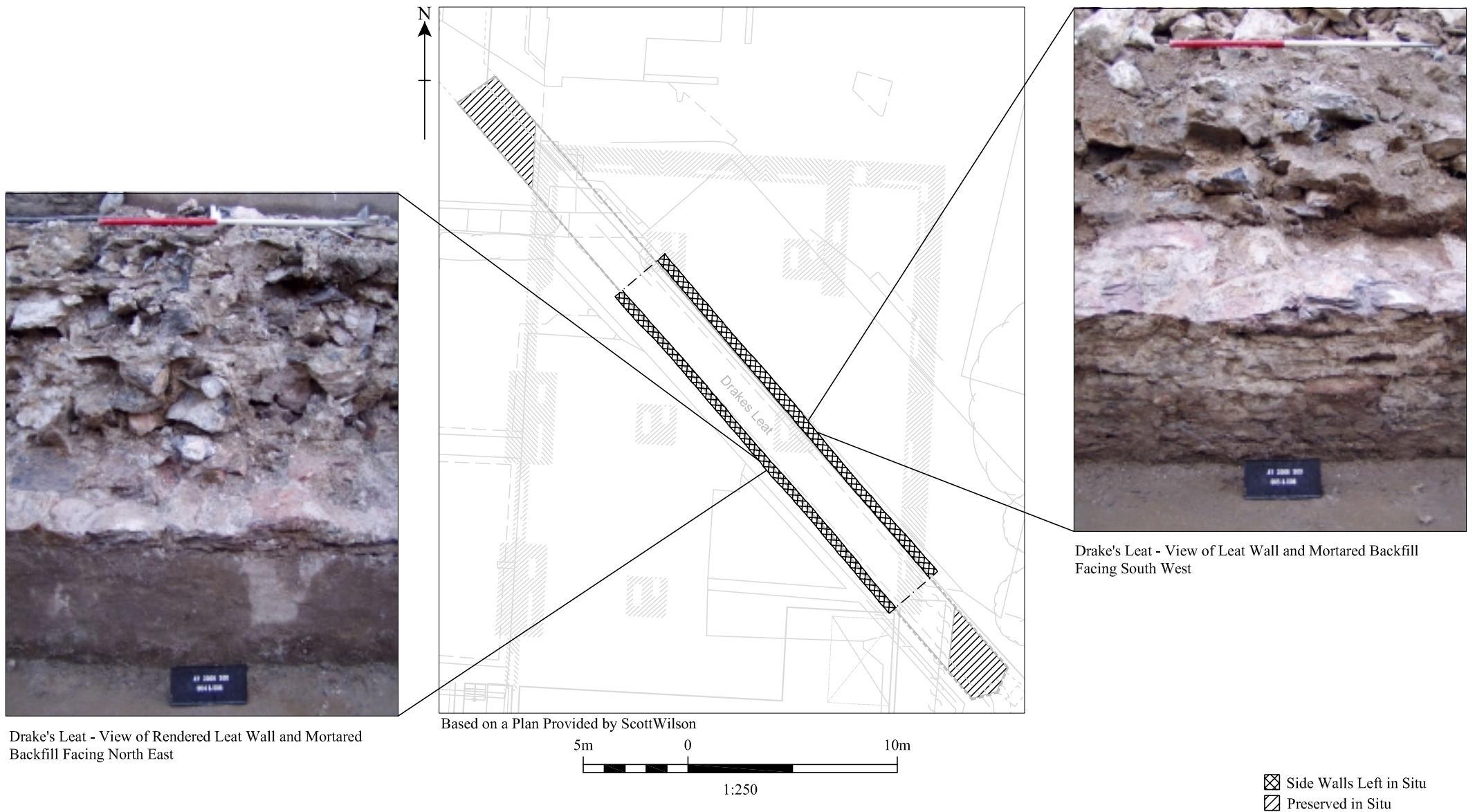
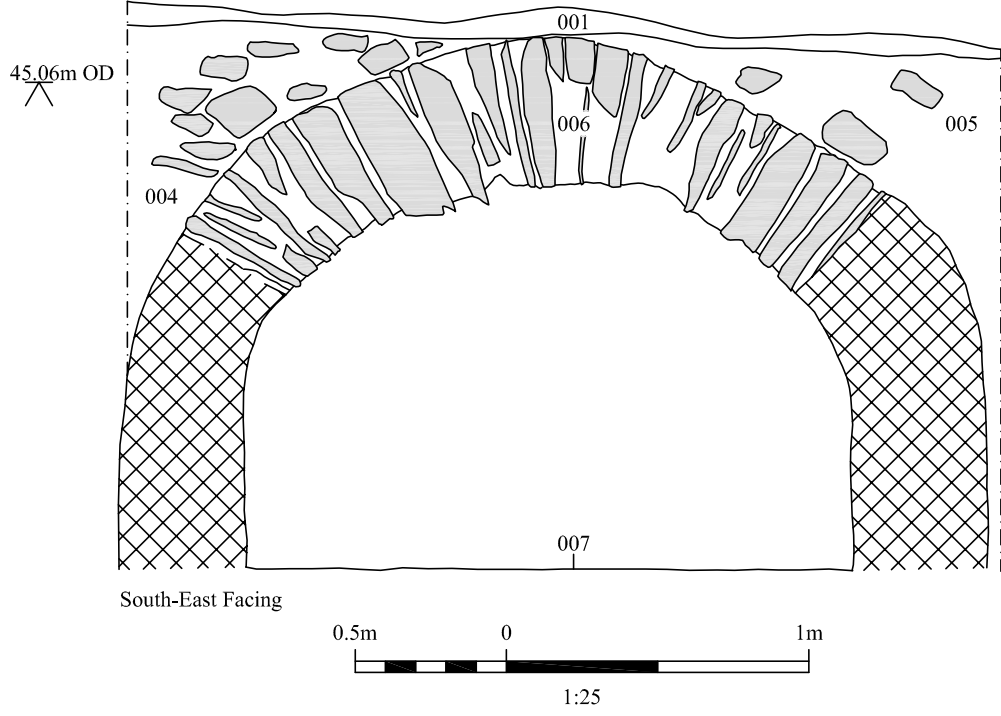
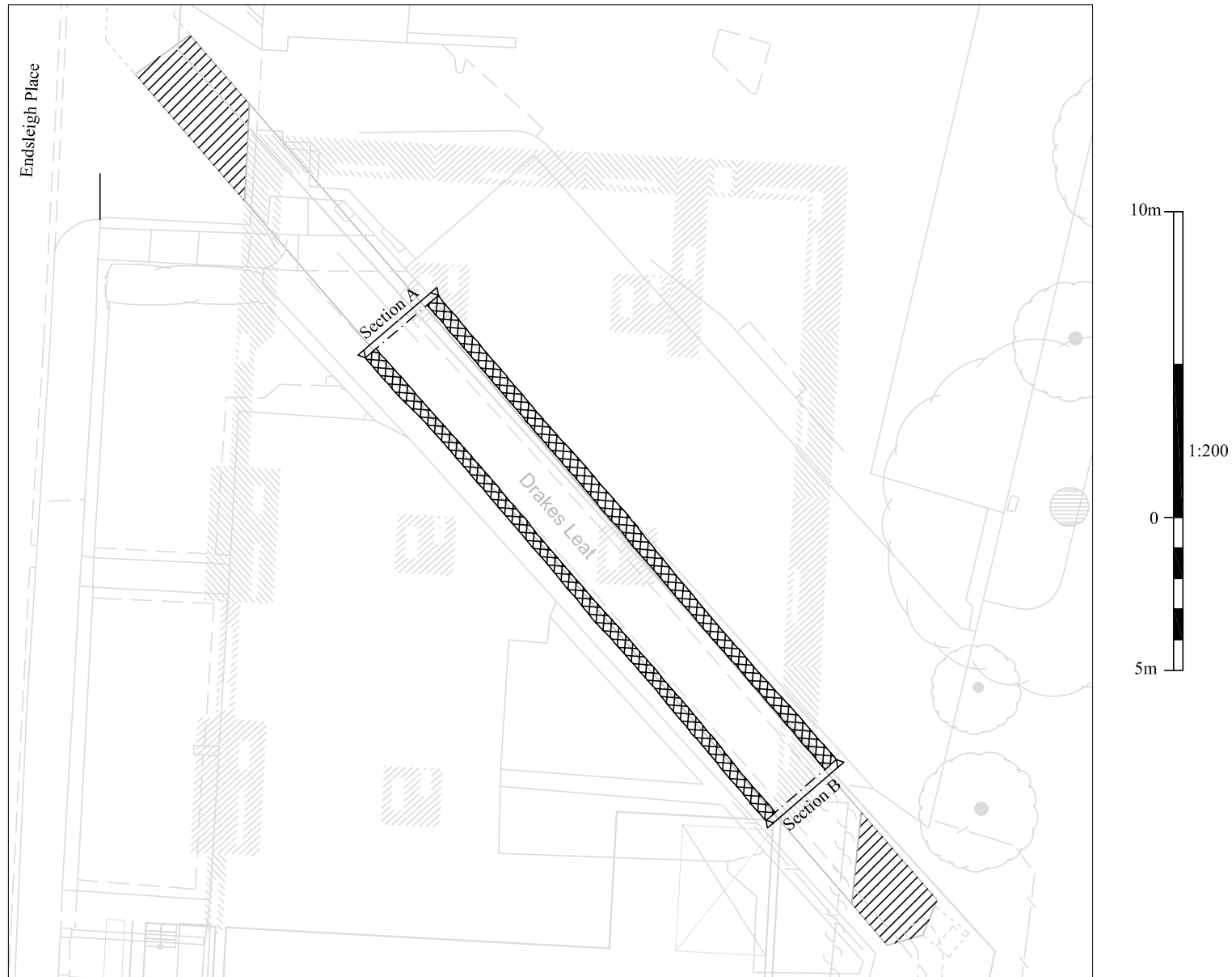


Figure 5: Located Sample Section Photographs

Section A

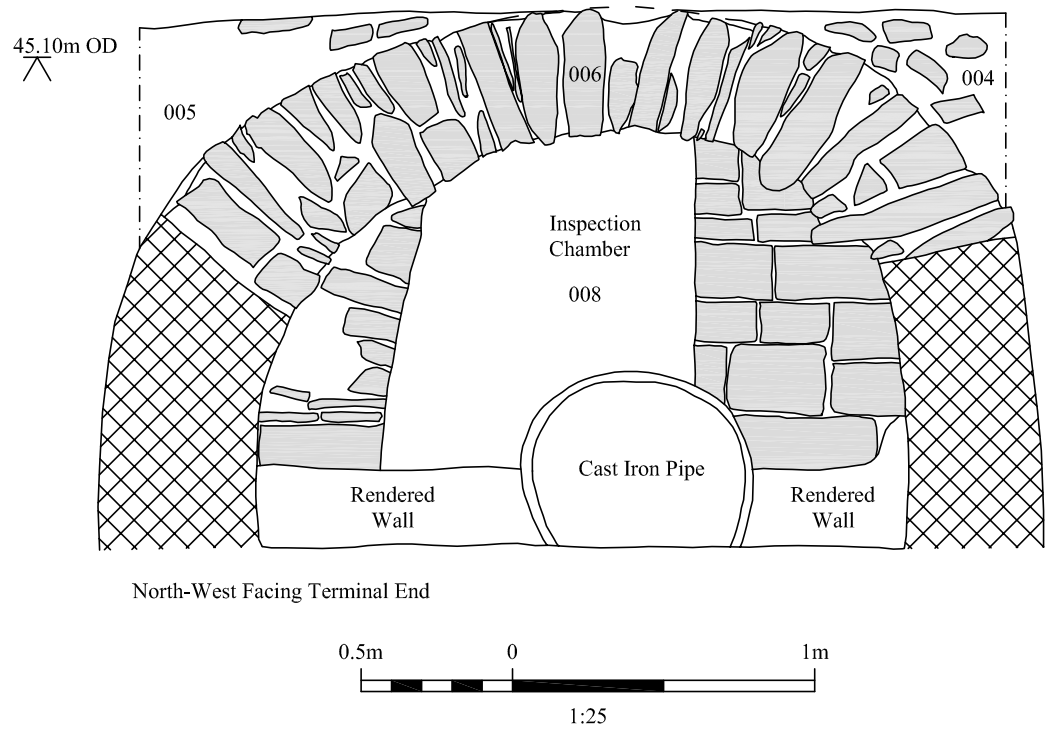


Plan of Drake's Leat



Based on a Plan Provided by Scott Wilson

Section B



- Limestone
- ⊗ Side Walls Left in Situ
- ▨ Preserved in Situ

Figure 6: Located Sections Through Drake's Leat

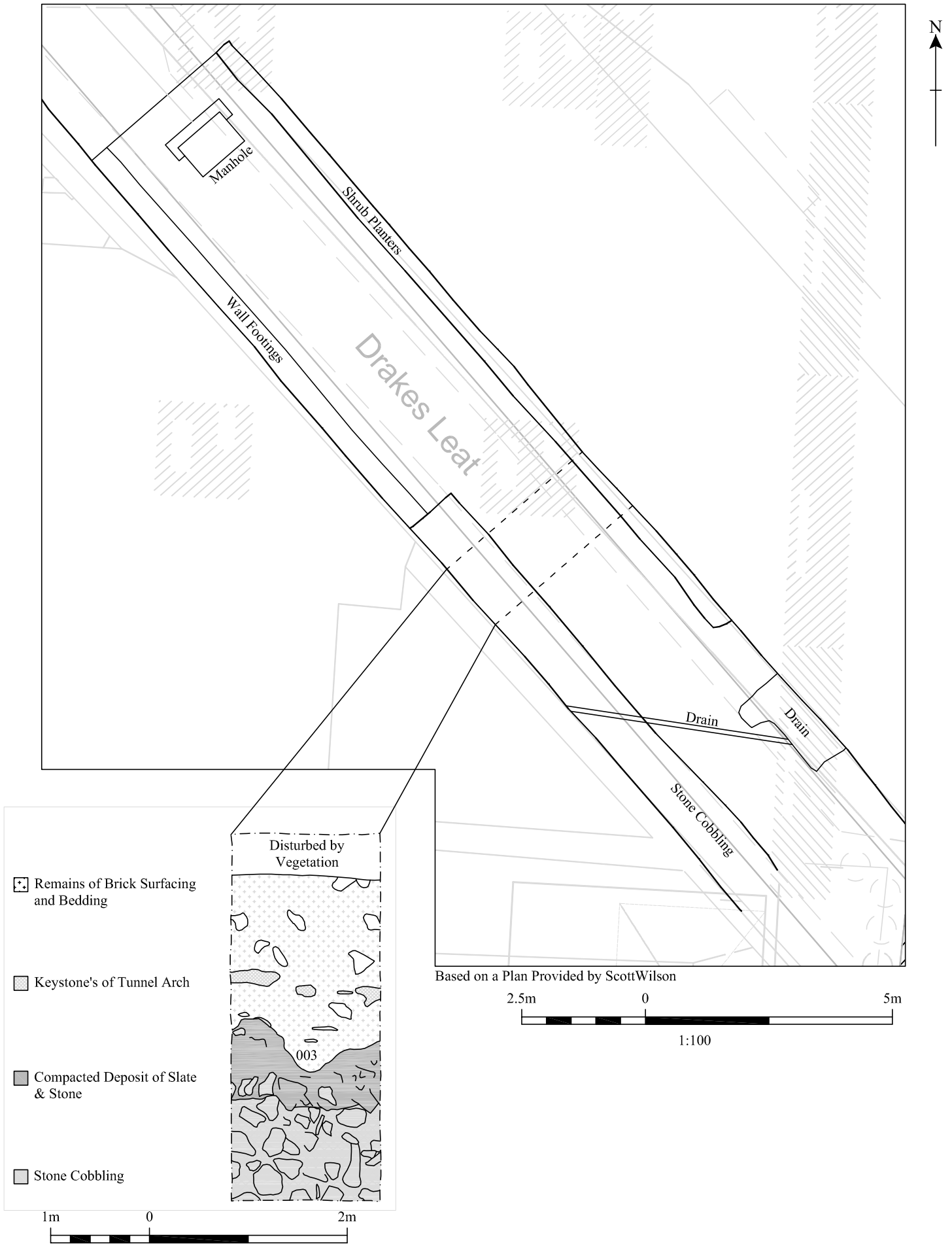


Figure 7: Detailed Plan of Post Medieval Surfaces (003)



Plate 1: Drake's Leat - South East Facing Section



Plate 2: Drake's Leat - South East Facing View



Plate 3: Drake's Leat - North West Facing View

APPENDIX A

Context	Description	Length	Width	Depth
001	Tarmac and vegetation	Site	Site	0.05m
002	Mixed dark grey and brown silty clay with inclusions of brick	Site	Site	0.30m
003	Stone cobbles, slate and brick surfacing	Site	Site	0.10-0.30m
004	Mortared stone backfill	Site	0.70m	1.05m
005	Mortared but looser stone backfill	Site	NFE	0.80m
006	Limestone culvert/culvert	Site	2.94m	1.75m
007	Concrete floor	Site	2.10m	NFE
008	Inspection chamber, wall and cast iron pipe	-	-	-

APPENDIX B – MATRIX

