



# Thacka Beck Flood Alleviation Scheme, Penrith, Cumbria

## Archaeological Measured Building Survey of Culverts



**Oxford Archaeology North**

September 2010

**Environment Agency**

Issue No: 2010-11/1098

OA North Job No: L10253

NGR (centred): NY 51743 30222

**Document Title:** THACKA BECK FLOOD ALLEVIATION SCHEME, PENRITH,  
CUMBRIA

**Document Type:** ARCHAEOLOGICAL MEASURED BUILDING SURVEY OF  
CULVERTS

**Client Name:** Environment Agency

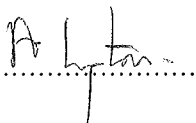
**Issue Number:** 2010-11/1098  
**OA Job Number:** L10253  
**OA Site Code:**

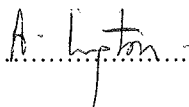
**National Grid Reference:** NY51743 30222 (centre)

**Prepared by:** Karl Taylor  
**Position:** Project Officer  
**Date:** September 2010

**Checked by:** Emily Mercer  
**Position:** Project Manager  
**Date:** September 2010

**Approved by:** Alan Lupton  
**Position:** Operations Manager  
**Date:** September 2010

Signed.....

Signed.....

**Oxford Archaeology North**

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

w: [www.oxfordarch.co.uk](http://www.oxfordarch.co.uk)  
e: [info@oxfordarch.co.uk](mailto:info@oxfordarch.co.uk)

**© Oxford Archaeology Ltd (2010)**

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

Oxford Archaeology Limited is a Registered Charity No: 285627

**Disclaimer:**

*This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Oxford Archaeology being obtained. Oxford Archaeology accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person/party using or relying on the document for such other purposes agrees, and will by such use or reliance be taken to confirm their agreement to indemnify Oxford Archaeology for all loss or damage resulting therefrom. Oxford Archaeology accepts no responsibility or liability for this document to any party other than the person/party by whom it was commissioned.*

---

## CONTENTS

---

|                                            |           |
|--------------------------------------------|-----------|
| <b>SUMMARY .....</b>                       | <b>2</b>  |
| <b>ACKNOWLEDGEMENTS .....</b>              | <b>3</b>  |
| <b>1. INTRODUCTION .....</b>               | <b>4</b>  |
| 1.1 Circumstances of Project.....          | 4         |
| 1.2 Location, Topography and Geology ..... | 4         |
| 1.3 Historical Background.....             | 4         |
| <b>2. METHODOLOGY .....</b>                | <b>6</b>  |
| 2.1 Project Design.....                    | 6         |
| 2.2 Objectives .....                       | 6         |
| 2.3 Methodology.....                       | 6         |
| <b>3. WATCHING BRIEF RESULTS .....</b>     | <b>8</b>  |
| 3.1 Introduction .....                     | 8         |
| 3.2 Culvert Descriptions.....              | 8         |
| <b>4. CONCLUSION .....</b>                 | <b>18</b> |
| <b>5. BIBLIOGRAPHY.....</b>                | <b>20</b> |
| 5.1 Primary Sources.....                   | 20        |
| 5.2 Secondary Sources .....                | 20        |
| <b>6 ILLUSTRATIONS.....</b>                | <b>22</b> |
| 6.1 Figures .....                          | 22        |
| 6.2 Plates .....                           | 22        |
| <b>APPENDIX 1: PROJECT DESIGN.....</b>     | <b>24</b> |

---

## SUMMARY

---

Thacka Beck flows through the town of Penrith, and for much of its course is culverted below the streets within a stone-lined culvert. As part of an on-going flood alleviation scheme, much of the culvert is due for replacement. As parts of it date back to at least the nineteenth century, Cumbria County Council Historic Environment Service (CCCHES) outlined recommendations that the existing stone-lined culverts be recorded in accordance with English Heritage guidelines (2006).

Sections of the Thacka Beck culvert follows a course below the eighteenth century Mansion House and associated listed walls, which were the subject of a separate survey carried out by Oxford Archaeology North in November and December 2009 (OA North 2010). An archaeological measured building recording survey was undertaken prior to their removal in advance of the culvert replacement works. The work on the culverts commenced in May 2010 following removal of the listed walls within the Mansion House area.

Thacka Beck is listed on the HER as a medieval earthwork, along the course of the waterway now running below the town. It is believed to have been first constructed as a leat in 1300 to take water to Penrith from the River Patteril due to the town's wells being so polluted (Bowen 2005). The watercourse was canalised by a Victorian culvert as it entered the town.

A measured building recording survey under watching brief conditions was carried out to establish the nature, extent and survival of the culverts identified for removal, and comprised an outline measured survey, together with brief descriptions of each section. The recording was limited to a photographic record, brief outline description and sketch section drawing.

In general, the inspected sections of culverts are all constructed from the same red sandstone fabric and use similar construction methods with a segmental arch and sandstone imposts. Some sections have previously been repaired and replaced with varying materials including concrete slab capping. The floor of some sections has been grouted obscuring the nature of the construction and, in addition to this, debris and gravel deposits have also obscured it. However, the floor of the culvert was partially visible at some locations suggesting that cobbles were mainly used.

For some of its length, the culvert is open and it has been suggested that it was originally constructed around 1300 to provide drinking water and may have been open for the whole of its length (Bowen 2005). Although there is no evidence pertaining to the construction method of the original watercourse, it was possibly stone-lined. It was canalised during the Victorian period, when the arched roof and imposts were probably added to certain sections. There was no evidence of a separate possibly earlier structure during the recording works suggesting the lengths of culvert subject to monitoring are probably of nineteenth century origin.

## ACKNOWLEDGEMENTS

---

Oxford Archaeology North would like to thank James Goad and Kate Howard of the Halcrow Group Ltd for commissioning the project, and also acknowledge the assistance of Chris Leach of Birse, Alan Thompson of the Environment Agency, and G & A M Lawson on site.

The building recording was undertaken by Jeremy Bradley and Karl Taylor and report writing was undertaken by Karl Taylor. The project was managed by Emily Mercer, who also edited the report.

---

## 1. INTRODUCTION

---

### 1.1 CIRCUMSTANCES OF PROJECT

- 1.1.1 Thacka Beck flows through the town of Penrith and for much of its course is culverted below the streets within a stone-lined culvert. As part of on-going flood alleviation scheme, much of the culvert is outlined for replacement and given that parts of it date back to at least the nineteenth century and are in poor condition, Cumbria County Council Historic Environment Service (CCCHES) outlined recommendations that the existing stone-lined culverts be recorded in accordance with English Heritage guidelines (2006) under watching brief conditions.
- 1.1.2 Part of the Thacka Beck culvert follows a course below the eighteenth century Mansion House and its associated listed walls, which were the subject of a separate survey carried out by Oxford Archaeology North (OA North) in November and December 2009 (OA North 2010). An archaeological measured building recording survey (English Heritage Level II (2006)) of sections of the Grade II and Grade II\* listed walls, further unlisted walls (but within the curtilage of listed properties), and the wall of a listed cottage close to Mansion House, Penrith, Cumbria (the Mansion House is listed Grade II\* LBS No 72785), was undertaken prior to their removal in advance of the culvert replacement works. The latter commenced in May 2010 following removal of the listed walls within the Mansion House area.

### 1.2 LOCATION, TOPOGRAPHY AND GEOLOGY

- 1.2.1 In total, seven culvert sites were recorded along the line of the culvert; Watson Terrace, NY 351295 530496; Sandgate to the Mansion House, NY 351770 530247 (one section for Sandgate and one section each side of the Mansion House); Friargate, NY 351786 530160; Somerfield Car Park, NY 351777 530034; and Roper Street to White House Gardens, NY 351898 529846.
- 1.2.2 For the most part, the topography of the site is flat or slightly sloping to the south. The bedrock geology consists of Permian New Red Sandstone (IGS 1979), whilst the overlying superficial deposits are Till (BGS 1977).

### 1.3 HISTORICAL BACKGROUND

- 1.3.1 The line of a Roman road between Manchester and Carlisle lies to the east of Penrith, and passes through the Roman fort at Brougham, situated to the south-east of the town, positioned to guard the nearby crossing of the River Eamont (Allan 1994, 6; Shotter 1997, 35). A large cluster of Roman landscape elements, structures, and stray finds have been recorded in this area (Cumbria County Council 2002, 29, map D). Two unstratified and poorly-located Roman coins have been discovered within Penrith, but there is no firm evidence to suggest any significant Roman activity ever took place within the town and, certainly no evidence of settlement (*op cit*, 5).

- 1.3.2 Although there is no documentary evidence for settlement in Penrith prior to the twelfth century, it has been suggested that the street plan indicates pre-Norman settlement, with St Andrew's Church at its centre (Winchester 1979, quoted in Cumbria County Council 2002, 6). A church (originally a defensible church tower) has stood on the site since at least the thirteenth century but the current building was built by Nicholas Hawksmoor in 1720 (Pevsner 1967, 173-4). A cross-shaft fragment, dated to the late eighth to early ninth century, was found built into the wall of Tynefield House in Penrith (Richardson 1998, 32). This is of considerable importance since it is the only artefact that pre-dates the Viking domination of Penrith during the early tenth century (*ibid*). There are significant tenth century monuments within St Andrew's churchyard, and these have been scheduled (SM 23662), although they are not thought to be in their original locations (Anon 1947, 225). The monuments include the famous Giant's Thumb High Cross and Giant's Grave, the latter comprising two crosses and four hogback stones (*op cit*, 221, 225). There is no record of early medieval remains within the site.
- 1.3.3 The surviving remains from the medieval period are high status buildings; St Andrew's Church and Penrith Castle, dated to the fourteenth century; Hutton Hall (Anon 1947, 219), which dates to as early as the fourteenth or fifteenth century (Pevsner 1967, 176); and the Gloucester Arms, which was formerly known as Dockray Hall, that dates to the late fifteenth century (*op cit*, 177). A standing structure known as the Plague Stone is on a somewhat smaller scale, but performed an important function during the great plague in 1598, when it was used to transfer corn between the town and country people (DoE 1983, map 3 item 41). Specific below ground remains listed by the Historic Environment Record (HER) include the site of the late medieval friary founded in the late thirteenth century (Haswell 1903, 350; Moorhouse 1971, 137), and the site of the Old Grammar School, which was founded in the fourteenth century (Nicolson and Burn 1777, 410). John de Whelpdale was one of the original governors and the family went on to build the Mansion House in 1750.
- 1.3.4 Thacka Beck is listed on the HER as a medieval earthwork, along the course of the waterway now running below the town. It is believed to have been first constructed as a leat in 1300 to take water to Penrith from the River Petteril due to the town's wells being so polluted (Bowen 2005). The watercourse was canalised by a Victorian culvert as it entered the town.

---

## 2. METHODOLOGY

---

### 2.1 PROJECT DESIGN

2.1.1 A project design was submitted by OA North (*Appendix 1*) in response to recommendations made by CCCHES. The work was consistent with the relevant standards and procedures of the Institute of Archaeologists (IfA 2008) and English Heritage (1991; 2006), and generally accepted best practice.).

### 2.2 OBJECTIVES

2.2.1 **Archaeological Measured Building Record:** to provide a drawn, photographic, and textual record of the culverts to a Level 2 standard (English Heritage 2006). The primary intention was to record all features of archaeological and historical interest prior to removal:

- along Watson Terrace;
- to the rear of the Mansion House;
- to the front of the Mansion House (Mansion House Drive);
- adjacent to the County Council Offices, Friargate;
- to the rear of Somerfield supermarket, Friargate;
- Roper Street to White House Gardens.

### 2.3 METHODOLOGY

2.3.1 The measured building recording was carried out to establish the nature, extent and survival of the culverts identified for removal, and comprised an outline measured survey, together with brief descriptions of each section. It must be stressed that access to the excavated culverts was extremely limited and the contractors were only able to allow access for brief periods (less than half an hour), and only when it was deemed safe to do so. Very quick measurements of the exposed culverts (limited to height and width) were obtained. Therefore the recording was limited to a photographic record, brief outline description and sketch section drawing.

2.3.2 **Photographic Archive:** a photographic archive of the walls included monochrome prints, using 35mm SLR cameras and digital images (RAW format) using 35mm DSLR cameras (12.8 megapixels) were also taken to be included in the report. The archive comprised:

- general photographs of the features using 35mm and digital equipment;



- detailed scaled coverage of architectural features and structural or decorative detail using 35mm and digital equipment;
- the culverts relationship to landscape setting, other buildings, or significant viewpoint using 35mm and digital equipment.

2.3.3 **Site Drawings:** the following plans were produced:

- ground plans showing show the locations of the culverts (Figs 2-5). These are based upon drawings provided by the client;
- 'as existing' cross-sections that show the main structural components of each culvert (Figs 6-10). These are based upon the clients drawings and no additional survey by OA North was carried out due to restricted access. Only basic measurements were taken on site.

2.3.4 **Interpretation and Analysis:** a visual inspection of the all the culverts was undertaken and recorded on OA North watching brief *proforma* sheets. An outline description was maintained to Level 2 EH building recording guidelines.

## 2.4 WATCHING BRIEF

2.4.1 During the course of the culvert replacement works each section requiring a record was visited by an OA North Archaeologist and a watching brief was maintained. During the watching brief a textual and photographic record was compiled. Access to each of the excavated culvert sections was extremely limited, around 15 minutes, and only during periods when the replacement culverts were not being installed. Health and safety concerns prevented extended access into the excavated culvert.

## 2.5 ARCHIVE

2.5.1 A full professional archive has been compiled in accordance with current IfA (2008) and English Heritage guidelines (English Heritage 1991; 2006). The paper and digital archive will be provided in the English Heritage Centre for Archaeology format and will be submitted to the Carlisle Record Office on completion of the project. Copies of the report will also be submitted to the Historic Environment Record. The Arts and Humanities Data Service (AHDS) online database *Online Access index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project.

---

### 3. WATCHING BRIEF RESULTS

---

#### 3.1 INTRODUCTION

3.1.1 The archaeological watching brief and building recording was carried out in order to record those sections of culvert affected by the Thacka Beck culvert replacement in mitigation of their removal. The sites were visited on seven separate occasions on the 27<sup>th</sup> May, 11<sup>th</sup> June, 21<sup>st</sup> June, 29<sup>th</sup> June, 13<sup>th</sup> July, 26<sup>th</sup> July and 26<sup>th</sup> August. The work included descriptive text, the results of which are outlined in this section commencing with the most northerly section.

#### 3.2 CULVERT DESCRIPTIONS

3.2.1 **Watson Terrace:** this site was visited on the 26<sup>th</sup> July 2010 during replacement of a section of the culvert (Plate 1; Fig 2). The section revealed was representative of the length of culvert along Watson Terrace. The culvert ran down the north side of the street, the apex of the arch being approximately 0.2m below the road surface. During the excavation a short time window was available to inspect the existing culvert, which was found to consist of a narrow opening with a shallow rise segmental arch constructed from red sandstone voussoirs, 1.6m long by 0.1m wide by 0.32m deep (Fig 6). The sides of the culvert are of concrete (Plate 2) and it has been modified and rebuilt and/or strengthened relatively recently. The width of the culvert is approximately 3.25m by approximately 0.7m deep. The floor of the culvert is constructed using cobbles or setts of unknown material, which have been patched and repaired in places and grouted with cement.



Plate 1: Excavation of the culvert in Watson Terrace



Plate 2: Excavated culvert below Watson Terrace

3.2.2 **Sandgate:** this section of the culvert followed a course along a narrow alleyway between two buildings (Figs 3 and 7), and for health and safety reasons, access to the culvert was prohibited. The culvert was recorded on 29<sup>th</sup> June 2010 and though it was inspected from a safe distance, it was found to span almost the whole width of the alleyway (Plate 3), approximately 3.85m. It has a very shallow segmental arch of similar appearance to the culvert at Watson Terrace constructed using voussoirs of similar dimensions. The arch was a similar depth below the surface as that in Watson Terrace. The remains of sandstone side walls or imposts could be seen, which were three courses high. The floor of the culvert was not visible.



Plate 3: Excavated Culvert in Sandgate

3.2.3 **Rear of Mansion House:** this section of culvert was situated in the car park at the rear of the Mansion House (Fig 3) below sections of listed walls which were recorded by OA North in late 2009 (OA North 2010) and then removed prior to the replacement works. The recording works on the culvert were carried out on 27<sup>th</sup> May 2010, revealing that this section of culvert was covered by a large reinforced concrete slab, the removal of which was protracted (Plate 4). The culvert is approximately 2.4m wide and 0.85 deep. The arch was situated directly below the slab (which was approximately 0.5m thick) and was of similar appearance to those already described with red sandstone voussoirs which are approximately 0.15m wide and 0.35m deep (Plate 5). The arch was more semi-circular in shape (Fig 8). The side walls or imposts were constructed from random rubblestone of similar red sandstone to the arch and were approximately 0.5m thick. The floor was difficult to observe but appears to be of cobbles of similar appearance to those at Watson Terrace. In common with the other culverts already described, access for recording was severely limited.



Plate 4: Excavation of culvert at the rear of The Mansion House



Plate 5: Excavated culvert at the rear of the Mansion House

3.2.4 **Front of Mansion House:** this section of culvert lay below sections of the listed walls previously recorded by OA North (OA North 2010) (Fig 3) and was visited on June 11<sup>th</sup> 2010 when the excavation was very advanced and all of the existing stone culvert was removed (Plates 6 and 7), therefore no recording work was carried out.



Plate 6: Excavation of culvert at the front of the Mansion House



Plate 7: Excavated culvert at the front of the Mansion House

- 3.2.5 **Friargate:** the culvert at this location was visited on the 21<sup>st</sup> June 2010. The fabric and nature of construction was similar to the culverts already described, which was of red sandstone (Plate 8). The apex of the arch was approximately 1m above the base of the culvert and the arch was approximately 0.30-0.36m thick, each voussoir measuring approximately 0.56m by 0.3m by 0.16m (Fig 8). Unlike the other culverts already described, a triangular keystone was present (Plate 8). The mortar consisted of both cement and lime. The side walls or imposts, of which little could be inspected, stood to a height of approximately 0.24m (three courses) and were constructed from squared red sandstone, each stone measuring approximately 0.47m by 0.90m, although this varied somewhat. The mortar was lime.
- 3.2.6 The base of the culvert, which measured 2.20m wide, was visible and consisted of rounded cobbles which, on average, measured approximately 0.3m by 0.12m (Plate 9).



Plate 8: Excavated culvert at Friargate



Plate 9: Floor of the excavated culvert at Friargate

3.2.7 **Somerfield Car Park:** in similar fashion to the other culverts already described, access to this excavation was severely restricted and limited to short periods of access when installation of the new culvert was not taking place. The recording of the culvert took place on 13<sup>th</sup> July 2010 (Plate 10) and it was revealed to be of similar appearance, construction and fabric to those already described, although a large amount of rubble and debris obscured much of it

(Plate 11). The apex of the arch was approximately 0.1m below the current ground surface, which comprised a concrete slab. The depth of the culvert from the soffit of the arch to the visible base was approximately 0.5m (Fig 10; Plate 11), although it appears that the original floor may have been lower and the current floor is of later repair and grouting. An eroded section seemed to corroborate this, although no lower floor surface was visible. The width of the culvert was approximately 2.2m, although due to the amount of debris and rubble, this was difficult to ascertain exactly. The imposts were visible and were of the same or similar construction to those present at the Friargate section (*Section 3.2.5*)



Plate 10: Excavation of the culvert at Somerfield Car Park



Plate 11: Excavated culvert at Somerfield Car Park





Plate 12: Imposts of the excavated culvert at Somerfield Car Park

3.2.8 **Roper Street to White House Gardens:** this section of culvert was inspected on 25<sup>th</sup> August 2010. Access to the excavation was, again, restricted due to health and safety reasons. This section of culvert passes below Roper Street and into White House Gardens before exiting into the open air just to the south (Plate 13). There are two differing sections of culvert in this location; the culvert below Roper Street is to remain *in situ* and is of slightly different appearance to those culverts already inspected (Plate 14); to the south of this in White House gardens, the culvert is of similar appearance to those already described (Plate 15). A later, concrete section of culvert formed the transition between the two sections.



Plate 13: Excavation of the culvert at Roper Street to White House Gardens



Plate 14: Excavated culvert passing below Roper Street

3.2.9 The overall appearance of the section of the section culvert passing below Roper Street is one of more substantial and higher quality construction. The south-facing section elevation of the arch was revealed to be of tooled squared voussoirs (Fig 11, Plate 14). The cross-sectional depth of the culvert was approximately 0.9m and the internal width was 2.6m. The apex of the culvert was approximately 0.7m below ground level. The floor of the culvert was not visible due to a build up of debris. The arch measured approximately 0.4m thick and each of the voussoirs were approximately 0.1–0.15m wide. The imposts were visible, which were some 0.5m high, and were constructed from squared rectangular sandstone with a more substantial course below. This could not be inspected due to waterlogging.



Plate 15: Excavated culvert in White House Gardens

3.2.10 As already mentioned, the southern part of the culvert was of similar construction to those excavated sections already described (Plate 15). The cross-section of the culvert was similar to the Roper Street section and it appears to be of similar dimensions, although inspection was impossible for health and safety reasons. The southern end of the section of culvert at White House Gardens was visited on 26<sup>th</sup> July 2010 prior to the commencement of culvert replacement works. Thacka Beck exits the culvert and flows through a deep stone-lined channel (Plate 16). The end of the culvert was visible and consisted of a concrete lintel supporting a random, squared rubblestone wall. The lintel was lined with corrugated-iron shuttering. Access to the culvert, in order to take measurements, was unavailable.



Plate 16: Thacka Beck exiting from the end of the culvert in White House Gardens

---

## 4. CONCLUSION

---

- 4.1.1 As has already been outlined, access to the excavated trenches in order to inspect and record the culverts was severely limited by both health and safety concerns and the ongoing installation of replacement culvert, which was unable to be paused while recording was carried out. This has resulted in a predominately visual and descriptive record of each revealed section of culvert. Measurements were taken where access was sufficient and safe to allow this.
- 4.1.2 In general, the inspected sections of culverts are all constructed from the same red sandstone fabric (typical to the area), and use similar construction methods with a segmental arch and sandstone impost. Some sections have previously been repaired and replaced with varying materials, including concrete capping at the Mansion House (Plate 4) and Somerfield Car Park (Plate 10) in particular. The floor of some sections has been grouted obscuring the nature of the construction, and, in addition to this, debris and gravel deposits have also obscured the floor. However, the floor of the culvert was partially visible at Watson Terrace (*Section 3.2.1*) and at Friargate (Plate 9). Similar cobbles were also probably present at Sandgate (*Section 3.2.2*). It can be inferred, therefore, in general, that the whole length of buried culvert between Watson Terrace and White House Gardens was a segmentally arched red sandstone culvert with a cobble or sett floor.
- 4.1.3 The cross-section measurements, where available, varied from 3.25m wide by 0.7m high at Watson Terrace (*Section 3.2.1*), to 2.4m wide by 0.85m high at the Mansion House (*Section 3.2.3*) to 2.6m wide by 0.9m high at Roper Street (*Section 3.2.9*). The apex of the arch at most of the locations was found to be situated only just below the ground surface; for example at Watson Terrace the apex was 0.3m below the road surface (*Section 3.2.1*), while at Somerfield Car Park, the apex was only 0.1m below the surface (*Section 3.2.7*). This obviously necessitated the repair and reinforcement of certain sections by concrete slabs.
- 4.1.4 For some of its length, the culvert is open and it has been suggested that it was originally constructed in around 1300 as a 'leat' (Bowen 2005) and it may have been open for the whole of its length. There is no evidence pertaining to the original method construction of the 'leat' but it is not unreasonable to assume it may have been stone-lined. It was canalised during the Victorian period when the arched roof and impost were probably added to certain sections. There was no evidence of a separate possibly earlier structure during the recording works suggesting the whole length is probably of nineteenth century origin.
- 4.1.5 The length of culvert passing below Roper Street differs slightly from the others in that it is deeper down (0.4-0.5m to the apex of the arch) and it is of better quality construction (*Section 3.2.9*). This was probably due to the fact that it carries Roper Street and needed to be more substantial.

- 4.1.6 In conclusion, the sections of culvert inspected imply that the length of buried culvert from Watson Terrace to White House Gardens was of sandstone construction with a segmental arch and cobbled floor and was probably constructed or improved in the nineteenth century.

## 5. BIBLIOGRAPHY

---

### 5.1 PRIMARY SOURCES

British Geological Survey, (BGS) Ten Mile Map, Quaternary Geology: North Sheet, 1977

Institute of Geological Sciences, (IGS) Ten Mile Map, Solid Geology: North Sheet, 1979

### 5.2 SECONDARY SOURCES

Allan, M, 1994 *The Roman Route Across the Northern Lake District: Brougham to Moresby*, Lancaster

Anon, 1947 Proceedings, *Cumberland Westmorland Antiq Archaeol Soc*, n ser, **47**, 199-233

Bowen, V, 2005 *Penrith at the Crossroads of History*  
[http://www.penrithandnorthlakesu3a.org.uk/NewNewsletters/Dec\\_Jan2005/penrith\\_at\\_the\\_crossroads\\_of\\_his.htm](http://www.penrithandnorthlakesu3a.org.uk/NewNewsletters/Dec_Jan2005/penrith_at_the_crossroads_of_his.htm)

Cumbria County Council, 2002 *Extensive Urban Survey, Archaeological Assessment Report, Penrith*, unpubl

Department of the Environment (DoE), 1983 *List of Buildings of Special Architectural or Historic Interest, District of Eden, Cumbria: Area of the former urban district of Penrith*

English Heritage, 1991 *Management of Archaeological Projects*, 2<sup>nd</sup> edition, London

English Heritage, 2006 *Understanding Historic Buildings: A Guide to Good Recording Practice*, Swindon

Haswell, F, 1903 Notes on the Friary at Penrith, *Cumberland Westmorland Antiq Archaeol Soc*, n ser, **3**, 350-2

IfA, 2008 *Standard and Guidance for the archaeological investigation and recording of standing buildings and structures*, Reading

Moorhouse, S, 1971 Medieval Britain in 1970 II. Post-Conquest, *Med Archaeol*, **15**, 137-79

Nicolson, J, and Burn, R, 1777 *The History and Antiquities of the Counties of Westmorland and Cumberland*, **2**, London

OA North, 2010 *Thacka Beck Flood Alleviation Scheme, Penrith, Cumbria, Measured Building Survey*, unpub rep

Pevsner, N, 1967 *The Buildings of England: Cumberland and Westmorland*, Harmondsworth

Richardson, C, 1998 A catalogue of recent acquisitions to Tullie House Museum and reported finds from the Cumbrian area 1990-1996. Part I: Tullie House accessions, *Cumberland Westmorland Antiq Archaeol Soc*, n ser, **98**, 1-60

Shotton, D, 1997 *Romans and Britons in North-West England*, Lancaster

## 6 ILLUSTRATIONS

---

### 6.1 FIGURES

Figure 1: Site Location

Figure 2: Locations of Culverts at Watson Terrace

Figure 3: Locations of Sandgate and Mansion Hose Culverts

Figure 4: Locations of Friargate and Somerfield Car Park Culverts

Figure 5: Locations of Roper Street and White Hose Gardens Culverts

Figure 6: Cross-section of the Culvert at Watson Terrace Facing South

Figure 7: Cross-section of the Culvert at Sandgate Facing North

Figure 8: Cross-section of the Culvert at The Mansion House Facing North

Figure 9: Cross-section of the Culvert at Friargate Facing South

Figure 10: Cross-Section of the Culvert at Somerfield Car Park Facing North

Figure 11: Cross-section of the Culvert at Roper Street to White House Gardens  
Facing North

### 6.2 PLATES

Plate 1: Excavation of the culvert in Watson Terrace

Plate 2: Excavated culvert below Watson Terrace

Plate 3: Plate 3: Excavated Culvert in Sandgate

Plate 4: Excavation of culvert at the rear of The Mansion House

Plate 5: Excavated culvert at the rear of the Mansion House

Plate 6: Excavation of culvert at the front of the Mansion House

Plate 7: Excavated culvert at the front of the Mansion House

Plate 8: Excavated culvert at Friargate

Plate 9: Floor of the excavated culvert at Friargate

Plate 10: Excavation of the culvert at Somerfield Car Park

Plate 11: Excavated culvert at Somerfield Car Park



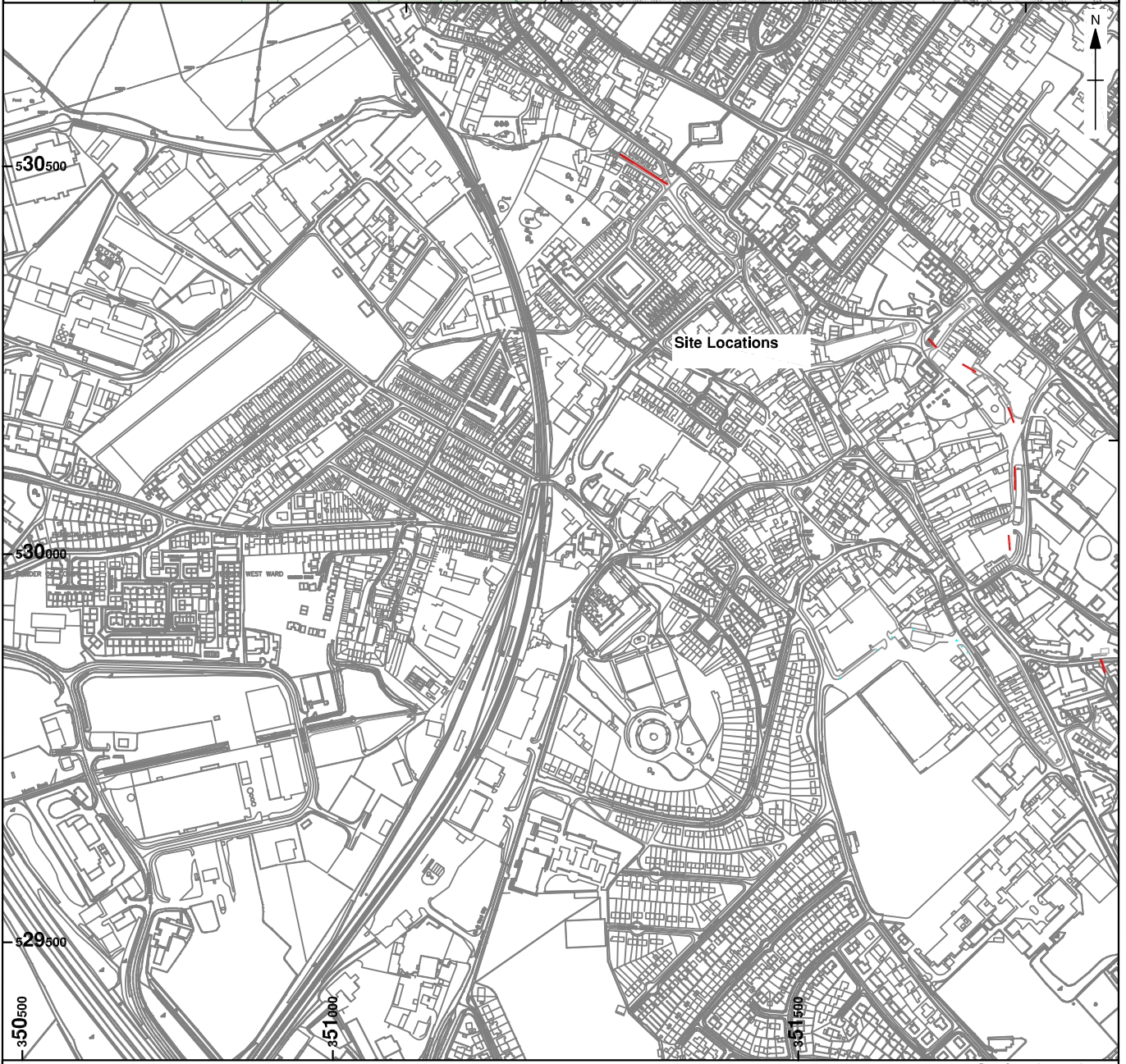
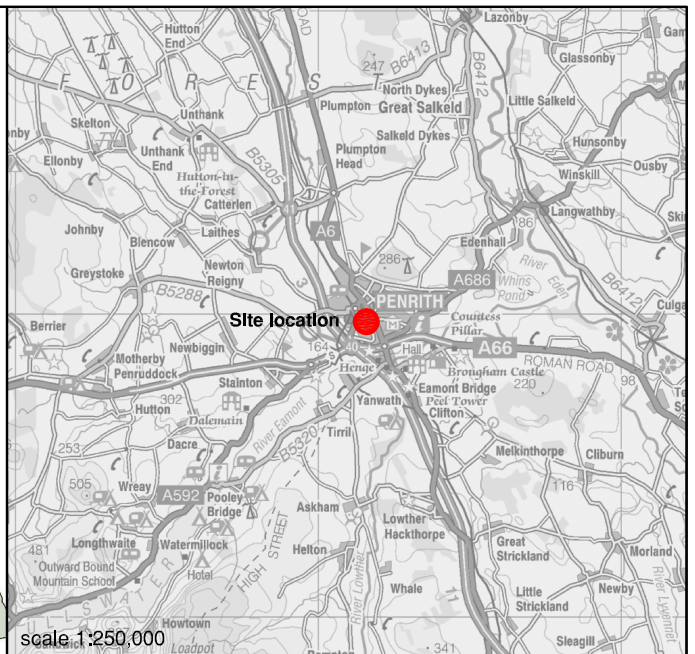
Plate 12: Imposts of the excavated culvert at Somerfield Car Park

Plate 13: Excavation of the culvert at Roper Street to White House Gardens

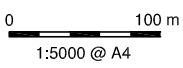
Plate 14: Excavated culvert passing below Roper Street

Plate 15: Excavated culvert in White House Gardens

Plate 16: Thacka Beck exiting from the end of the culvert in White House Gardens



Based upon the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office ©Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Oxford Archaeology Licence No. AL 100005569 (2010).



EM\*L10201\*KIT\*25.01.10

Figure 1: Site location

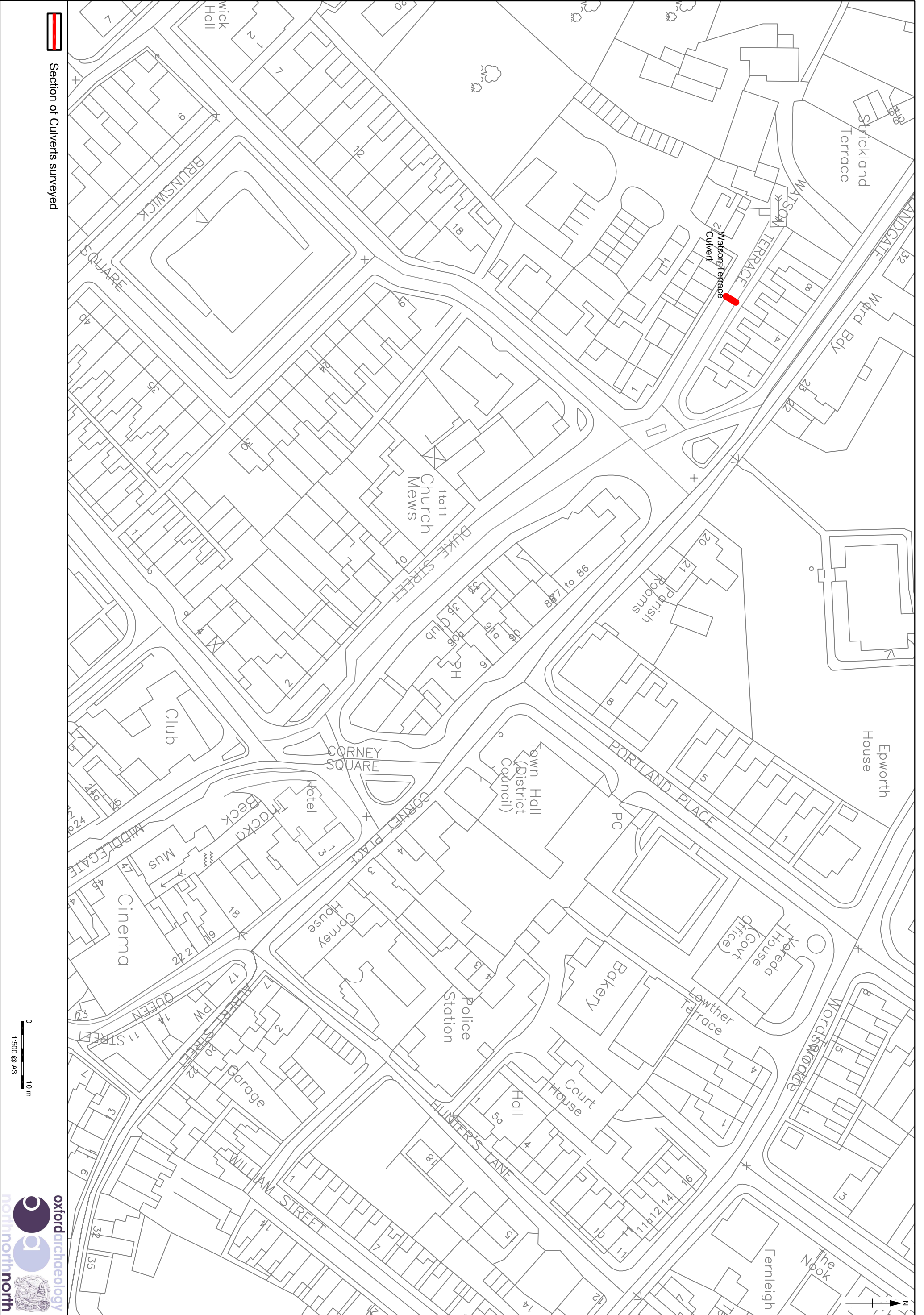


Figure 2: Location of Culvert at Watson Terrace

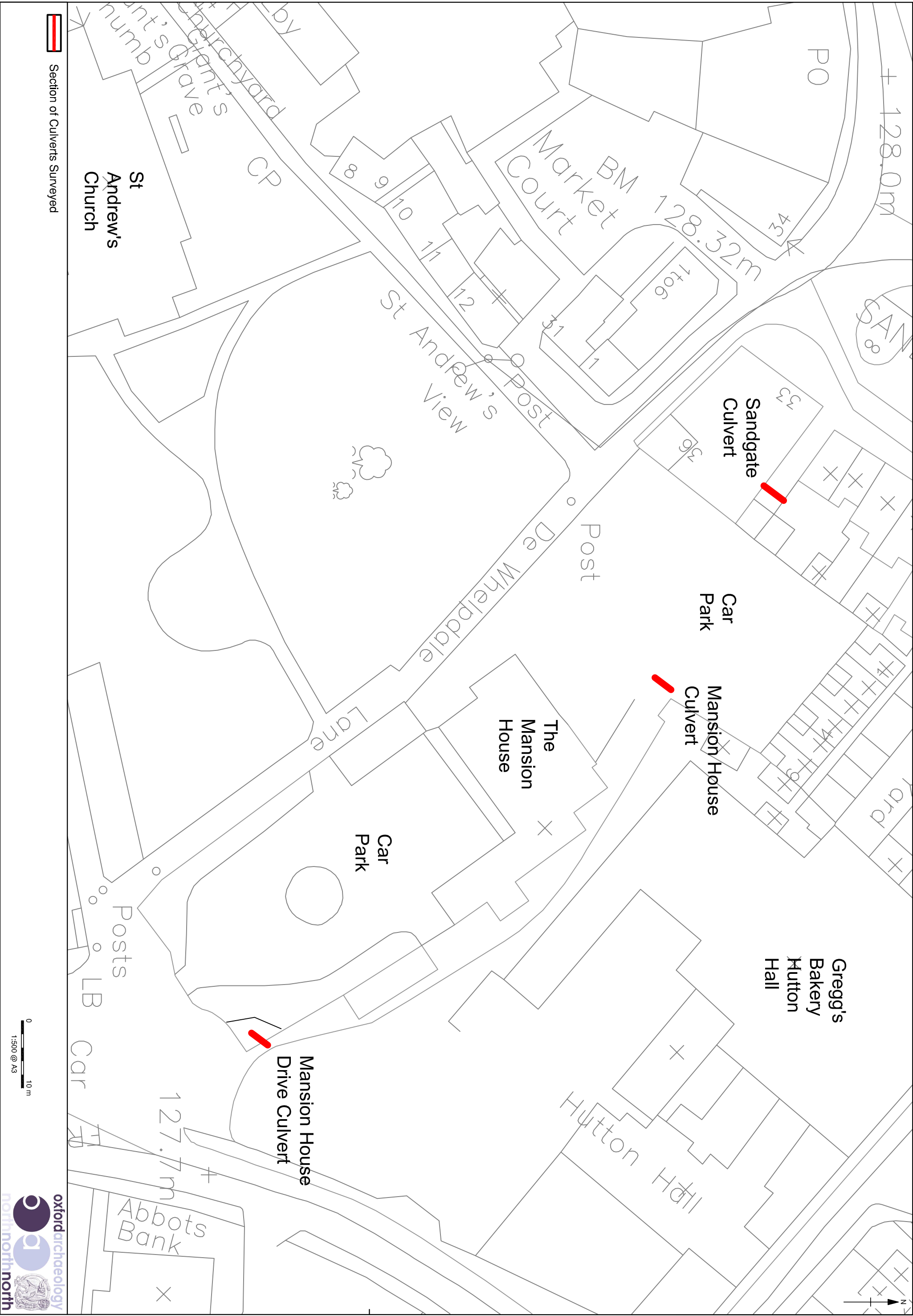


Figure 3: Locations of Sandgate and Mansion House Culverts

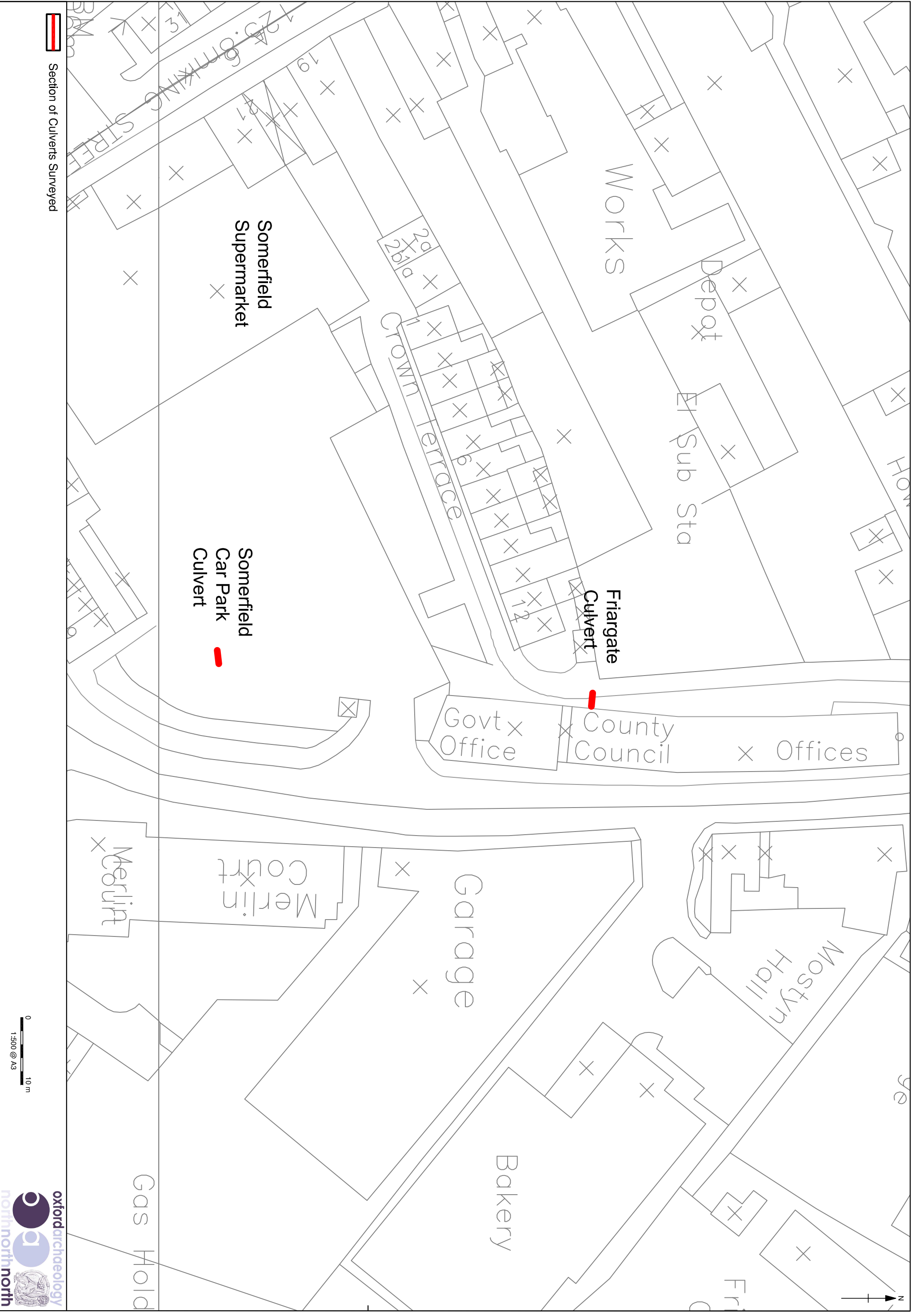


Figure 4: Locations of Friargate and Sommerfield Car Park Culverts

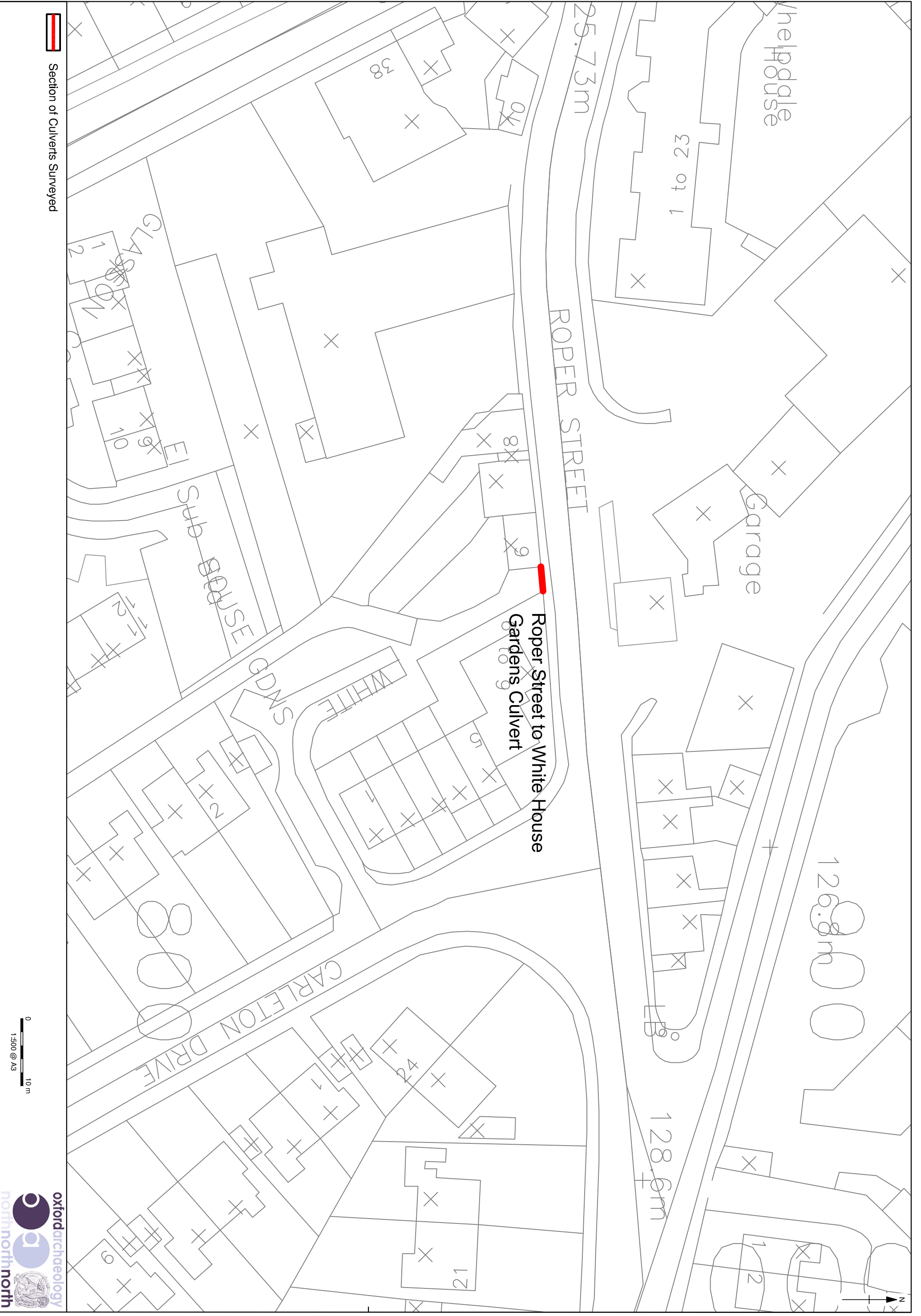
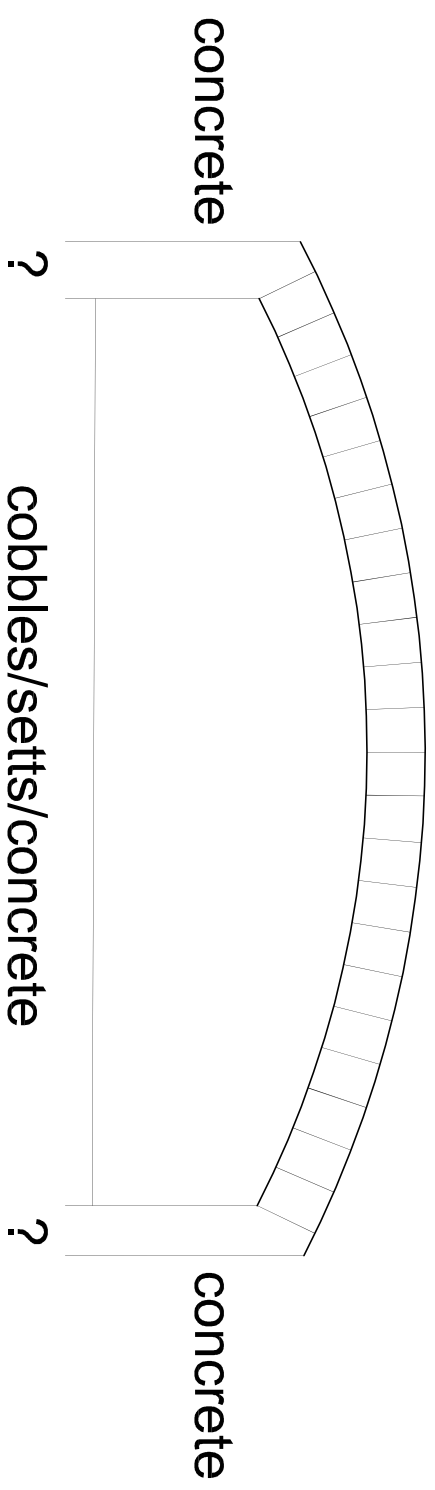


Figure 5: Locations of Roper Street to White House Gardens Culvert

Road



0  
1:20 @ A3  
0.5 m

Figure 6: Cross-Section of the Culvert at Watson Terrace Facing South

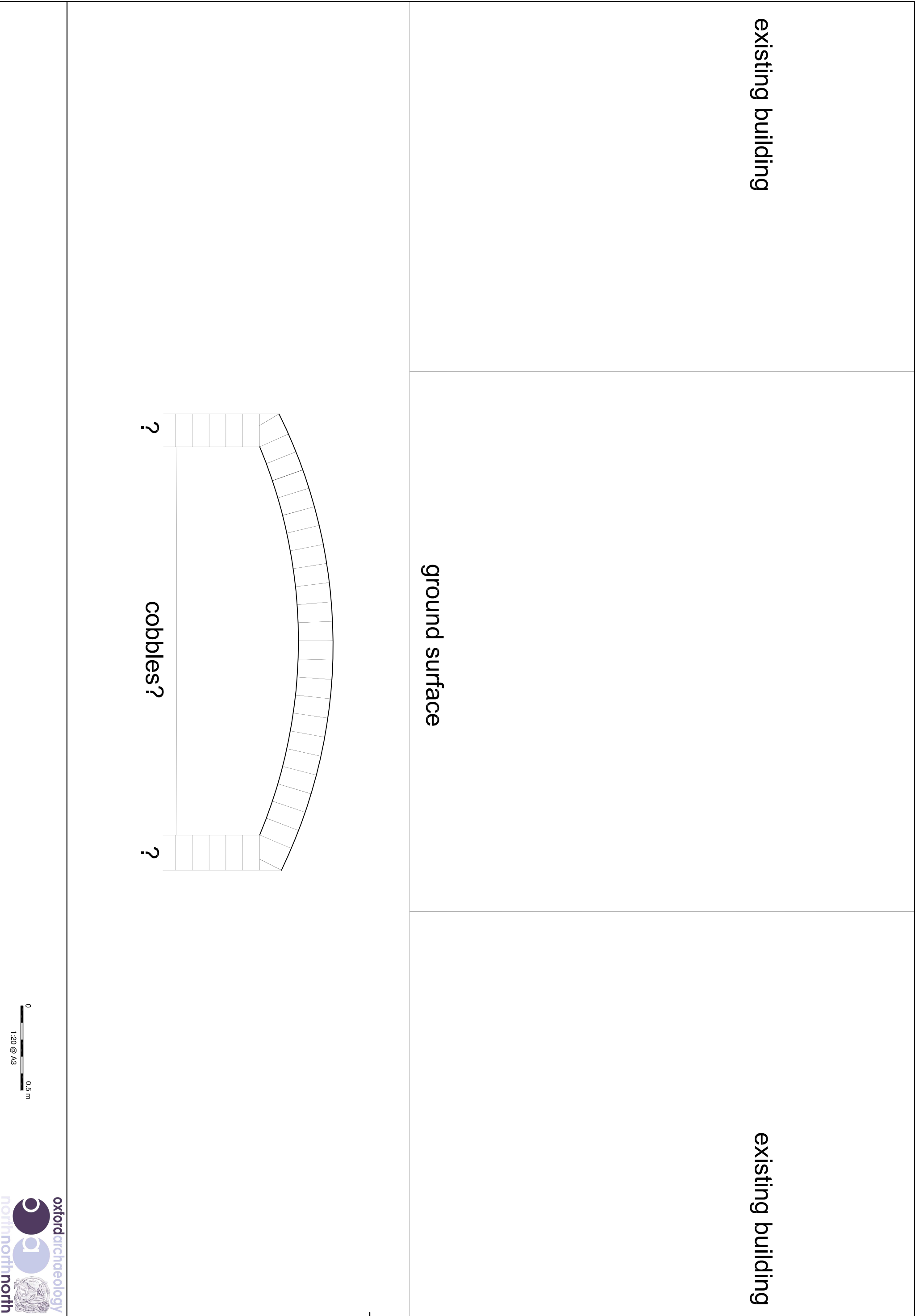
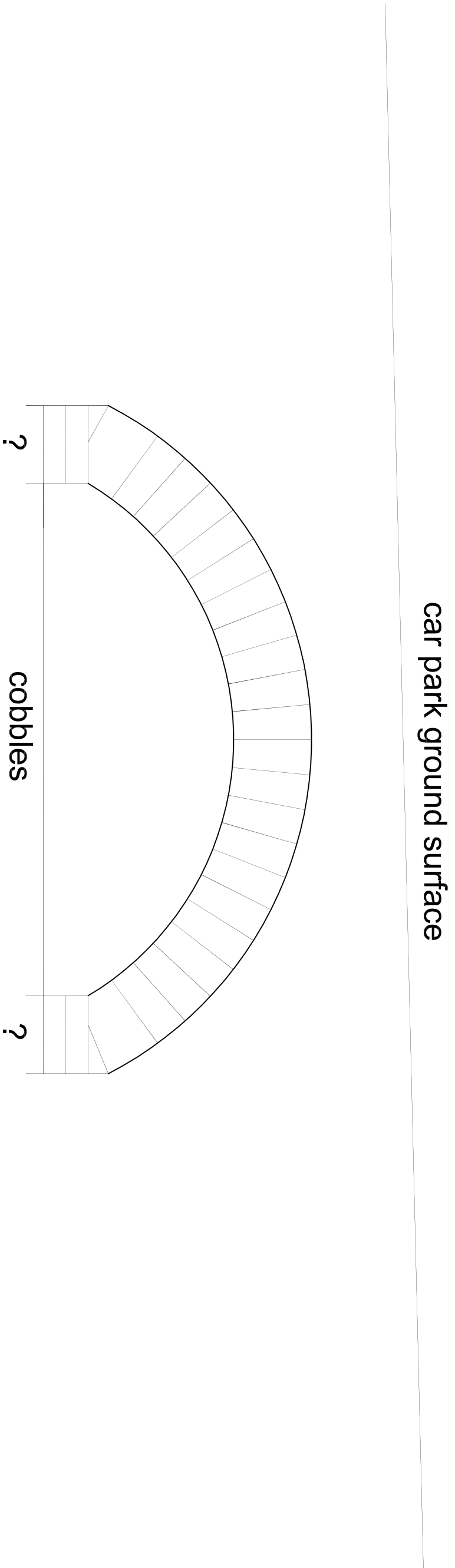


Figure 7: Cross-Section of the Culvert at Sandgate Facing North

0  
1:20 @ A3  
0.5 m





0  
1:20 @ A3  
0.5 m

Figure 8: Cross-Section of the culvert at the Mansion House facing north

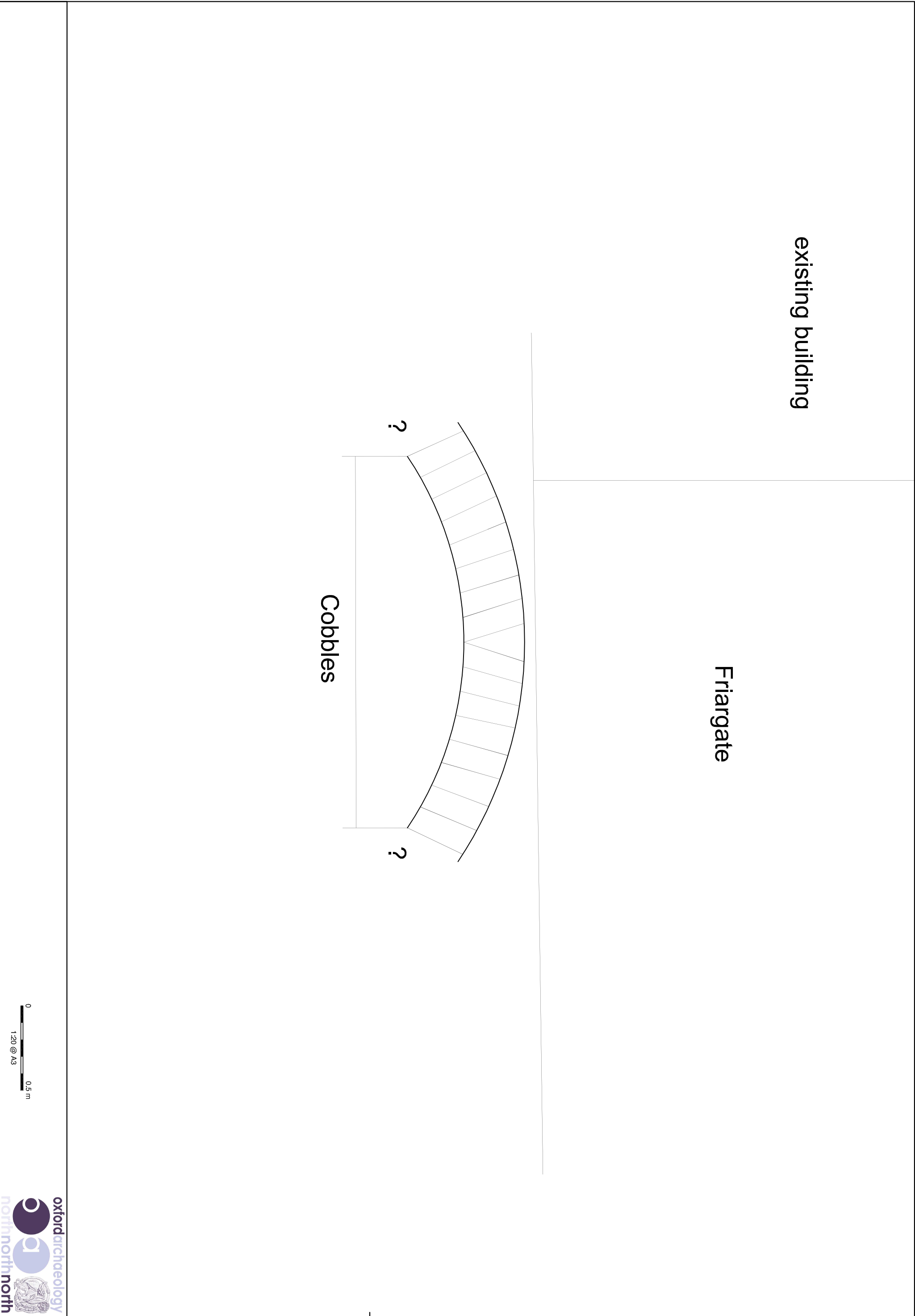


Figure 9: Cross-Section of the Culvert at Friargate Facing South

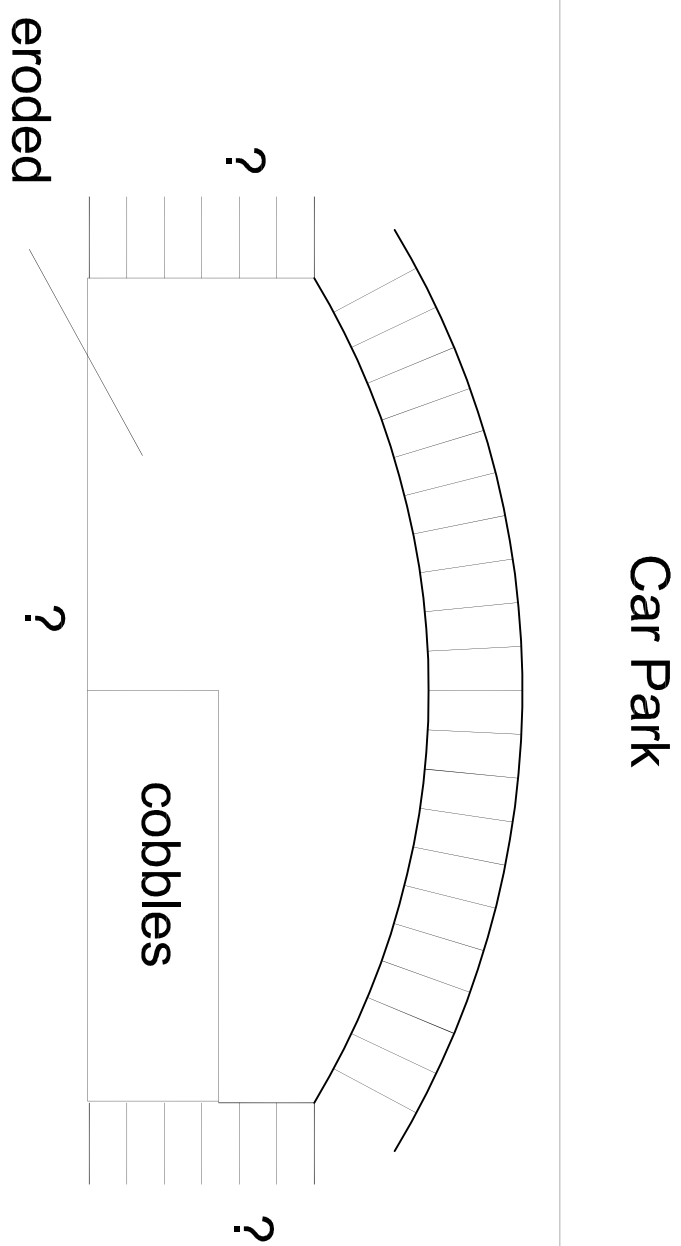


Figure 10: Cross-Section of the Culvert at Somerfield Car Park Facing North

Roper Street

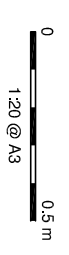
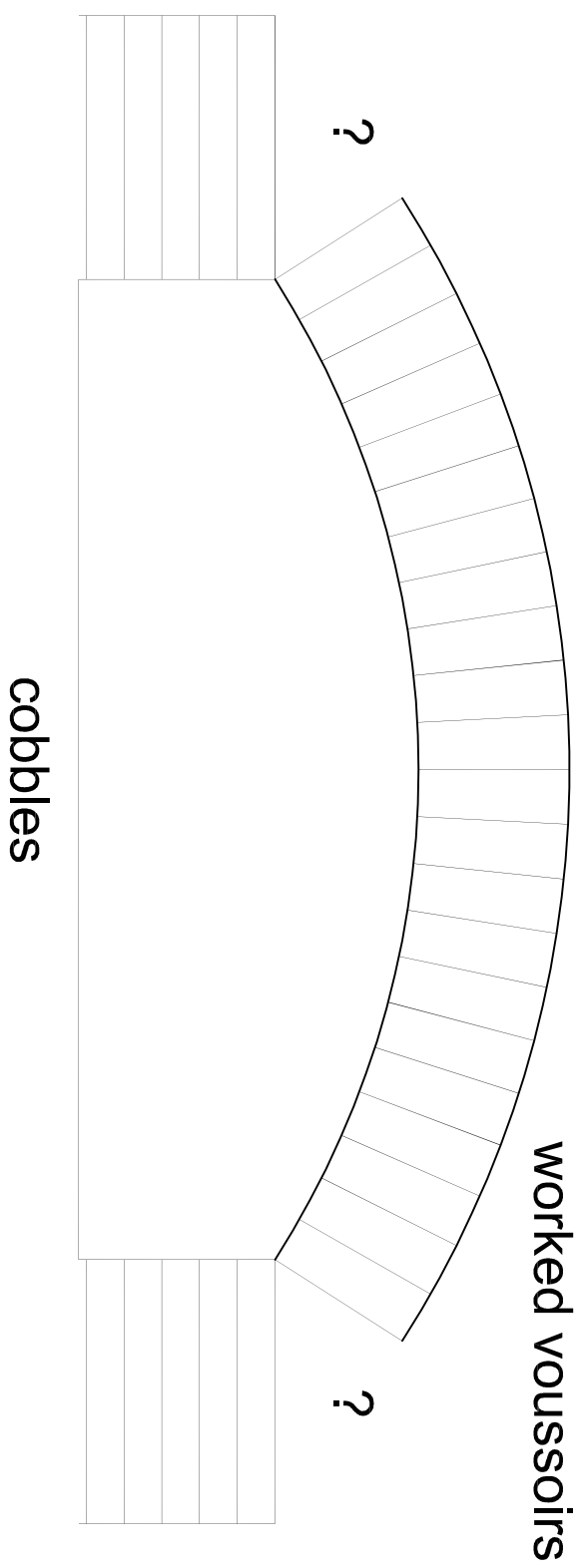


Figure 1 1 : Cross-Section of the Culvert at Roper Street to White House Gardens Facing North

---

## APPENDIX 1: PROJECT DESIGN

---

### 1. INTRODUCTION

#### 1.1 PROJECT BACKGROUND

1.1.1 Halcrow Group Ltd, on behalf of the Environment Agency, has requested that Oxford Archaeology North (OA North) submit proposals to undertake an archaeological measured building recording survey of sections of buried stone-lined culverts along the course of the Thacka Beck, as it runs through the town of Penrith, Cumbria. The sections of culvert to be recorded are proposed for removal in advance of culvert replacement as part of the ongoing works for the flood alleviation scheme. Consequently, the Cumbria County Council Historic Environment Service (CCCHES) outlined recommendations that the culverts be recorded. To this effect, the following proposals are for a measured cross-section survey and descriptive and photographic record of the culverts, based on a Level I/II survey in accordance with English Heritage guidelines (2006), during their under watching brief.

#### 1.2 OXFORD ARCHAEOLOGY NORTH

1.2.1 Oxford Archaeology North has considerable experience of sites of all periods, having undertaken a great number of small and large scale projects throughout Northern England during the past 30 years. Surveys of this nature have taken place within the planning process, to fulfil the requirements of clients and planning authorities, to very rigorous timetables.

1.2.2 OA North has the professional expertise and resources to undertake the project detailed below to a high level of quality and efficiency. OA North is an Institute for Archaeologists (IfA) registered organisation, registration number 17, and all its members of staff operate subject to the IFA Code of Conduct (2008).

### 2. OBJECTIVES

2.1 The programme of work has been designed in order to record the fabric of the culverts in mitigation of their removal. The required stages to achieve these ends are as follows:

- **Archaeological Measured Building Record:** to provide a drawn, photographic, and textual record of the culverts to a Level I/II standard as per the English Heritage (2006) guidelines. The primary intention is to record all features of archaeological and historical interest prior to removal. The culverts requiring survey are in the following locations:
  - along Watson Terrace,
  - behind the Cinema on Middlegate,
  - to the rear of the Mansion House,
  - to the front of the Mansion House (Mansion House Drive),
  - adjacent to the County Council Offices, Friargate,
  - adjacent to the garage, Old London Road,
- **Report and Archive Production:** a report will be produced for the client within eight weeks of completion of the fieldwork. A site archive will be produced to English Heritage guidelines (1991) and in accordance with the *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (UKIC 1990).

### 3. METHODS STATEMENT

#### 3.1 ARCHAEOLOGICAL MEASURED BUILDING RECORDING WATCHING BRIEF

- 3.1.1 The measured building recording will be carried out to establish the nature, extent and survival of the culverts identified for removal, and will consist of a measured survey based on a Level I/II standard in accordance with English Heritage guidelines (2006).
- 3.1.2 The recording will be carried out during the works by the client's on-site contractors in removing the culverts. The culverts must be revealed in order for the archaeological recording to be carried out, allowing sufficient time for the OA North archaeologist to record. The exact time needed to record each section will be determined by the nature of the surviving culverts. It is proposed that the recording be carried out in open trenches in order to obviate the need for working in confined spaces. To this end any work within confined spaces will not be carried out unless by prior arrangement, and will require a separate project design and revision of costs.
- 3.1.3 The culverts will require 'breaking through' in order to fully record the cross-section and any internal detail.
- 3.1.4 **Photographic Archive:** a photographic archive of the culverts will include monochrome prints, using 35mm SLR camera, as well as digital images using DSLR cameras (15 megapixels) to be included in the report. The archive will comprise;
- i. general photographs of the culverts and features (where possible) using 35mm equipment,
  - ii. detailed scaled coverage of architectural features and structural or decorative detail using 35mm equipment,
  - iii. the culverts' relationship to their setting, buildings, or significant viewpoint using 35mm equipment,
- 3.1.5 The location of each photograph will be marked on a ground plan supplied as a dwg file.
- 3.1.6 **Site Drawings:** the following plans will be produced;
- i. ground plans will show the layout and extent of the culverts (using base plans supplied by the client);
  - ii. 'as existing' cross-sections will be produced that will show the main structural components of each culvert. Two cross-sections for each length of removed culvert will be produced, and will be based upon existing drawings provided by the client if of sufficient accuracy. Should further survey by OA North be required, additional time may be necessary.
- 3.1.7 The ground plans drawings will usually be produced at a scale of 1:100, the elevation will be produced at 1:50. Each section of wall will be surveyed by means of reflectorless total station, which in this case will be a *Leica 800* series. The total station will be connected to a tablet computer running English Heritage's *TheoLt* software which enables the survey to be drawn immediately into a CAD package (AutoCAD 2004). The survey data will be edited in the office for the production of the final drawings.
- 3.1.8 OA North does not undertake to correct survey inaccuracies in any drawings supplied by the client, which shall remain the responsibility of the client. However, if inaccuracies significantly impede the progress of the archaeological survey and must be rectified to allow the archaeological survey to proceed, a charge for this correction will be made as a variation.
- 3.1.9 **Interpretation and Analysis:** a visual inspection will be undertaken utilising the OA North buildings *proforma* sheets. An outline description will be maintained to a Level II survey.

This level of recording is descriptive and will produce an analysis of the development and use of the structure but will not discuss the evidence on which the analysis is based.

### 3.2 REPORT PRODUCTION

3.2.1 One bound copy of the final written synthetic report together with a digital copy supplied on CD will be submitted to the client, and a further three copies submitted to the Cumbria Historic Environment Records (HER) for reference purposes, within eight weeks of completion. The report will include;

- a site location plan related to the national grid,
- a front cover to include the planning application number where applicable and the NGR,
- the dates on which the fieldwork was undertaken and by whom,
- a concise, non-technical summary of the results,
- the precise location, address and NGR will be provided,
- a description of the methodology employed, work undertaken and results obtained,
- appropriate plans showing the location and position of features,
- a description with all fixtures and features of archaeological or architectural interest identified,
- plans, elevation and section drawings and photographs at an appropriate scale,
- the report will also include a complete bibliography of sources from which data has been derived,
- a copy of this project design in the appendices, and indications of any agreed departure from that design.

3.2.2 This report will be in the same basic format as this project design.

3.2.3 **Confidentiality:** all internal reports to the client are designed as documents for the specific use of the client, for the particular purpose as defined in the project brief and project design, and should be treated as such. They are not suitable for publication as academic documents or otherwise without amendment or revision.

### 3.3 ARCHIVE

3.3.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with current English Heritage guidelines (*Management of Archaeological Projects*, 2nd edition, 1991). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. OA North conforms to best practice in the preparation of project archives for long-term storage.

3.3.2 This archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the Cumbria HER (the index to the archive and a copy of the report). OA North practice is to deposit the original record archive of projects with the appropriate County Record Office, in this case Carlisle.

3.3.3 The Arts and Humanities Data Service (AHDS) online database project *Online Access to index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project.

#### 4. HEALTH AND SAFETY

- 4.1 OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1997). A risk assessment will be completed in advance of any on-site works and copies will be made available on request to all interested parties.
- 4.2 Any known contamination issues or any specific health and safety restrictions on site should be made known to OA North by the client to ensure all procedures can be met, and that the risk is dealt with appropriately.

#### 5. OTHER MATTERS

- 5.1 **Access:** free access to all the sites, including those on private property is assumed.

#### 6. WORK TIMETABLE

- 6.1 **Archaeological Measured Building Record Watching Brief:** the duration of the work will be dependant upon the contractor's timetable and scheme of works. Once the sections of culverts to be removed have been revealed it is anticipated that actual recording of each cross-section will take no longer than half a day.
- 6.2 **Report Production:** the report will be issued within eight weeks of the completion of the fieldwork.
- 6.3 **Written Instruction:** one week's notice should be allowed to enable the necessary arrangements and notifications to be made to commence the project.

#### 7. STAFFING PROPOSALS

- 7.1 The project will be under the direct management of **Emily Mercer** (OA North senior project manager) to whom all correspondence should be addressed.
- 7.2 The work will be undertaken by **Karl Taylor** (OA North project officer) who has a wealth of experience in the recording and analysis of historic buildings.

#### BIBLIOGRAPHY

English Heritage, 1991 *The Management of Archaeological Projects*, 2nd edn, London

English Heritage, 2006 *Understanding Historic Buildings, a Guide to Good Recording Practice*, London

SCAUM (Standing Conference of Archaeological Unit Managers), 1991 *Health and Safety Manual*, Poole

United Kingdom Institute for Conservation (UKIC), 1990 *Guidelines for the preparation of archives for long-term storage*