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## Large-Scale National Grid Data

Published 1996

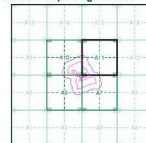
Source map scale - 1:1,250

"Large Scale National Grid Data" superseded 5M cards (Ordnance Survey's Survey of Information on Microfilm) in 1992, and continued to be produced until 1995. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

### Map Name(s) and Date(s)



### Historical Map - Segment A11



### Order Details

Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 100

### Site Details

Richmond-upon-Thames College, Egerton Road,  
TWICKENHAM, TW2 7SU



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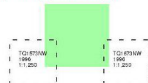
## Large-Scale National Grid Data

Published 1996

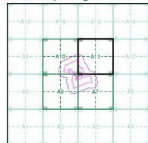
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"Large Scale National Grid Data" superseded SM cards (Ordnance Survey's Survey of Information on Microfilm) in 1992, and continued to be produced until 1995. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

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## Historical Map - Segment A11



## Order Details

Order Number: 56081832\_1\_1  
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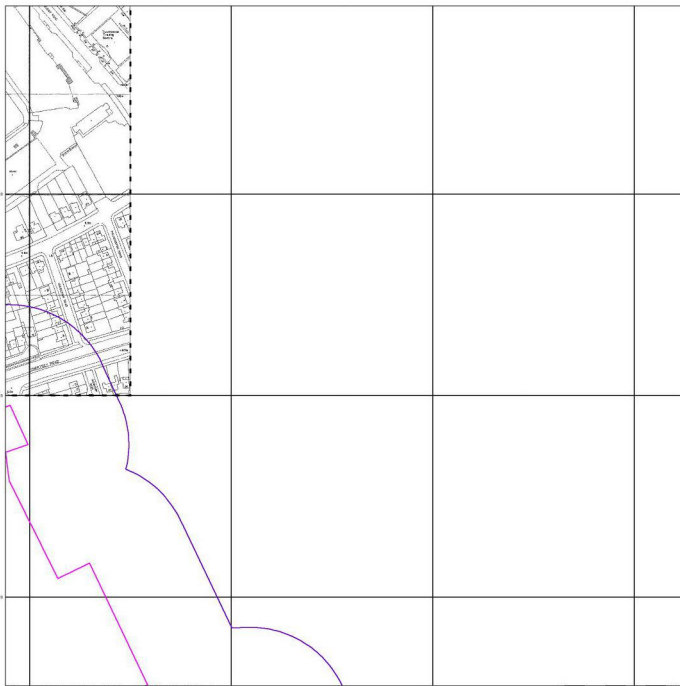
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## Large-Scale National Grid Data

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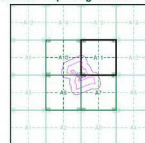
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"Large Scale National Grid Data" superseded 5M cards (Ordnance Survey's "Survey of Information on Microfilm") in 1992, and continued to be produced until 1995. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

### Map Name(s) and Date(s)

TC1614SW  
1995  
1:1,250

### Historical Map - Segment A11



### Order Details

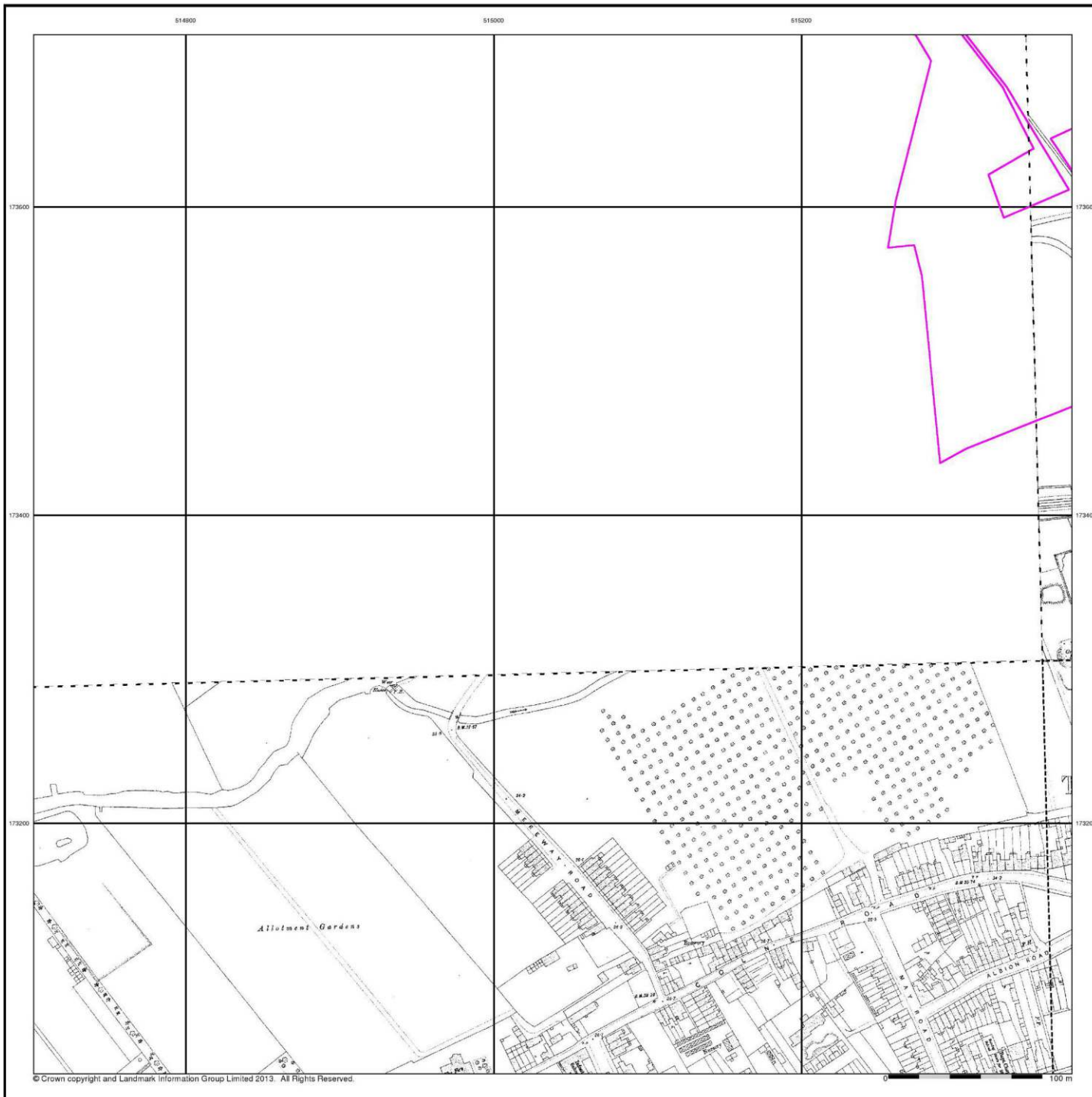
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Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 100

### Site Details

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Fax: 0844 844 2051  
Web: www.envirocheck.co.uk



## London

Published 1894 - 1896

Source map scale - 1:1,056

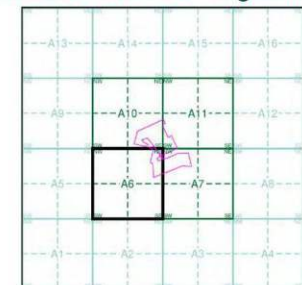
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)

		009_00_078 1896 1:1,056
009_00_067 1894 1:1,056		009_00_083 1894 1:1,056

### Historical Town Plan - Segment A6



### Order Details

Order Number: 56081832\_1\_1  
 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
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 Site Area (Ha): 12.71  
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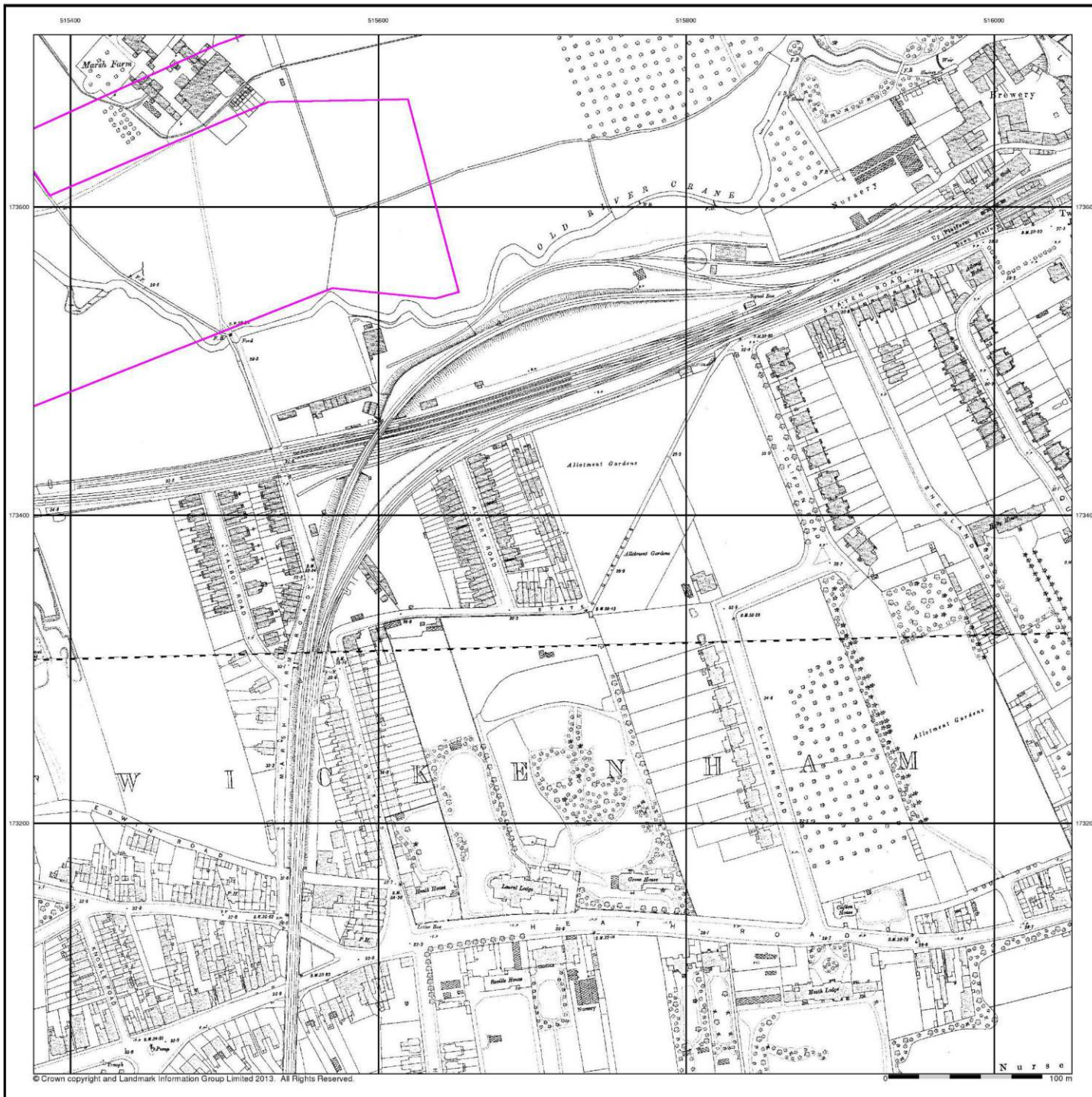
### Site Details

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 TWICKENHAM, TW2 7SJ



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**London**

**Published 1894 - 1896**

**Source map scale - 1:1,056**

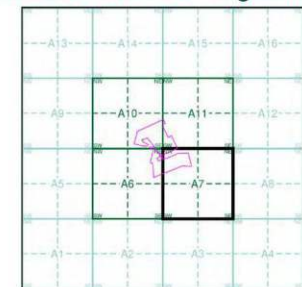
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

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#### Map Name(s) and Date(s)

009_00_078	1896	1:1,056
009_00_088	1894	1:1,056

#### Historical Town Plan - Segment A7



#### Order Details

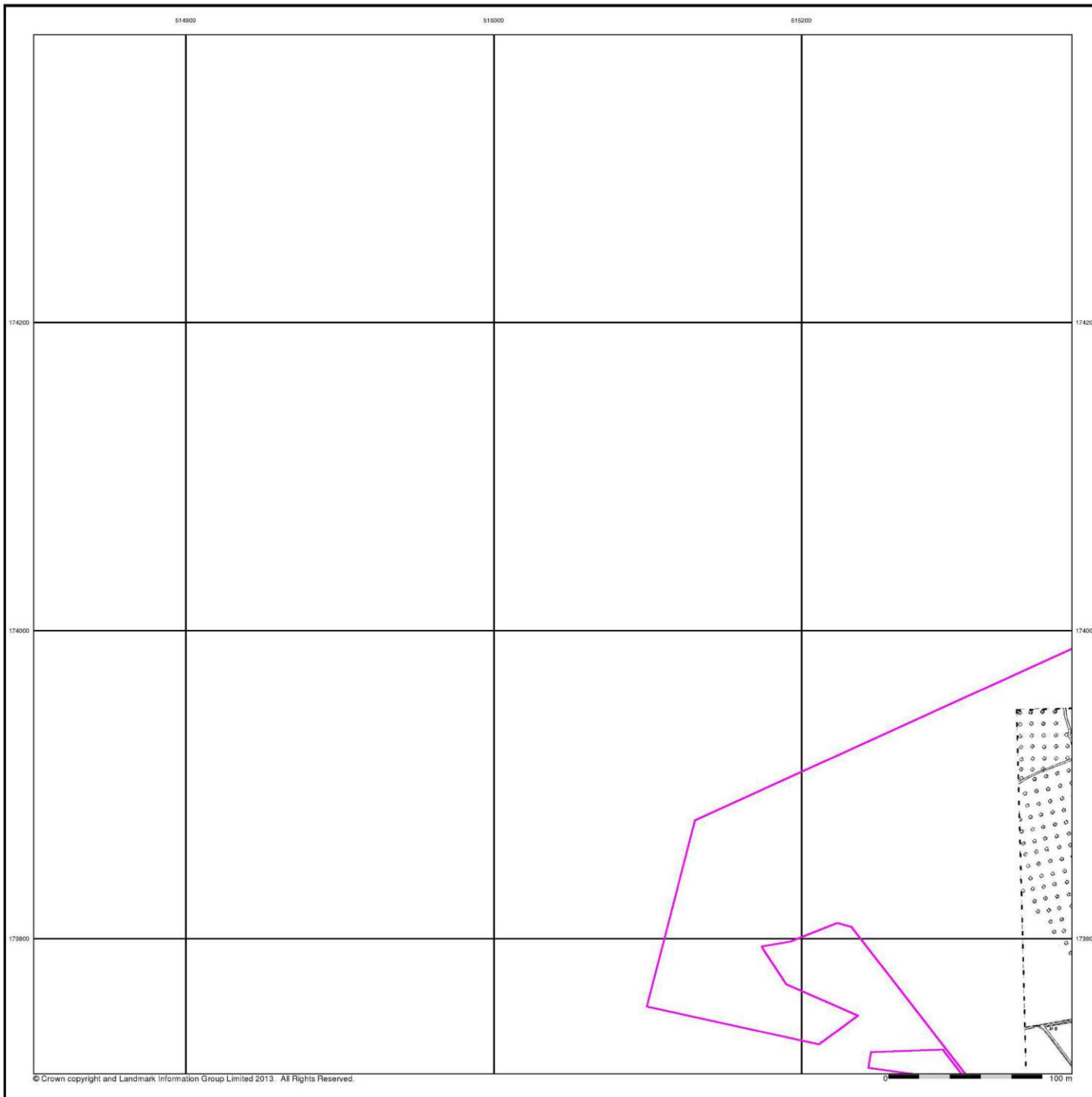
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 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 0

#### Site Details

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## London

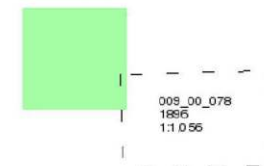
Published 1896

Source map scale - 1:1,056

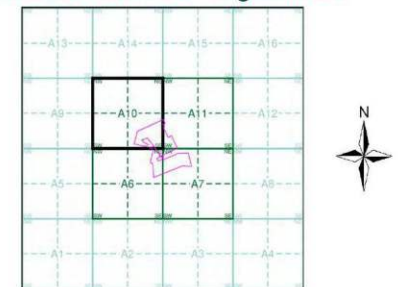
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

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## Map Name(s) and Date(s)



## Historical Town Plan - Segment A10



## Order Details

Order Number: 56081832\_1\_1  
 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 0

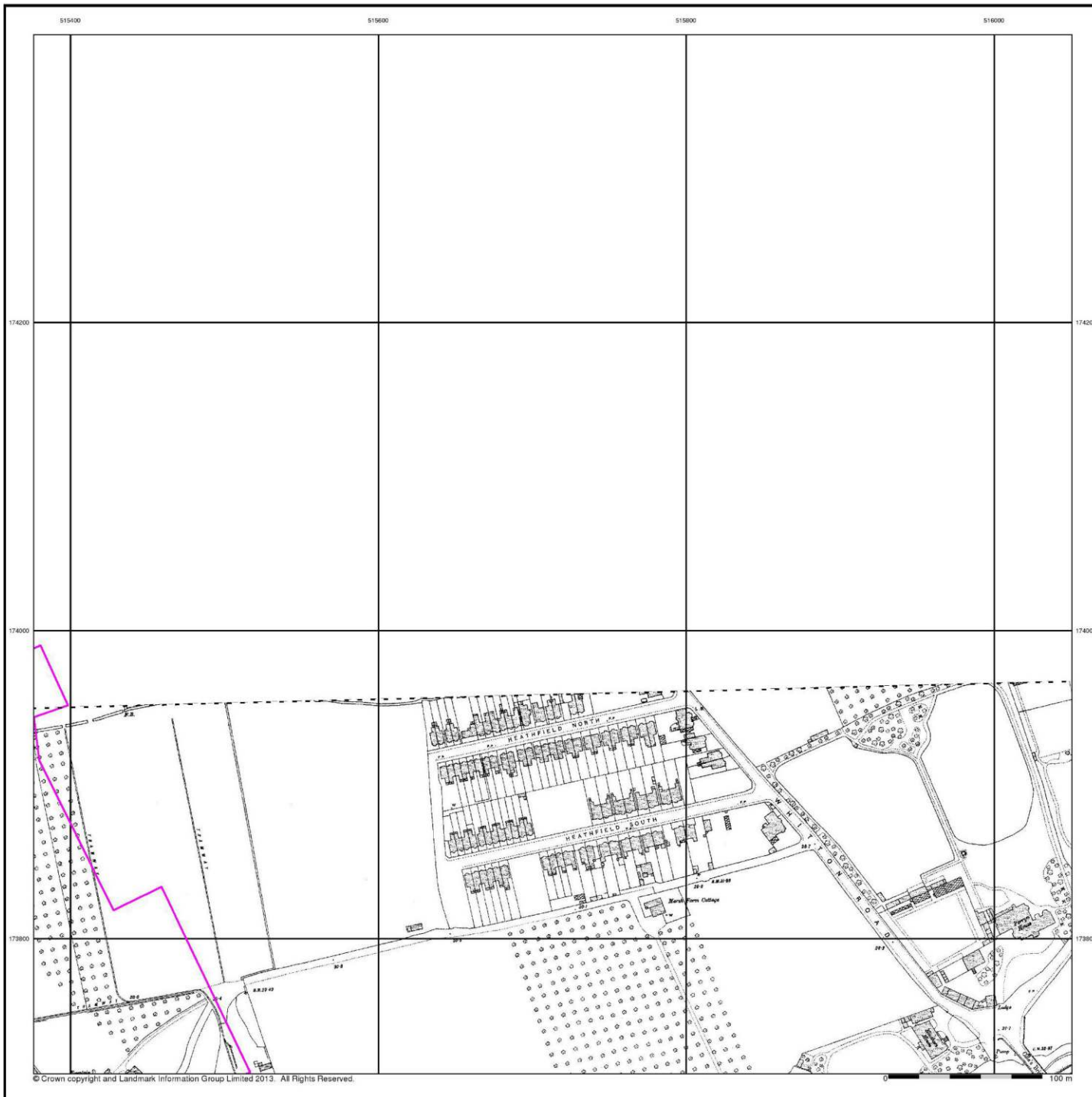
## Site Details

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## London

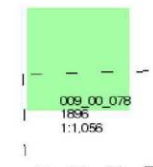
Published 1896

Source map scale - 1:1,056

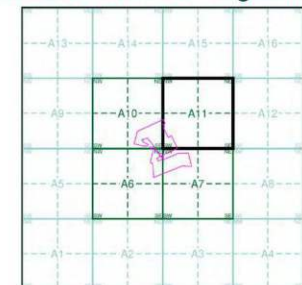
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

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### Map Name(s) and Date(s)



### Historical Town Plan - Segment A11



### Order Details

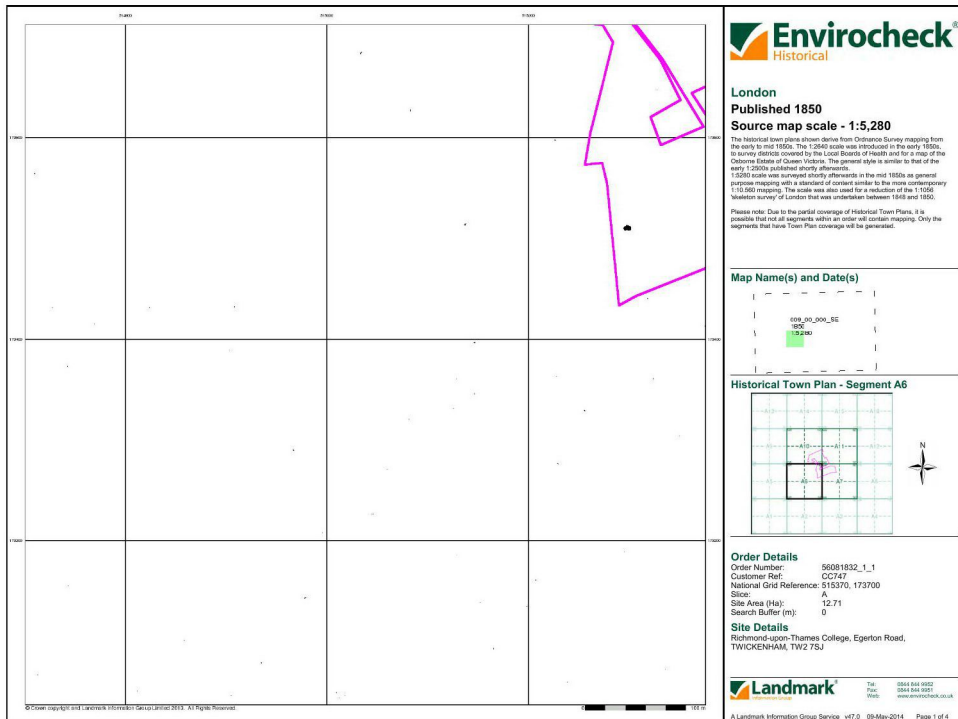
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 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 0

### Site Details

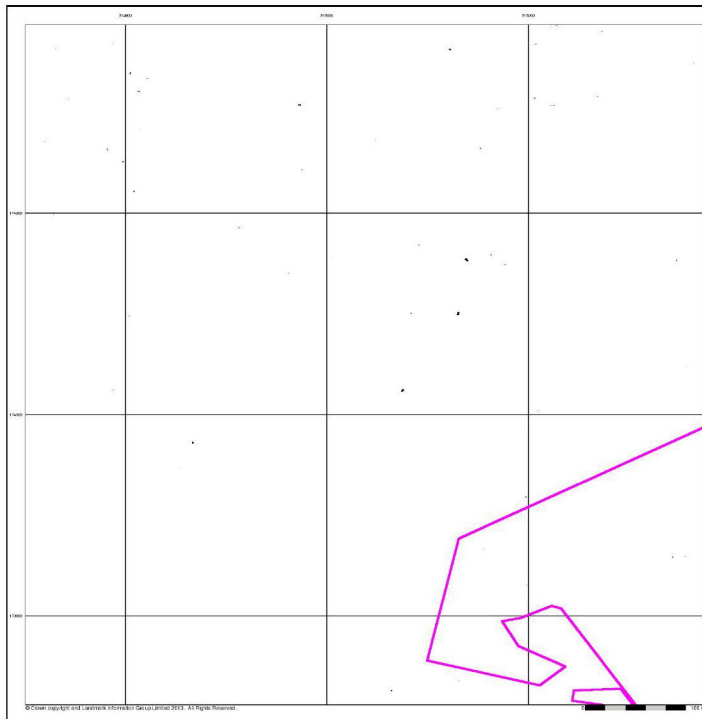
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## London

Published 1850

Source map scale - 1:5,280

The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2500 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Outcome Estates of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards.

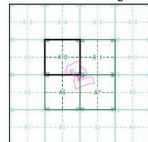
1:2500 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of contour similar to the more contemporary 1:10,000 mapping. The scale was also used for a reduction of the 1:10000 (Ordnance Survey) of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)



### Historical Town Plan - Segment A10



### Order Details

Order Number: 56081832\_1\_1  
Customer Ref: COT47  
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Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

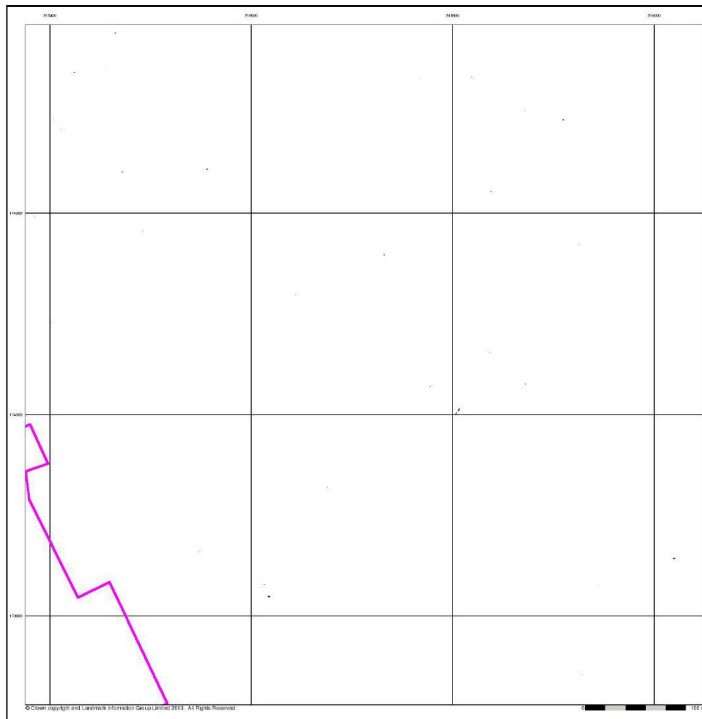
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## London

Published 1850

Source map scale - 1:5,280

The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2500 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Ordnance Survey of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards.

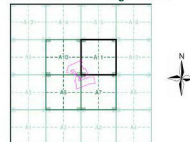
1:5000 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of contour similar to the more contemporary 1:10,560 mapping. The scale was also used for a reduction of the 1:10560 reduction survey of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)



### Historical Town Plan - Segment A11



### Order Details

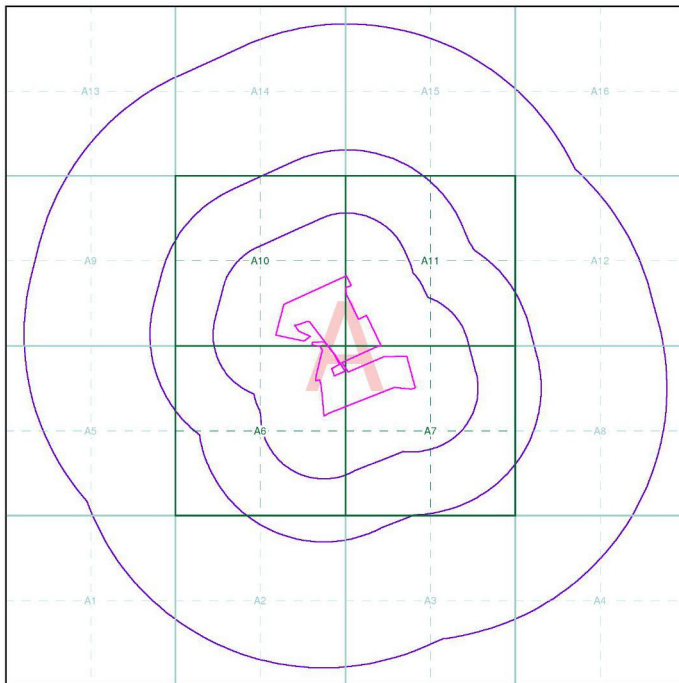
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 Search Buffer (m): 0

### Site Details

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## Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

### Site

Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice grid. This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

### Segment

A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

### Quadrant

A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the dataset to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

## Client Details

Ms M ODea, Cascade Consulting, Enterprise House,  
Manchester Science Park, Lloyd Street North, Manchester,  
Greater Manchester, M15 6SE

## Order Details

Order Number: 56081832\_1\_1  
Customer Ref: C0747  
National Grid Reference: 515370, 173710  
Site Area (Ha): 12.71  
Search Buffer (m): 1000

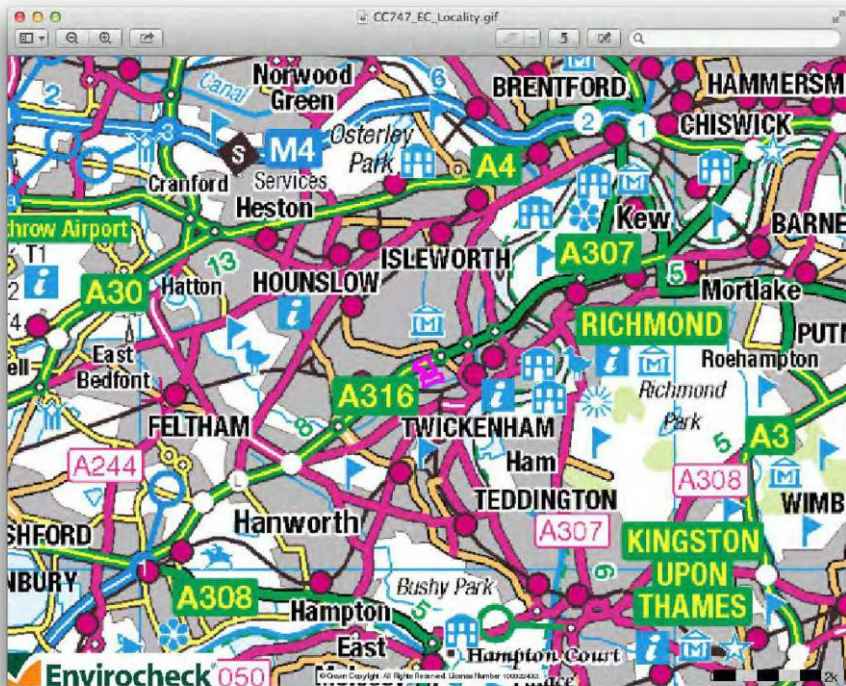
## Site Details

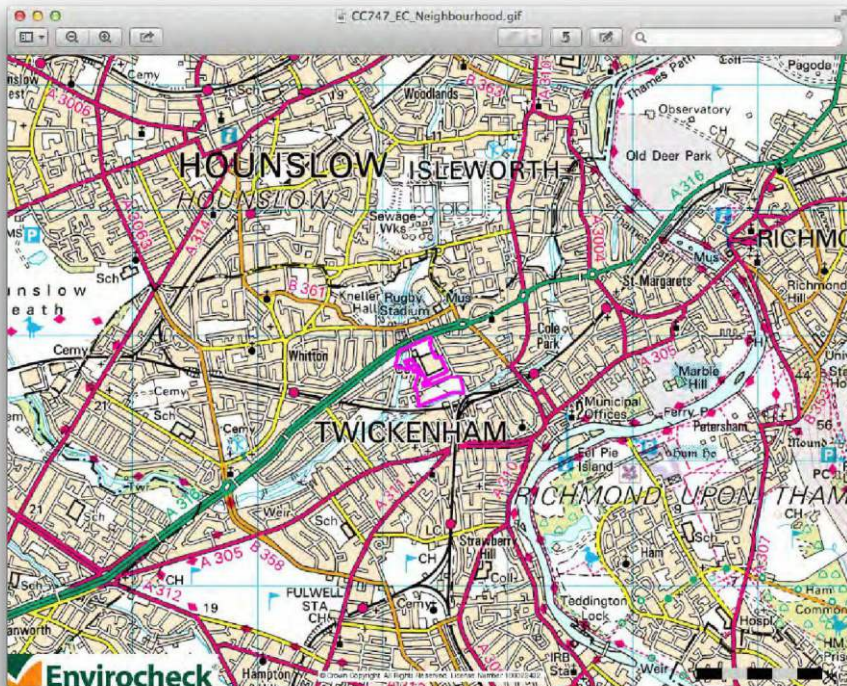
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TWICKENHAM, TW2 7SJ

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<http://www.landmarkinfo.co.uk/Terms/Show/515>

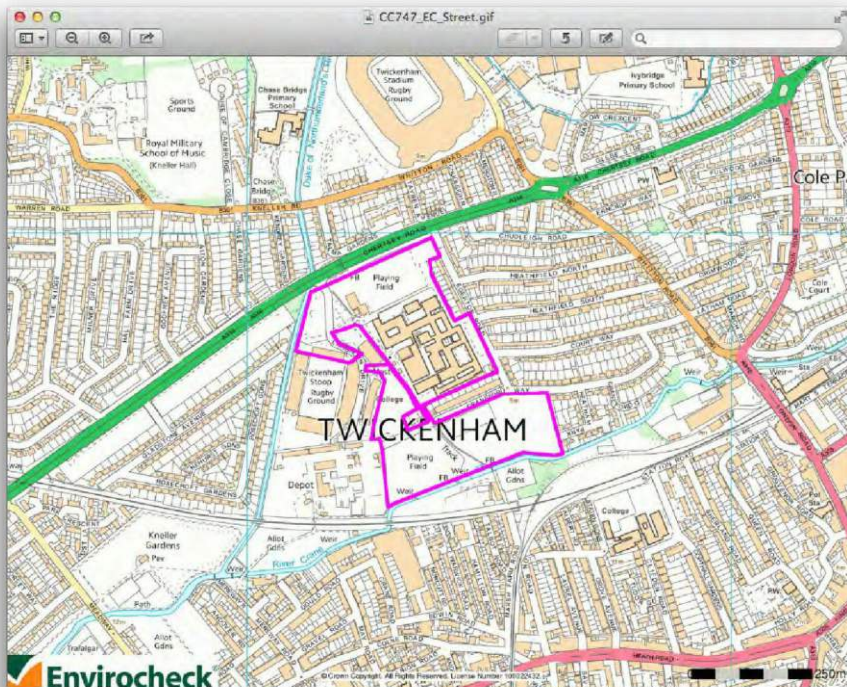


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Web: www.envirocheck.co.uk












## **Appendix 11.2: Soiltechnics Classification of Waste Soils for Off Site Disposal**

**Proposed Redevelopment  
of  
Richmond Upon Thames College  
Egerton Road  
Twickenham**

**REPORT ON THE CLASSIFICATION OF WASTE SOILS FOR OFF  
SITE DISPOSAL  
(Basic Categorisation – level 1)**

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Report Reference: STE1297R-L01					
<b>Report Originators</b>					
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Supervised by	 Dr Matthew Hooper B.Sc. (Hons), M.Sc., Ph.D., F.G.S.			matt.hooper@soiltechnics.net Senior geo-environmental Engineer for Soiltechnics Limited	
Reviewed by	Nigel Thornion B.Sc (Hons), C.Eng., M.I.C.E., M.I.H.T., F.G.S.			nigel.thornion@soiltechnics.net Director for Soiltechnics Limited	
<b>Report Issue</b>					
Company	Name	Paper Issue	Date	Electronic Issue	Date
AKT	Joyce Feng	Final Draft		Final Draft	22.07.08

## Aerial photograph of site





## Report status and format

Report section	Principal coverage	Report status		
		First draft	Final draft	Comments
1	Executive summary		22.07.08	
2	Introduction		22.07.08	
3	Description and history of the site and geology of the area		22.07.08	
4	Fieldwork		22.07.08	
5	Ground conditions encountered		22.07.08	
6	Laboratory testing		22.07.08	
7	The Landfill Directive and its consequences in relation to soils for disposal to landfills.		22.07.08	
8	Primary Classification		22.07.08	
9	Secondary assessment		22.07.08	
10	Naturally deposited soils not affected by artificial contaminants		22.07.08	
11	Basic categorisation		22.07.08	
12	Treatment of wastes		22.07.08	
13	Drawings		22.07.08	

### List of drawings

Drawing	Title	Revision
STE1297R-01	Site location plan	
STE1297R-02	Plan showing existing site features and approximate location of exploratory points.	

### List of appendices

Appendix	Contents
A	Fieldwork records
B	Copy of laboratory test result certificates (Total concentration of metallic and semi metals).
C	Copy of laboratory test result certificate (landfill waste acceptance criteria – table 5.1).
D	Hazard assessment spread sheet.
E	Comparison of test data with landfill waste acceptance criteria (table 5.1) (Secondary assessment procedures).
F	Basic categorisation schedules
G	Example of a pre treatment form

## 1. Executive Summary

### General

We recommend the following executive summary is not read in isolation to the main report which follows.

### Site description, history and development proposals

The site is located towards the centre of Twickenham and is occupied by Richmond-Upon-Thames College. Prior to the college, historically OS maps record the site to be open space and a tram way was recorded run across the southern half of the site.

At this stage the proposals are being developed however we understand that the existing buildings are to be demolished to make way for the new college buildings.

### Ground conditions encountered.

Exploratory excavations generally encountered between 0.3-1.0m of topsoil or made ground grading into orange brown clays becoming sand and gravel considered to be Kempton Park Gravel to depths of between 4.2-5.3m and locally 9.3m. Stiff grey dark grey clay considered to be London Clay was encountered underlying the Kempton Park Gravel. Groundwater was encountered at between 1.1-3.5m during exploratory excavations and water levels of between 1.33-2.54m have been recorded in standpipes installed across the site.

### Waste categorisation

The Made Ground soils across the site are classified as inert with the exception of the soils from around trial pit TP14 which are classified as non-hazardous based on elevated concentrations of hydrocarbons. The extent of soils likely to be affected by hydrocarbon contamination (and thus classified as non hazardous) will be subject to further investigations.

The Kempton Park Gravels are classified as inert.

The underlying London Clays, considered to be unaffected by artificial contamination, can also be classified as inert for off-site disposal.

**SECTION 2 - CONTENTS**

<b>2</b>	<b>Introduction</b>
2.1	Objectives
2.2	Client instructions and confidentiality
2.3	Site location and redevelopment proposals
2.4	Classification of soil types
2.5	Report format and investigation standards
2.6	Status of this report
2.7	Report distribution

**2 Introduction****2.1 Objectives**

2.1.1 This report describes a ground investigation carried out for the redevelopment of Richmond-Upon-Thames College, Twickenham.

2.1.2 The principal objective of this report is to characterise soil waste generated by the above development for landfill purposes based on available investigatory data, following procedures described in current Environment Agency publications relating to the landfill directive.

**2.2 Client Instructions and Confidentiality**

2.2.1 The investigation was carried out in May 2008 and reported in July 2008 acting on instructions received from Adams Kara Taylor (Consulting Civil and Structural Engineers), on behalf of our mutual client Richmond-Upon-Thames College.

2.2.2 This report has been prepared for the sole benefit of our above named instructing client, but this report, and its contents, remains the property of Soiltechnics Limited until payment in full of our invoices in connection with production of this report.

2.2.3 This report accompanies a general ground investigation report, which concentrates on geotechnical and geo-environmental issues.

## **2.3 Site Location and Development Proposals**

2.3.1 The National Grid reference for the site is 515350,173810. A plan showing the location of the site is presented on Drawing STE1297R-01

2.3.2 We understand the project will consist of the phased demolition of the existing buildings at Richmond Upon Thames College in combination with and followed by:-

- Construction of temporary accommodation block to the south of the existing campus
- A new four to five storey "L" shaped building approximately 250m long by 40m extending to playing fields to the north of the site and within the footprint of the existing college buildings, and

## **2.4 Classification of soil types**

2.4.1 Our investigations consider two soil types which are likely to be generated as wastes as part of construction operations. Firstly we carry out a full hazard assessment and subsequent testing for waste acceptance criteria on soils which are not considered to be naturally deposited or likely to be affected by artificial contamination. Secondly, where appropriate, we consider soils which are naturally occurring and not likely to be affected by artificial contamination, where no specific testing in relation to the classification process is considered necessary. Naturally occurring soils are considered separately in section 10.

## **2.5 Report Format and Investigation Standards**

2.5.1 Sections 2 to 6 of this report describe the factual aspects of the investigation. Section 7 describes the current background to generation and management of waste and need for classification. Sections 8 and 9, detail the analysis of test data, leading to the required 'basic categorisation' of waste for landfill in Section 11. Section 12 provides information for the requirement of treatment of waste.

2.5.2 Investigation standards are described in the text of this report.

## 2.6 Status of this Report

- 2.6.1 This report is final based on our current instructions.
- 2.6.2 The investigation was carried out and reported based on our understanding of current guidance produced by the Environment Agency. Changes in guidance are likely, and thus may necessitate an alteration in the report, or indeed, supplementary investigations. Equally, if the nature of the development changes, Soiltechnics should be advised and reassessment carried out if considered appropriate.

## 2.7 Report distribution

- 2.7.1 This report has been prepared to assist in the design and planning process of the development and will normally require distribution to the following parties, although this list may not be exhaustive:

Party	Reason
Client	For information / reference and cost planning
Developer / Contractor / project manager	To ensure procedures are implemented, programmed and costed
Planning department	Potentially to discharge planning conditions
Landfill operators	For acceptance of wastes to landfill
Waste recycling operators (if appropriate)	For recycling or reducing hazardous properties (if and where appropriate)
Project design team	To progress the design
CDM Coordinator	To advise in construction risk identification and management under the construction (design and management) regulations

**SECTION 3 - CONTENTS**

<b>3</b>	<b>Description and history of the site and geology of the area</b>
3.1	General
3.2	Brief description of the site
3.3	Brief history of the site
3.4	Geology of the area

### **3 Description and history of the site and geology of the area**

#### **3.1 General**

- 3.1.1 A full desk study for the site was carried out and is fully reported in our main ground investigation report. For completeness, however, a summary of the desk study in relation to characterising the site is provided in the following paragraphs.

#### **3.2 Brief Description of the Site**

- 3.2.1 The site is located in Twickenham within the main site occupied by Richmond-Upon-Thames College buildings, car parks and sports fields. The southern end of the site is on the opposite side of the road to the main college and is currently an area of former tennis courts surfaced in bituminous bound type material.

#### **3.3 Brief History of the Site**

- 3.3.1 Historical Ordnance Survey maps dating back to 1871 record the site to be open space with a tramway running across the southern third of the site circa 1915. Buildings recorded on the site circa 1938 and the site was first recorded as a college circa 1961.

### 3.4 Geology of the Area

#### 3.4.1

Inspection of the geological map of the area (at 1:50000 scale) published by the British Geological Survey indicates the topography local to the site (based on borehole/observations recorded on the map) is formed in the following sequence of soils.

Strata	Approximate thickness (m)	Typical soil type	Likely permeability
Kempton Park Gravel	Not recorded	Silt, sand and Gravel	Moderate
London Clay	50m	Clay	Low
Lambeth Group	50m	Clay sands, and gravels	Low - Moderate
Upper Chalk	>50m	Chalk	High

**Table 3.5.1**

The soil types and assessment of permeability's are based on geological memoirs, in combination of our experience of investigations in these soil types.



**SECTION 4 - CONTENTS****4 Fieldwork****4 Fieldwork**

4.1 Fieldwork comprised the following activities:-

- Excavation of twenty six exploratory trial pits using hand tools with soil infiltration tests undertaken in eight of these
- Excavation of six exploratory boreholes using cable and tool percussion drilling techniques
- Excavation of twenty one exploratory boreholes formed using driven tube sampling equipment with infiltration tests undertaken in two of these
- Dynamic cone penetration testing in thirteen locations

4.2 A plan of the site showing observed/existing site features and position of exploratory points is presented on Drawing STE1297R-02.

4.3 Fieldwork records are presented in Appendix A.

4.4 All soils/rocks exposed in exploratory excavations were described by an experienced geo-environmental engineer, in accordance with BS5930: 1999 'Code of Practice for Site Investigations'.

4.5 Soil samples from exploratory excavations were taken using clean stainless steel sampling equipment with a view to minimising cross contamination. Soil samples were at least 2kg and deemed representative of the soil layer exposed in the excavation. The soil sample was placed in a new plastic container, which was labelled and sealed. Samples were taken by an experienced geo-environmental engineer.

**SECTION 5 - CONTENTS**

<b>5</b>	<b>Ground conditions encountered</b>
5.1	Soils and stratigraphy
5.2	Composition of soil samples for classification testing

**5 Ground conditions encountered.****5.1 Soils and stratigraphy**

5.1.1 The exploratory excavations encountered soils, which, in our opinion, were identified as follows in order of superposition:-

**either**

- Dark to light brown grey and orange sandy silt or silty clays with gravels and cobbles of brick and flint gravels, between ground level and average depth of 1m locally 1.9m adjacent to existing foundations.

**or**

- Brown grey and orange gravelly sand and sandy clay or light to dark brown sandy silt between ground level to between 0.3-1.0m considered to be made ground or topsoil these deposits graded into:-
- Loose becoming medium dense orange brown clays and silts becoming sands, sands and gravels to an average depth of 5m, locally to a depth of 9.3m considered to be Kempton Park Gravels.
- Stiff becoming very stiff blue grey clay considered to be London Clay to a depth in excess of 25m.

With the exception of Made Ground, the investigation generally confirmed published geological records.

## 5.2

### Composition of soil samples for classification testing

5.2

In addition to individual sampling and laboratory testing used to undertake our primary classification (ref Section 8), two composite samples were also produced for subsequent laboratory testing to aid our secondary assessment (ref Section 9). The source of each soil sample is detailed below.

Composition of soil samples for classification testing		
Strata	Source	Soil Type
Made Ground (Bulk 1)	TP05 0.3-0.4m, 0.7-0.8m TP13 0.3m TP09 0.4-0.5m TP04 0.5-0.6m TP07 0.3-0.4m TP01 0.2-0.3m DTS19 0.2-0.4m DTS18 0.2-0.4m DTS06 0.2-0.35m DTS13 0.2-0.3m DTS01 0.4-0.55m DTS06 0.05-0.2m DTS10 0.1-0.3m DTS20 0.7-0.9m DTS14 0.1-0.3m DTS07 0.05-0.1m DTS12 0.6-1.0m DTS03 0.06-0.2m DTS08 0.05-0.2m	Brown grey and orange gravelly sand and gravelly sandy clay
Kempton Park Gravel (Bulk 2)	DTS17 1.7-2.0m DTS13 0.7-0.9m DTS13 1.2-1.3m DTS10 1.2-1.7m DTS02 2.0-2.2m DTS01 1.8-2.0m DTS13 2.1-2.5 DTS06 1.5-2.0m DTS09 2.0-2.4m DTS01 1.0-1.5m DTS12 1.4-1.5m DTS20 1.2-1.5m DTS05 1.5-1.7m DTS16 2.0-2.5m DTS16 1.0-1.5m BH06 1.5m BH02 1.4m	Orange brown slightly clayey sand and gravel or flint

**SECTION 6 - CONTENTS**

<b>6</b>	<b>Laboratory testing</b>
6.1	Methodology
6.2	Quality assurance
6.3	Presentation

**6 Laboratory testing****6.1 Methodology**

6.1 Laboratory testing was carried out as deemed necessary to characterise soils likely to be produced as waste by the development. Testing was limited to the following:

- Using inductively coupled plasma – optical emission spectrometry (ICP-OES), determination of concentration of metals
- Using a combination of headspace GC-FID and hexane/acetone extraction, determination of “CWG” banded petroleum hydrocarbons.
- Using gas chromatography – mass spectrometry, determination of the concentration of Polycyclic Aromatic Hydrocarbons (PAH)
- Following methods based on and incorporating procedures published in HMSO ‘*Methods for the Examination of Water and Associated Materials*’ determination of concentration of chemical contaminants on soil (refer Section 7 for discussion).
- Following methods described in the Environment Agency publication ‘*Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*’ (April 2005) – suite of testing in accordance with Table 2.1.

**6.2 Quality assurance**

6.2.1 Laboratory testing was carried out by an independent specialist testing house which operates quality assurance schemes and is progressing accreditation under the MCERTS scheme for the second (EA) testing suite.

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**6.3 Presentation**

6.3 Copies of laboratory testing results are presented in Appendices B and C.

## **SECTION 7 - CONTENTS**

<b>7</b>	<b>The Landfill Directive and its consequence in relation to soils for disposal to landfill</b>
7.1	General
7.2	The Landfill Directive and implementation in the UK
7.3	Content of the regulations with respect to disposal of soils to landfill
7.4	Waste acceptance procedures
7.5	Waste acceptance criteria
7.6	European Waste Catalogue (EWC) coding

## **7 The Landfill Directive and its consequence in relation to soils for disposal to landfill.**

### **7.1 General**

- 7.1.1 The following is based on our understanding of current, and publicly available, information with relevant documents referred to in the text.

### **7.2 The Landfill Directive and Implementation in the UK**

- 7.2.1 The Landfill Directive represents an important change in the way we dispose of waste. It encourages waste minimisation by promoting increased levels of recycling and recovery. The Landfill Directive became law in July 1999 and transcribed into the Landfill (England and Wales) Regulations which came into force in August 2002. These Regulations were amended on 16<sup>th</sup> July 2005 by introducing criteria to classify soils for disposal to landfill.

### **7.3 Content of the Regulations with respect to disposal of soils to landfill**

- 7.3.1 The regulations require the Environment Agency to classify landfill sites for acceptance of hazardous, non-hazardous and inert wastes. These regulations also prohibit the following wastes from landfill.
- 1) Waste in liquid form
  - 2) Wastes, which are explosive, corrosive, oxidising, flammable or highly flammable
  - 3) Hospital or clinical wastes and other infectious wastes

- 4) Whole used tyres (from 2003) and shredded tyres (from 2008) other than bicycle tyres or tyres over 1.4m diameter
  - 5) Any other waste, which does not fulfil acceptance criteria
- 7.3.2 Mixing or dilution of the above type of wastes to meet acceptable criteria is prohibited.
- 7.3.3 It is a requirement of the landfill operator to accept materials for landfill, which has been subject to prior treatment unless:
  - a) It is inert waste for which treatment is not technically feasible; or
  - b) Waste, which cannot be treated to reduce its quantity or the hazards, which it poses to human health or the environment.
- 7.3.4 The operation of a landfill site for non-hazardous waste can accept:
  - a) municipal waste
  - b) non-hazardous wastes which meet acceptance criteria

#### **7.4 Waste Acceptance Procedures**

- 7.4.1 It is a requirement of the waste producer to characterise the waste for landfill purposes under the following criteria:
  - a) Source and origin of the waste
  - b) Information on the process producing the waste
  - c) Description of the waste treatment applied or a statement of reasons why such treatment is not considered necessary
  - d) Date on composition of the waste, and where relevant, the leaching behaviour
  - e) Appearance of the waste (smell, colour, physical form)
  - f) Code according to the European Waste Catalogue
  - g) For hazardous waste – relevant hazard properties
  - h) Information to demonstrate waste is not a prohibited waste
  - i) Landfill class at which the waste may be accepted
  - j) Additional precautions to be taken at landfill
  - k) Check material can be recycled or recovered
- 7.4.2 The above is deemed level 1 and 'Basic Characterisation', the production of which is the objective of this report. The landfill operator has a responsibility to be satisfied that the waste is consistent and compliant with the basic characterisation. This is deemed level 2 'Compliance'. Level 3 is on site verification.

## **7.5 Waste Acceptance Criteria (WAC)**

- 7.5.1 The Environment Agency publication, *'Framework for the classification of contaminated soils as hazardous wastes'* (July 2004), provides an appropriate procedure for establishing if the soils are hazardous or non-hazardous.
- 7.5.2 The first stage is classifying a potentially 'contaminated' soil for disposal to landfill is to establish its chemical status by first identifying potential sources/types of chemical contamination (desk study) followed by intrusive site investigations to obtain samples for undefined testing of soil samples to measure concentrations of chemical contaminants. Such data will provide information to partly complete the basic characteristic checklist.
- 7.5.3 Laboratory test data is then compared with the Environment Agency publication *'hazardous waste – interpretation of the definition and classification of hazardous waste (second edition, version 2.1)'*. Where the waste is suspected to contain oil, we have referred to the Environment Agency draft consultation paper *'How to Find Out if Waste Oil and Wastes that Contain Oil are Hazardous'* (Draft Version 2.5 – October 2006). With reference to these documents a hazard assessment has been carried out to enable categorisation of the material as hazardous or non-hazardous and to subsequently establish the European Waste Catalogue (EWC) code (ref Section 7.6 below).
- 7.5.4 If the soil is deemed hazardous then measurement of organic contaminants and leachable inorganic contaminants is necessary for comparison with values listed in the Environment Agency publication *'Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures'* (April 2005). Similarly should the soil be deemed as non hazardous then such testing may also be undertaken to determine if it is potentially inert. This document also provides guidance on sampling materials, and frequency as well as test procedures and quality assurance of testing.
- 7.5.5 The above procedures are described with respect to the subject site in Sections 8 and 9 of this report, leading to basic characterisation of soils for disposal. Subject to the results of the categorisation, and anticipated development methodology, consideration should be given by the developer to reduce volumes of disposal or treatment to allow reclassification.



## **7.6 European Waste Catalogue (EWC) Coding**

- 7.6.1 The EWC 2002 is a catalogue of all wastes, grouped according to generic industry, process or waste type. It is divided into twenty main chapters, each with a two digit code between 01 and 20. Following the EWC, in our opinion, soils considered as part of this investigation would be categorised within 'Group 17' of the EWC catalogue, which comprises 'Construction and Demolition Wastes (including excavated soils from contaminated sites)'.  
*(Soils from contaminated sites)*.
- 7.6.2 The Catalogue further categorises the waste, such that soils considered as part of this investigation would be classified as either 17 05 04 defined as 'soil and stones (other than those mentioned in 17 05 03)' or 17 05 03\* defined as soil or stones containing dangerous substances (where hazardous wastes are described by entries followed by an asterisk).
- 7.6.3 Where demolition/construction wastes, other than those defined by EWC code 17 05 04 or 17 05 03\* (for example, concrete, brick or wood) are produced, then the appropriate EWC code should also be applied. Such waste products are considered outside the investigation scope of this report (which describes the disposal of soil waste only), though we can provide assistance with such categorisations upon further instruction.
- 7.6.4 It should be appreciated that there is no obligation on any landfill operator to accept waste if they choose not to. The licence/permit entitles them to accept waste of particular descriptions but does not compel them to do so. Where they do, waste operators may require testing of untested waste soils prior to acceptance at landfill in accordance with the landfill regulations.

**SECTION 8 - CONTENTS**

<b>8</b>	<b>Primary Classification</b>
8.1	Soils types
8.2	Classification as hazardous or non hazardous waste

**8 Primary Classification****8.1 Soil Types**

- 8.1.1 Based on soils exposed in exploratory excavations, in combination with anticipated construction works, we assume soils generated for off-site disposal will comprise Made Ground, Kempton Park Gravel and London Clay.

**8.2 Classification as hazardous or non-hazardous waste**

- 8.2.1 The Environment Agency publication 'Framework for the classification of contaminated soils as hazardous wastes' (July 2004) provides the following procedure for establishing if the soils are hazardous or non-hazardous. The first stage in classifying a potentially 'contaminated' soil for disposal is to establish its chemical status by first identifying potential sources/types of chemical contamination (desk study) followed by intrusive site investigations to obtain samples for laboratory testing of soil samples to measure concentrations of chemical contaminants.
- 8.2.2 Historical records, do not indicate the site has been subject to industrial activities in tables 2.3 and 2.4 of Contaminated Land Report (CLR) no. 8. 'Potential contaminants for the Assessment of Land' produced by the Department for Environment, Food, and Rural Affairs (DEFRA) in conjunction with the Environment Agency (EA). In addition we are not aware of any previous site activities, which would have generated specific contamination. We did however identify soils in two locations which exhibited a slight hydrocarbon type odour.
- 8.2.3 With reference to CLR8, and in the absence of any knowledge of historical site uses which may have generated specific contamination, we have scheduled testing to measure the concentration of metallic and semi-metallic contaminants listed in table 2.1 (of CLR8) when they are considered a risk to human receptors. In addition, we scheduled two samples taken from the suspected hydrocarbon compacted soils for

determination of total petroleum hydrocarbons with speciation. Copies of test result certificates are presented in Appendix B.

- 8.2.4 Following Contaminated Land Report (CLR) no. 7 'Assessment of risks to human health from: Land Contamination. An overview of the development of soil guideline values related to research', we have carried out an analysis of test data for each chemical contaminant considered in this investigation. A conservative approach has been adopted for the analysis whereby the maximum test value for each contaminant has been adopted as a preliminary screening process to determine if the soils are hazardous or non-hazardous. Should the analysis indicate potentially hazardous properties then a process of zoning by further analysing the site history, geological conditions and analytical data may be undertaken.
- 8.2.5 Laboratory test data measures the concentration of anions, which are unlikely to exist in the pure metallic form in the soil, but probably exist on a compound. Following guidance provided in the 'framework for the classification of contaminated soils as hazardous wastes,' we have reviewed a variety of compounds for each of the metallic and semi metallic elements from table 2.1 of CLR8, limiting our review to insoluble compounds (soluble compounds will have allowed soil leaching to reduce their concentration). Firstly, if the compound includes an anion of a 'light' molecular weight, and is listed in the *Approved Supply List* (seventh edition) (Published by the Health and Safety Executive) then this compound is used to convert the measured metallic concentration to the substance concentration using their respective molecular weights. This derived conversion factor is then used in the threshold concentration spreadsheet (refer paragraph 8.2.8 below).
- 8.2.6 The review of chemical compounds associated with each selected metallic and semi metallic element, includes selection of a 'worst case' substance from the approved supply list giving the most severe hazardous properties thus allowing a combined hazard assessment for all chemicals under consideration. For review of organic contamination, we have directly adopted the threshold concentrations for the appropriate organic compounds listed in the *Approved Supply List*.
- 8.2.7 Our assessment of each of the chemical substances is maintained on our files and is available for confidential review/audit by the Environment Agency.
- 8.2.8 A spreadsheet detailing the hazard assessment following the procedures described in 'framework for the classification of contaminated soils as hazardous wastes' is presented in Appendix D.
- 8.2.9 The spreadsheet indicates the soils are **non hazardous**.

**SECTION 9 - CONTENTS****9 Secondary assessment****9 Secondary assessment**

- 9.1 Following 'Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures' produced by the Environment Agency (Version 1, April 2005) we have scheduled testing of two samples to measure the parameters listed in table 5.1 (landfill waste acceptance criteria) included in the above publication. A copy of the test result certificate is presented in Appendix C.
- 9.2 The samples were deemed representative of each soil type described in Section 5. Each sample was formed by combining individual samples taken from exploratory excavations within each soil type. The combined sample for each soil type then quartered in the laboratory to produce a representative sample for subsequent testing.
- 9.3 Laboratory test data has been compared with the landfill waste acceptable criteria (table 5.1) to allow the secondary assessment to be completed. A copy of table 5.1 is presented in Appendix E with test result data added for ease of comparison.
- 9.4 Elevated concentration of hydrocarbons were measured on a sample of soil taken from trial pit TP14, which exceeds the landfill waste criteria for inert, thus categorising the soil as **non-hazardous**. As part of our Ground Investigation we have recommended further investigations in this vicinity to establish the extent of this contamination thus potentially allowing zoning.
- 9.5 With respect to the remainder of the site, comparison of test data with landfill waste acceptance criteria indicates the Made Ground and Kempton Park Gravels are classified as **inert** waste for off-site disposal.

**SECTION 10 - CONTENTS**

<b>10</b>	<b>Naturally deposited soils not affected by artificial contaminants</b>
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## **10**      **Naturally deposited soils not affected by artificial contaminants**

- 10.1      With reference to the European Waste Catalogue and table 5.1 of the Environment Agency publication '*a better place – guidance for waste destined for disposal in landfills – version 2 June 2006*', naturally occurring soils not likely to be affected by contamination can be classified as inert waste, with a EWC code of 17 05 04. Should any of the naturally deposited soils be suspected to contain contamination (by virtue of visual or olfactory evidence) upon excavation, then such soils should be stockpiled appropriately and additional testing carried out as considered necessary. Based on evidence obtained during our investigations, we are of the opinion that the London Clay at the site are not likely to be affected by chemical contamination and thus can be classified as **inert waste**.

**SECTION 11- CONTENTS****11 Basic Categorisation****11 Basic Categorisation**

11.1 Based on the above we have produced four basic categorisation schedules relating to the Made Ground, hydrocarbon contaminated Made Ground (around trial pit TP14- extent subject to further instructions), Kempton Park Gravel and London Clay deposits, which are presented in Appendix F. These schedules should be provided together with a copy of this report to an appropriately licensed landfill facility to demonstrate the material can be deposited at this facility. In addition to this, a pre treatment confirmation form will be required (see section 12.4.1 below).

11.2 We understand that some landfill sites have licences which have restrictions on concentrations of chemical contaminants, and thus we recommend this report is provided to the selected landfill facility to confirm (or otherwise) it can accept the waste. Please be aware that landfill sites are obligated to undertake in house quality assurance tests, and thus may require further WAC testing for any soils encountered as part of this investigation. As discussed in Section 7.6.4 there is no obligation on any landfill operator to accept waste if they choose not to and waste operators may require additional testing of untested waste soils prior to acceptance at landfill in accordance with the landfill regulations.

**SECTION 12 - CONTENTS**

<b>12</b>	<b>Treatment of wastes</b>
12.1	Regulations
12.2	Treatment of inert wastes
12.3	Treatment of non hazardous wastes
12.4	Landfill operators
12.5	Waste management plans

**12 Treatment of wastes****12.1 Regulations**

- 12.1.1 Treatment of wastes is now a requirement of the landfill directive applied by the Landfill (England and Wales) Regulations 2002. Landfill cannot accept untreated waste (be it hazardous or non hazardous), thus waste producers have the choice of treating it themselves on site or treating it elsewhere prior to disposal to landfill. The regulations require:

*'10 – (1) The operator of a landfill shall ensure that the landfill is only used for landfilling waste which is subject to prior treatment unless:*

- a) It is inert waste for which treatment is not technically feasible; or*
- b) It is waste other than inert waste and treatment would not reduce its quantity or the hazards which it poses to human health or the environment.'*

- 12.1.2 Regulation 2 defines treatment as: *'physical, thermal, chemical or biological processes (including sorting) that change the characteristics of waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery.'*

- 12.1.3 A treatment option must comply with the definition of treatment. This involves a 'three point test' against which treatment is assessed ie:

1. It must be a physical, thermal, chemical or biological process including sorting

2. It must change the characteristics of the waste: and
3. It must do so in order to:
  - a) Reduce its volume; or
  - b) Reduce its hazardous nature; or
  - c) Facilitate its handling; or
  - d) Enhance its recovery.

## **12.2 Treatment of Inert wastes**

12.2.1 Inert waste does not need to be treated if it is not technically feasible however treatment should reduce the amount of waste which goes to landfill and enhance its recovery (by re-use or recycling). Inert wastes are often suitable for recycling, for example as an aggregate or an engineering fill material. A fact sheet on treatment of inert wastes is available on the following website [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

12.2.2 Excavations in the Made Ground (except in the locality of trial pit TP14), Kempton Park Gravel and London Clay (not affected by artificial contamination) will generate inert wastes which could be reused on site or off site for bulk filling, subject of course to maintenance of an acceptable water content.

## **12.3 Treatment of non hazardous waste**

12.3.1 Guidance and indeed examples of treatment is provided in the Environment Agency publication *'Treatment of non hazardous wastes for landfill - your waste – your responsibility.'* again available on the EA website.

## **12.4 Landfill operators**

12.4.1 It is a requirement of the landfill operator to check if the waste soils taken to the facility have been treated. An example of a pre treatment form is provided in Appendix G. This form is based on a similar form produced on page 35 of the publication referenced in paragraph 12.3.1 above. The form in Appendix G will require completion by the developer and will depend upon the pre treatment likely to be adopted for the project. We will be pleased to assist in deriving a pre treatment strategy, and indeed assist in producing a waste management plan as described below.



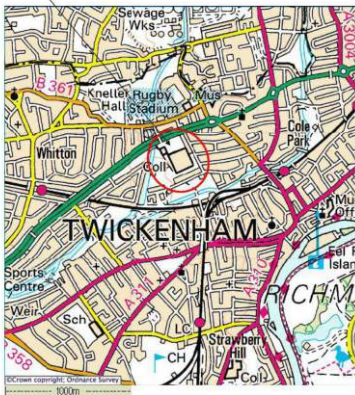
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## 12.5 Waste management plans

- 12.5.1 On the 6<sup>th</sup> April 2008, 'The Site Waste Management Plans Regulations 2008' come into force. This requires the client to produce a waste management plan for construction projects which exceeds an estimated cost of £300,000 excluding VAT prior to commencement of the works. We will be pleased to assist in production of the waste management plan.

The Site

Grid reference 515350, 173810



**SOILTECHNICS**

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Cedar Park, White Lodge, Weybridge, Surrey, Middlesex, UK  
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Project  
Richmond-Upon-Thames College, Egerton Road,  
Twickenham

Title  
Site Location Plan

scale	date	drawn by	checked by
As shown	16.06.08	RC	
project of	drawn by	checked by	revision
STE1297R	01		

08/01



**SOILTECHNICS**

## KEY TO LEGENDS (Extract from BS 5930:1999 table 11)

### SOILS

	Topsoil
	Made ground
	Boulders & Cobbles
	Gravel
	Sand
	Silt
	Clay
	Peat/Organic clays

### SEDIMENTARY ROCKS

	Chalk
	Limestone
	Sandstone
	Siltstone
	Mudstone
	Shale
	Coal
	Conglomerate

Composite soil types are signified by combined symbols.

## KEY TO SYMBOLS USED ON TRIAL PIT RECORDS

### SAMPLING

<b>B</b>	bulk disturbed sample	<b>U (38)</b>	undisturbed (38mm) sample
<b>D</b>	disturbed sample	<b>W</b>	water sample
<b>J</b>	jar sample	<b>CBR</b>	undisturbed sample taken in CBR mould

## NOTES ASSOCIATED WITH INSITU TESTING

**Hand Held Shear Vane (V)** The hand held shear vane provides a quick and direct measurement of undrained shear strength and is calibrated in  $\text{kN/m}^2$  (Pa). The apparatus reads to a maximum shear strength of 150KPa. The results are reported in columns to the right of the trial pit legend.

**Pocket Penetrometer Results (P)** The pocket penetrometer is calibrated in  $\text{kg/cm}^2$  and is deemed to measure the unconfined compressive strength of the soil under test. Under most conditions the unconfined compressive strength of the soil is twice the undrained shear strength of a soil. Thus, an Unconfined compressive strength  $1\text{kg/cm}^2 = 0.009807 \times 100 \times 100 / 2 = 49.04$ , say  $50\text{KN/m}^2$  (equivalent undrained shear strength).

Tests are carried out in the sides of trial pits where access can be safely achieved otherwise testing is carried out on excavated intact lumps. Neither the hand held shear vane nor the pocket penetrometer is recognised in British Standard publications.

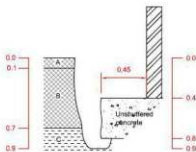


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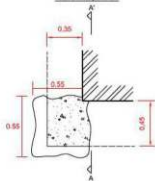
Chadwell, 1000 Enderby, Redgrave, Suffolk, IP10 1RT.  
Tel: (01504) 781877 Fax: (01504) 781887 E-mail: mail@soiltechnics.net

## STANDARD KEY TO TRIAL PIT RECORDS

Section A - A' of trial pit TP01 facing east



Plan of trial pit TP01



Photographic record of trial pit TP01



Key



Masonry



Concrete

- A 50mm thick concrete pavers onto 50mm sand (MADE GROUND)
- B Firm brown, grey and light brown gravelly sandy CLAY. Gravel consists of flint, brick, metal and concrete (MADE GROUND)
- C Firm orange and light brown gravelly sandy CLAY. Gravel consists of coarse flint (KEMPTON PARK GRAVEL)

Notes

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable and no groundwater encountered.
3. All dimensions shown in metres



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Cedar Barn, White Lodge, Wulgrave, Northampton, NN6 9PY

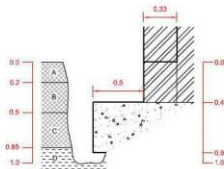
Tel: (01604) 781877 Fax: (01604) 781007 E-mail: [mail@soiltechnics.net](mailto:mail@soiltechnics.net)

Project  
Richmond-Upon-Thames College, Egerton Road,  
Twickenham.

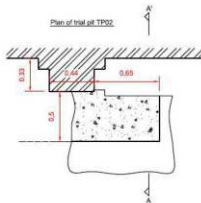
Title  
Detail of foundation exposed in Trial pit TP01

scale	date	drawn by	checked by
1:25 @ A4	28.05.08	MOW	
project ref	drawing	revision	
STE1297R	TP01		

Section A - A' of trial pit TP02 facing south



Plan of trial pit TP02



Photographic record of trial pit TP02



Key



Masonry



Concrete

- A Grass onto firm brown sandy SILT (MADE GROUND)
- B Medium dense brown and light brown clayey gravelly SAND. Gravel consists of flint, brick with some boulders of sandstone and timber (MADE GROUND)
- C Firm brown and orange brown sandy gravelly CLAY. Gravel consists of flint and brick. (MADE GROUND)
- D Firm orange and light brown gravelly sandy CLAY. Gravel consists of coarse flint. (KEMPTON PARK GRAVEL)

Notes

- 1. Trial pit excavated using hand tools
- 2. Trial pit sides remained stable and no groundwater encountered.
- 3. All dimensions shown in metres



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Cedar Barn, White Lodge, Wulgrave, Northampton, NN6 9PY

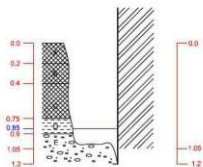
Tel: (01604) 781877 Fax: (01604) 781007 E-mail: [mail@soiltechnics.net](mailto:mail@soiltechnics.net)

Project  
Richmond-Upon-Thames College, Egerton Road,  
Twickenham.

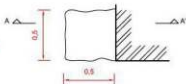
Title  
Detail of foundation exposed in Trial pit TP02

scale	date	drawn by	checked by
1:25 @ A4	28.05.08	MOW	
project ref	drawing no.	revision	
STE1297R	TP02		

Section A - A' of trial pit TP03 facing north.



Plan of trial pit TP03



Photographic record of trial pit TP03



Key



Masonry



Concrete

- A Grass onto firm brown sandy SILT (MADE GROUND)
- B Medium dense brown and light brown clayey gravelly SAND. Gravel consists of flint, brick with some boulders of sandstone and timber (MADE GROUND)
- C Firm brown and dark grey sandy gravelly CLAY. Gravel consists of sandstone, flint and brick. (MADE GROUND)
- D Stiff orange and light brown sandy CLAY. (KEMPTON PARK GRAVELS)
- E Orange sandy GRAVEL. Gravel consists of flint. (KEMPTON PARK GRAVELS)

Notes.

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable
3. Groundwater encountered at 0.85m
4. All dimensions shown in metres
5. Unable to determine base due to water
6. Steel bar used to confirm concrete projection at approximately 1.2m depth
7. Trial pit relocated to TP04



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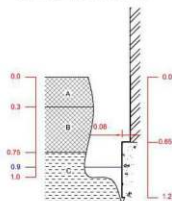
Tel: (01604) 781877 Fax: (01604) 781007 E-mail: [mail@soiltechnics.net](mailto:mail@soiltechnics.net)

Project  
Richmond-Upon-Thames College, Egerton Road,  
Twickenham.

Title  
Detail of foundation exposed in Trial pit TP03

scale	date	drawn by	checked by
1:25 @ A4	28.05.08	MOW	
project ref	drawing	revision	
STE1297R	TP03		

Section A - A' of trial pit TP04 facing east



Key



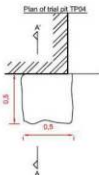
Masonry



Concrete

- A Grass onto firm dark brown sandy SILT (MADE GROUND)
- B Firm brown and light brown gravelly sandy CLAY. Gravel consists of flint, brick and timber (MADE GROUND)
- C Firm orange and light brown gravelly sandy CLAY. Gravel consists of coarse flint (KEMPTON PARK GRAVEL)

Photographic record of trial pit TP04



Notes

1. Trial pit excavated using hand tools
2. Trial pit sides remained static
3. Groundwater encountered at 0.5m.
4. Trial pit terminated due to water inflow.
5. Steel bar used to probe below and confirm foundation depth
6. All dimensions shown in metres



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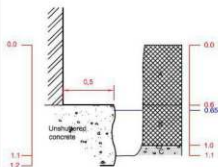
Project  
Richmond-Up-on-Thames College, Egerton Road,  
Twickenham.

Title  
Detail of foundation exposed in Trial pit TP04

scale	date	drawn by	checked by
1:25 @ A4	28.05.08	MOW	
project ref	drawing no.	revision	
STE1297R	TP04		



Section A - A' of trial pit TP05 facing west



Key



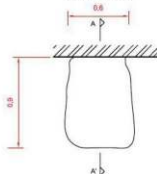
Masonry



Concrete

- A 50mm thick concrete pavior over 50mm sand over red and brown slightly clayey sandy GRAVEL with occasional cobbles of brick. Gravel consists of brick. (MADE GROUND)
- B Firm brown sandy gravelly CLAY. Gravel consists of brick and flint. (MADE GROUND)
- C Loose orange brown clayey SAND and GRAVEL. Gravel consists of coarse flint. (KEMPTON PARK GRAVEL)

Plan of trial pit TP05



Photographic record of trial pit TP05



Notes

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable
3. Groundwater encountered at 0.65m.
4. Trial pit terminated due to water inflow
5. Steel bar used to estimate base of foundation.
6. All dimensions shown in metres



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Project  
Richmond-Upon-Thames College, Egerton Road,  
Twickenham.

Title  
Detail of foundation exposed in Trial pit TP05

scale	date	drawn by	checked by
1:25 @ A4	28.05.08	MOW	
project ref	drawing	revision	
STE1297R	TP05		



515400

515600

515800

516000



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0 100 m



## Large-Scale National Grid Data

Published 1993 - 1994

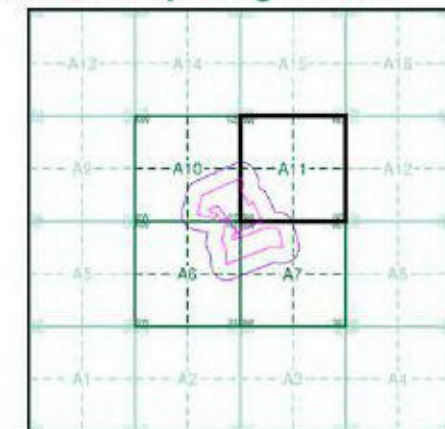
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

### Map Name(s) and Date(s)

TQ1574SW	TQ1574SE
1994	1994
1:1,250	1:1,250
TQ1573NW	
1993	
1:1,250	

### Historical Map - Segment A11



### Order Details

Order Number: 56081832\_1\_1  
 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 100

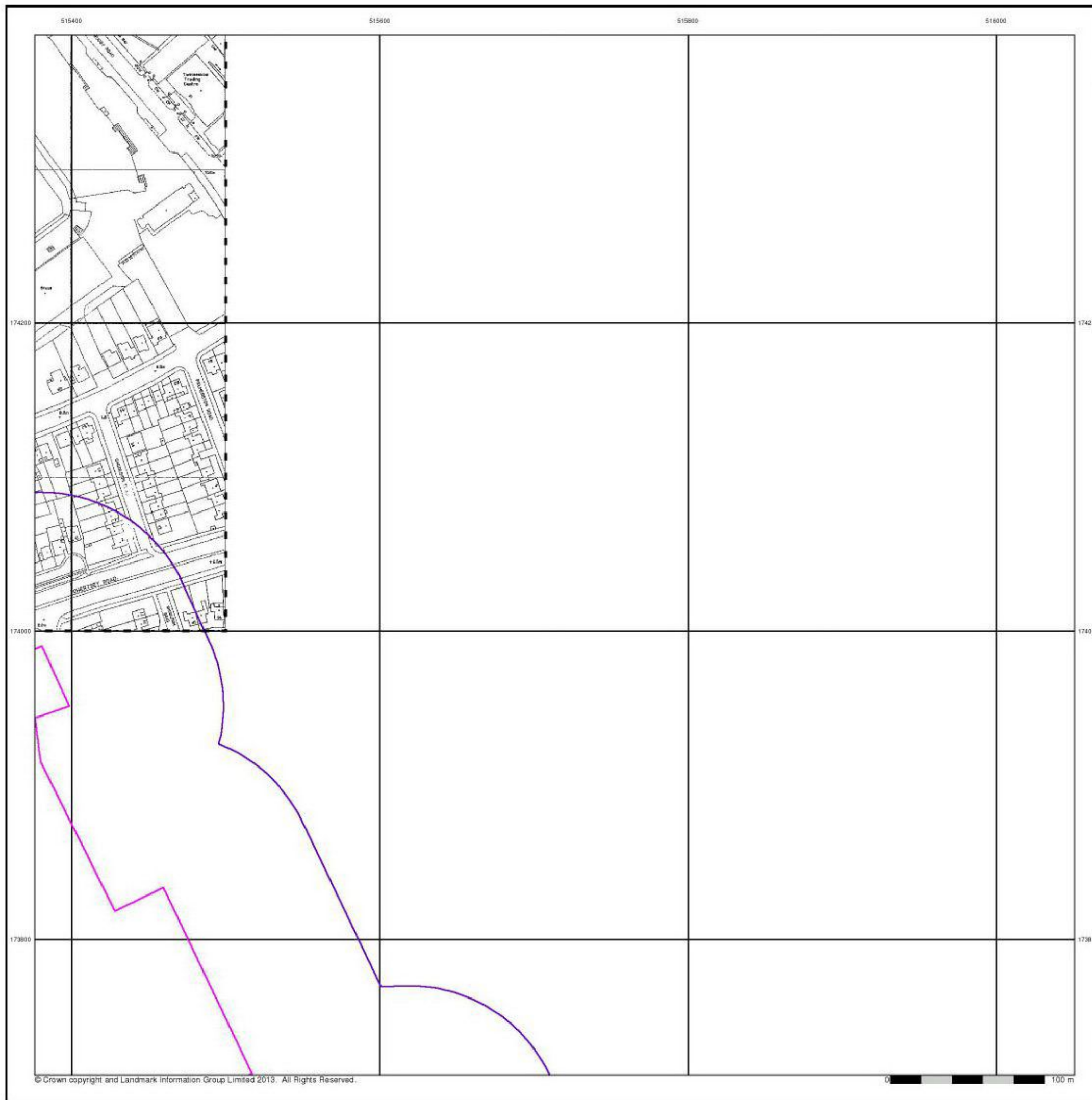
### Site Details

Richmond-upon-Thames College, Egerton Road,  
 TWICKENHAM, TW2 7SJ



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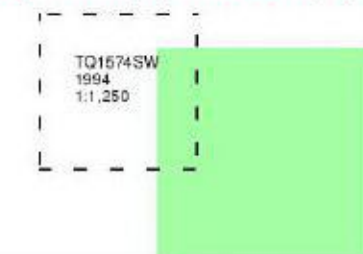
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Published 1994

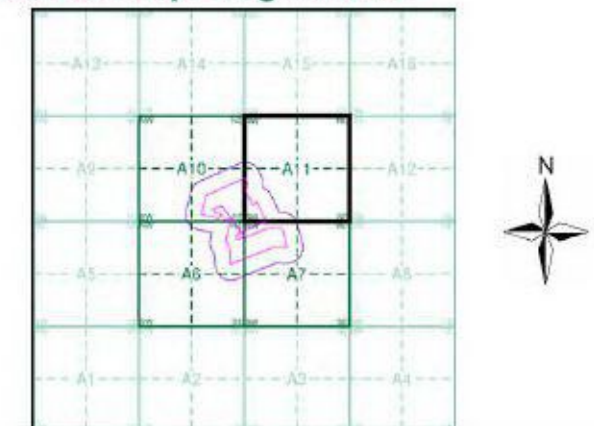
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'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

### Map Name(s) and Date(s)



### Historical Map - Segment A11



### Order Details

Order Number: 56081832\_1\_1  
 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 100

### Site Details

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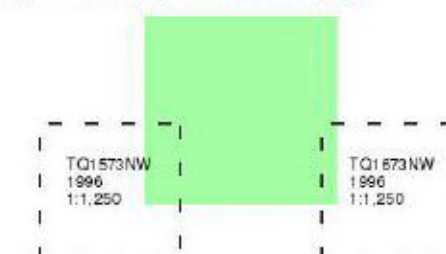
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Published 1996

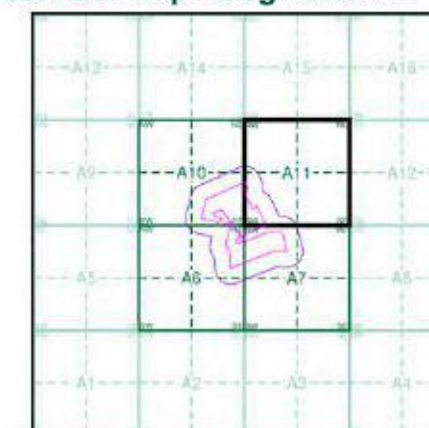
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

### Map Name(s) and Date(s)



### Historical Map - Segment A11

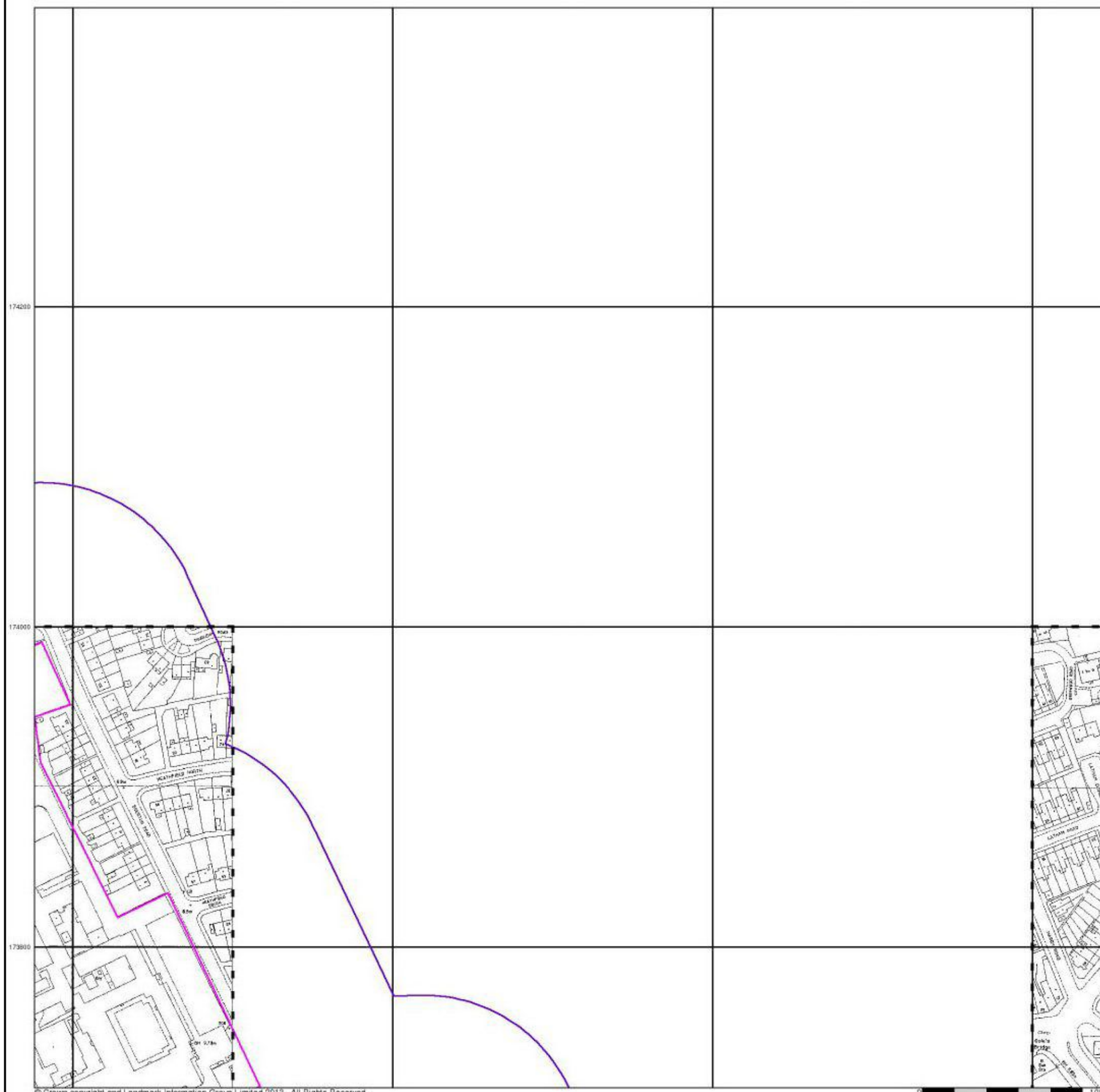


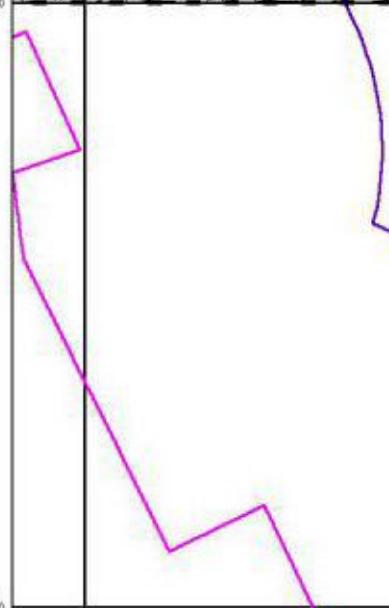
### Order Details

Order Number: 56081832\_1\_1  
 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 100

### Site Details

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0 100 m

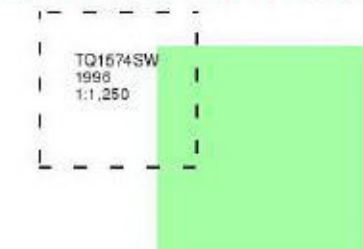


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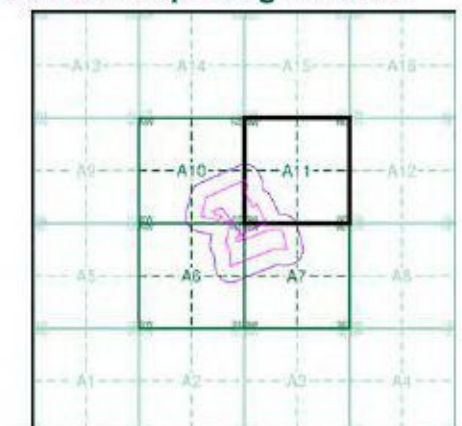
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

### Map Name(s) and Date(s)



### Historical Map - Segment A11



### Order Details

Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
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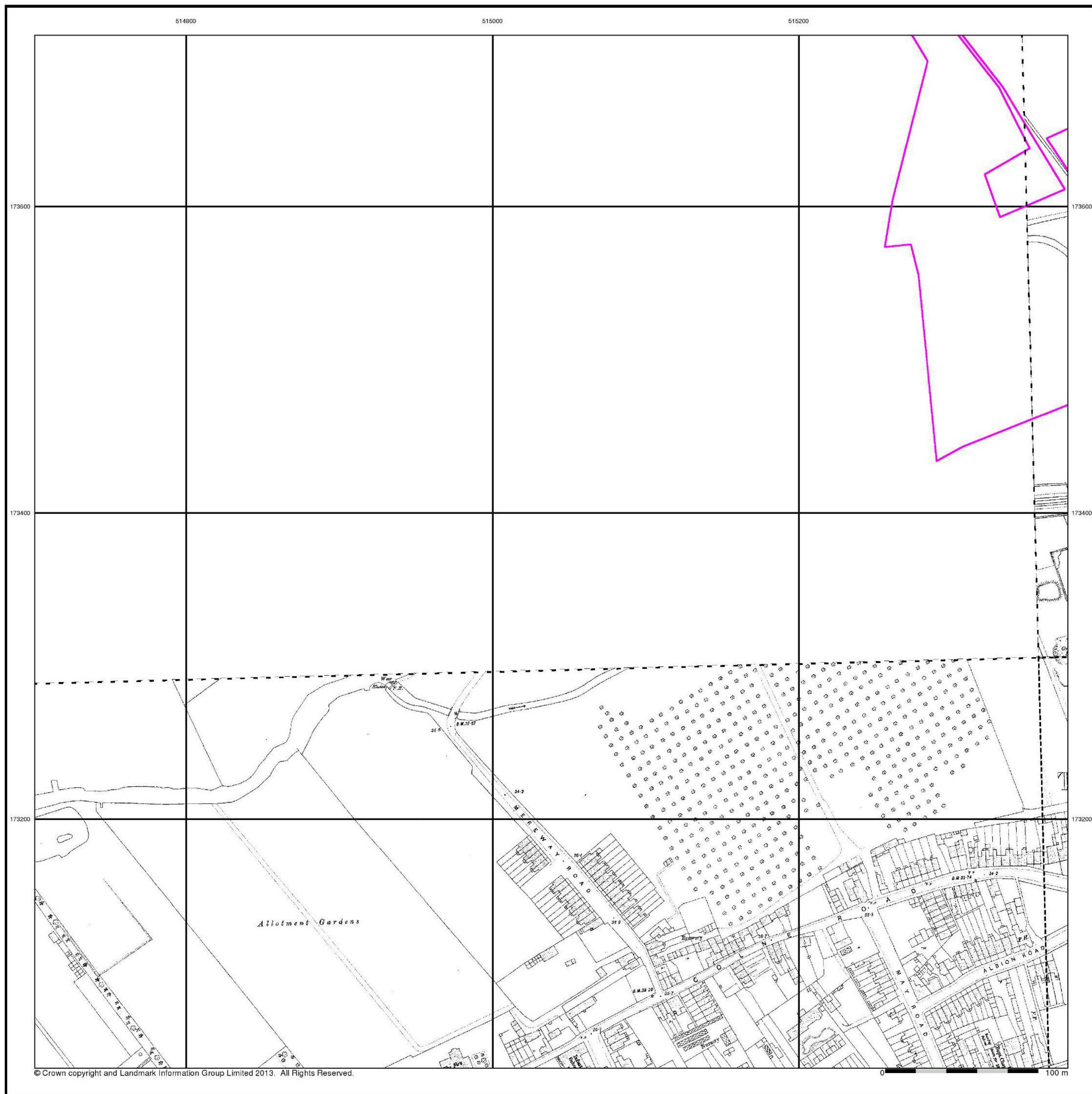
### Site Details

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## London

Published 1894 - 1896

Source map scale - 1:1,056

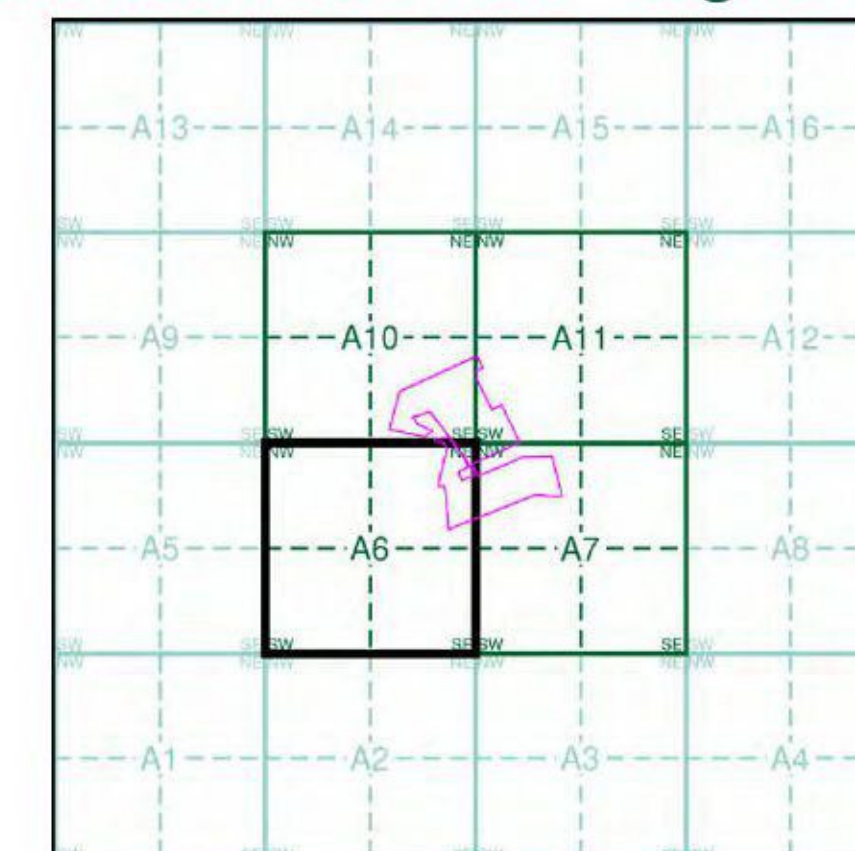
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)

009_00_078	1896	1:1,056
009_00_087	1894	1:1,056
009_00_088	1894	1:1,056

### Historical Town Plan - Segment A6



### Order Details

Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

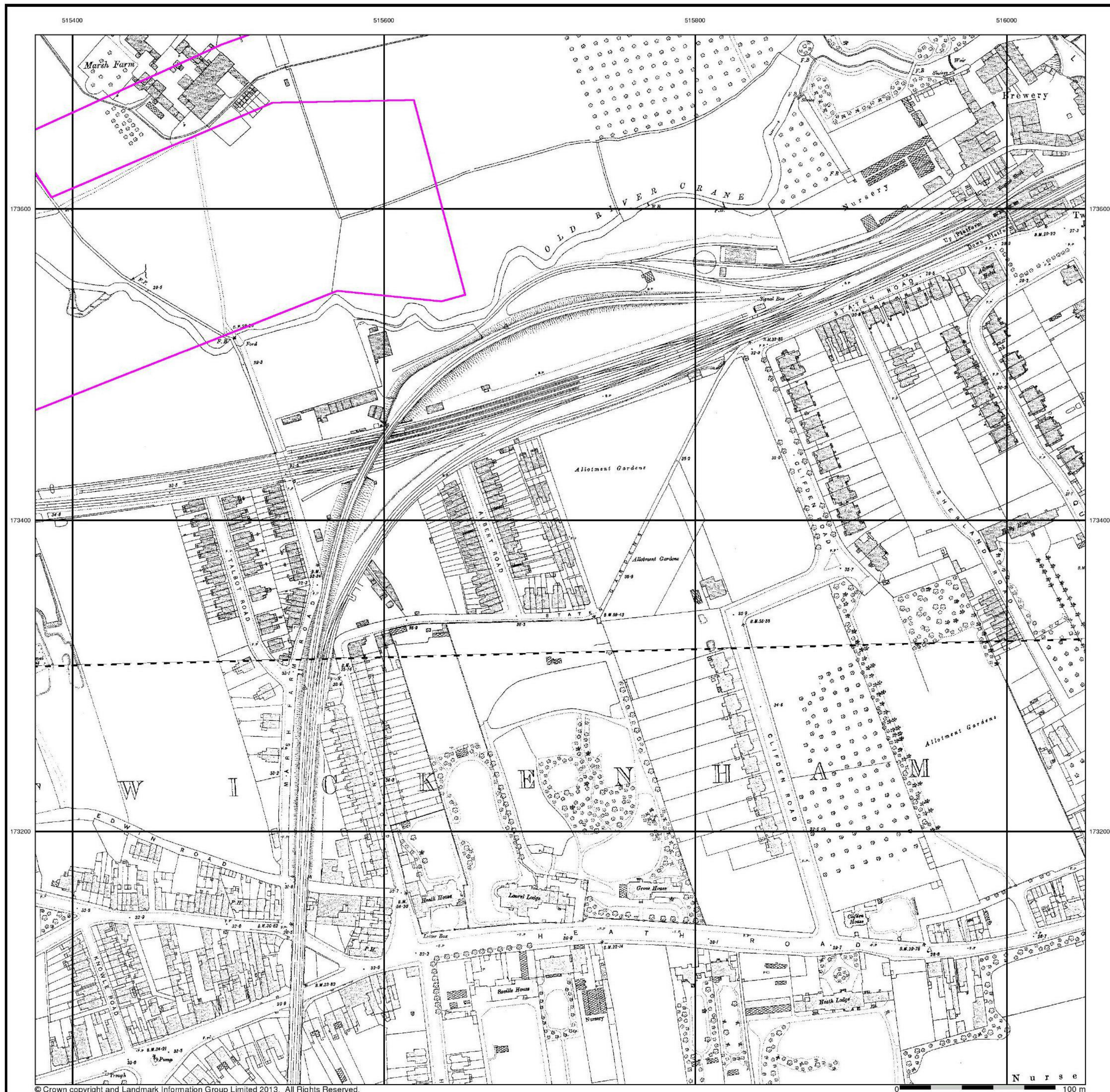
### Site Details

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## London

Published 1894 - 1896

Source map scale - 1:1,056

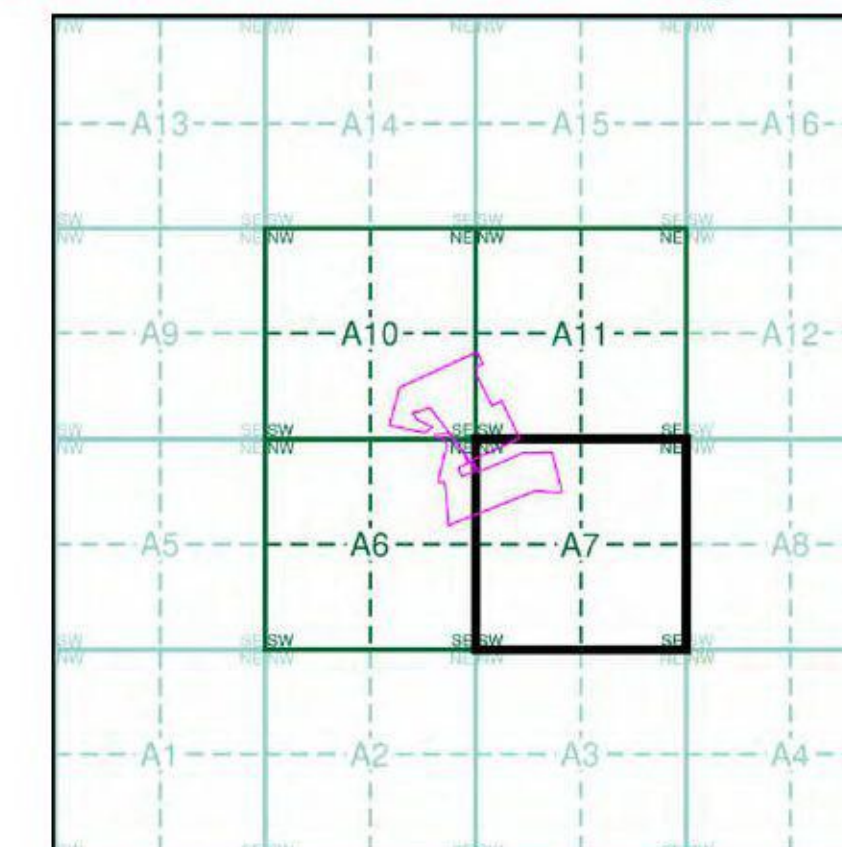
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)

009_00_078
1896
1:1,056
009_00_088
1894
1:1,056

### Historical Town Plan - Segment A7



### Order Details

Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

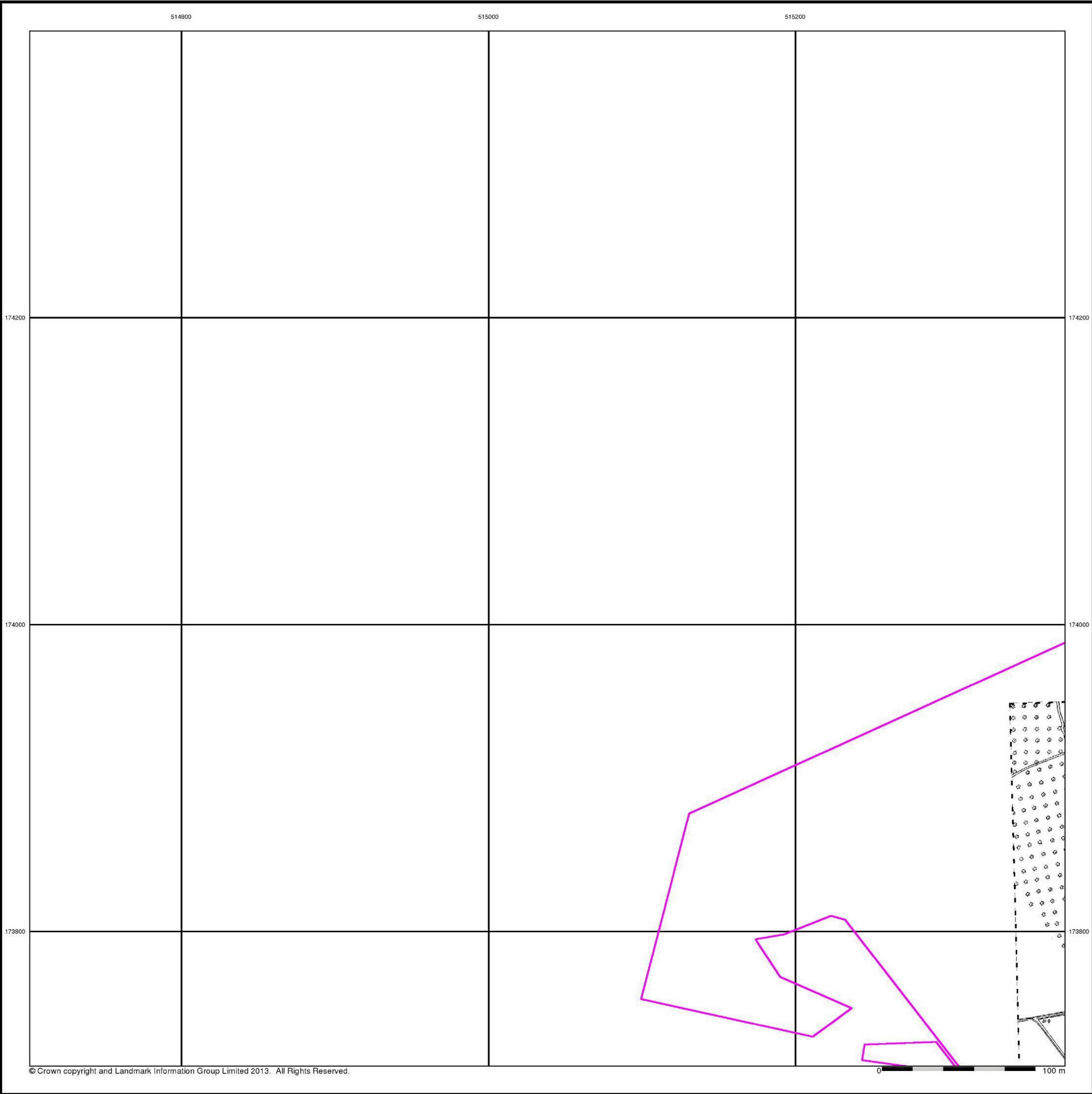
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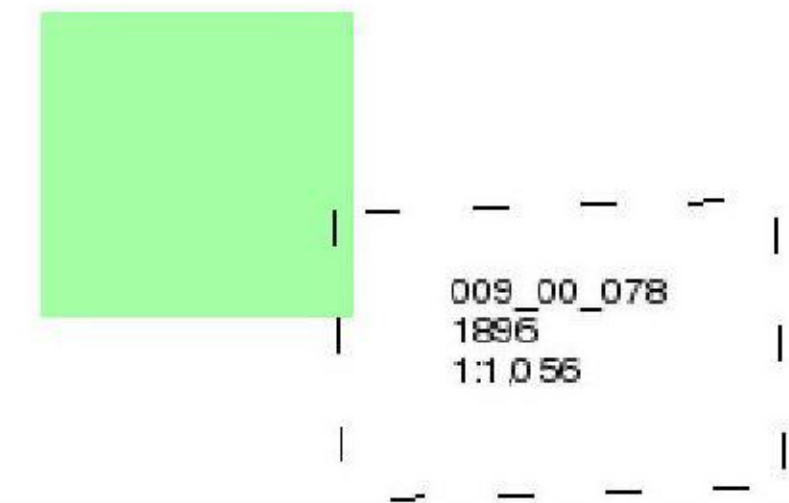


**London**  
**Published 1896**  
**Source map scale - 1:1,056**

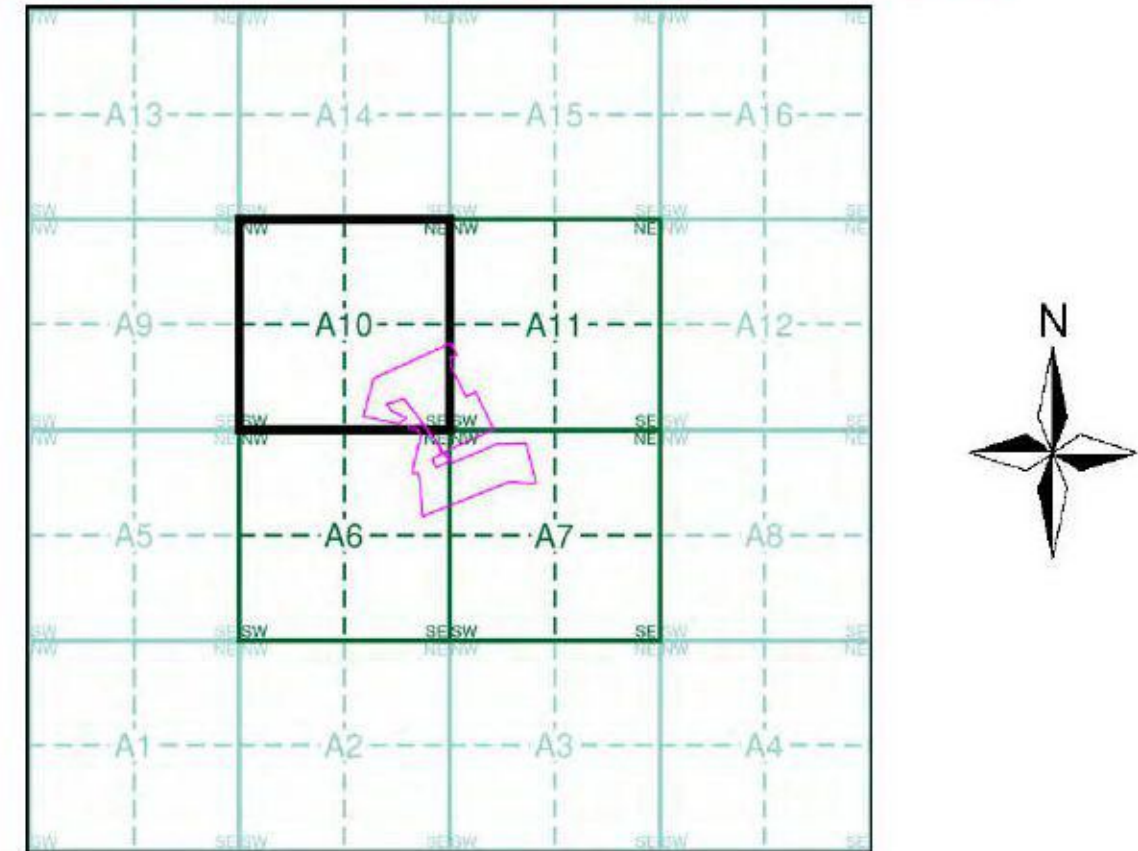
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

**Map Name(s) and Date(s)**



**Historical Town Plan - Segment A10**

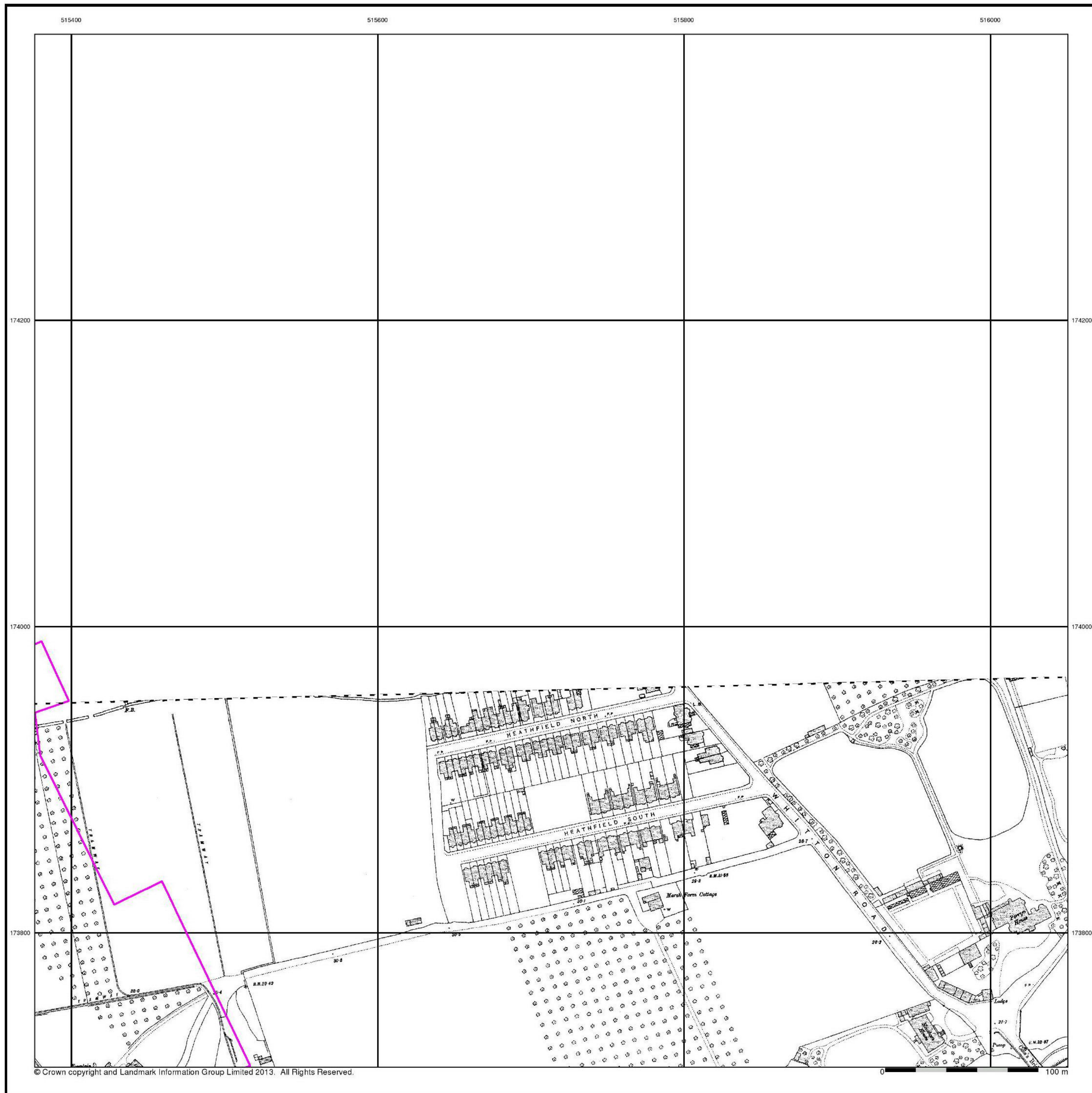


**Order Details**  
Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

**Site Details**  
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London

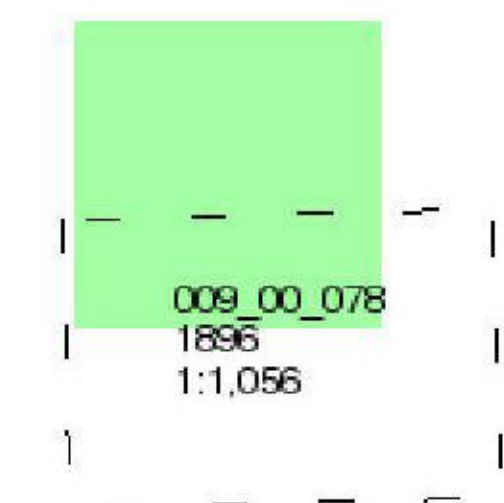
Published 1896

Source map scale - 1:1,056

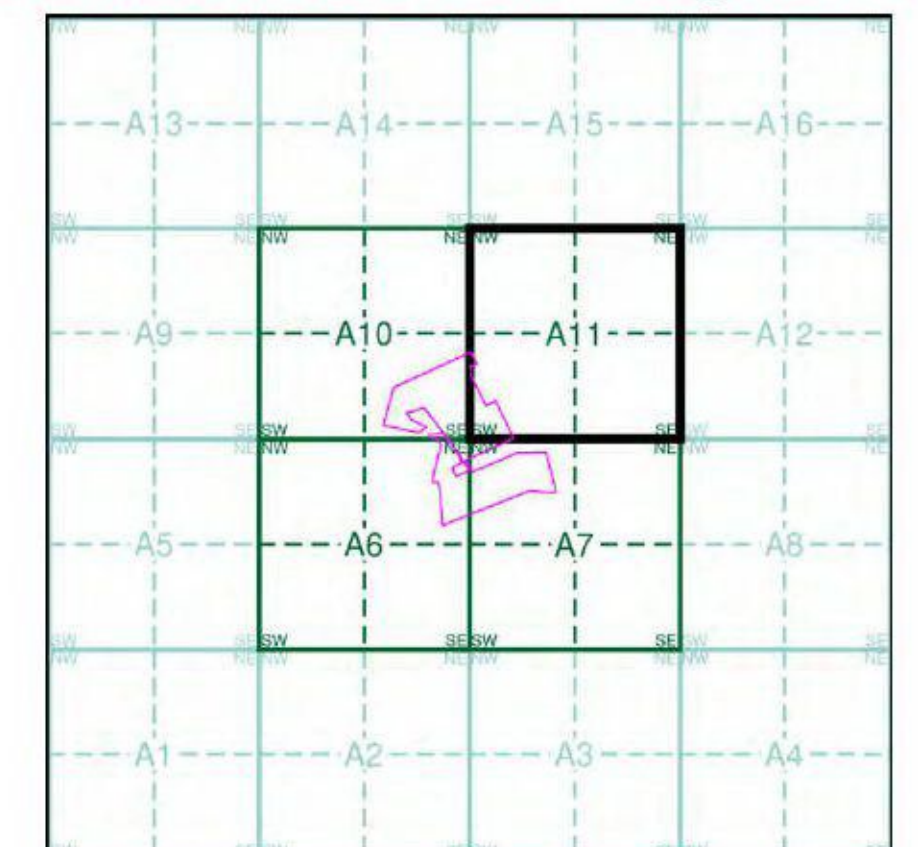
The 1:1056 scale of Ordnance Survey mapping was adopted from Ireland in 1848 and was used to survey towns with a population of over 4000, plus county towns of lesser population, in those counties mapped at the six-inch scale in 1841-55. The scale was the largest scale at which London was mapped by the Ordnance Survey and a 'skeleton' survey of the capital, showing little more than streets, street names, frontages and altitudes, was undertaken between 1848 and 1850. The majority of the 1:1056 surveys were later replaced by 1:500 surveys; although almost all the remainder were revised at this scale, sometimes more than once before 1895. The type of detail shown on the 1:1056 scale is broadly similar to that on 1:500; the apparent omission of minor details such as sewer access points and street lights may be as much a reflection of the generally earlier date of these plans, as of the specification of the map.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)



### Historical Town Plan - Segment A11



### Order Details

Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

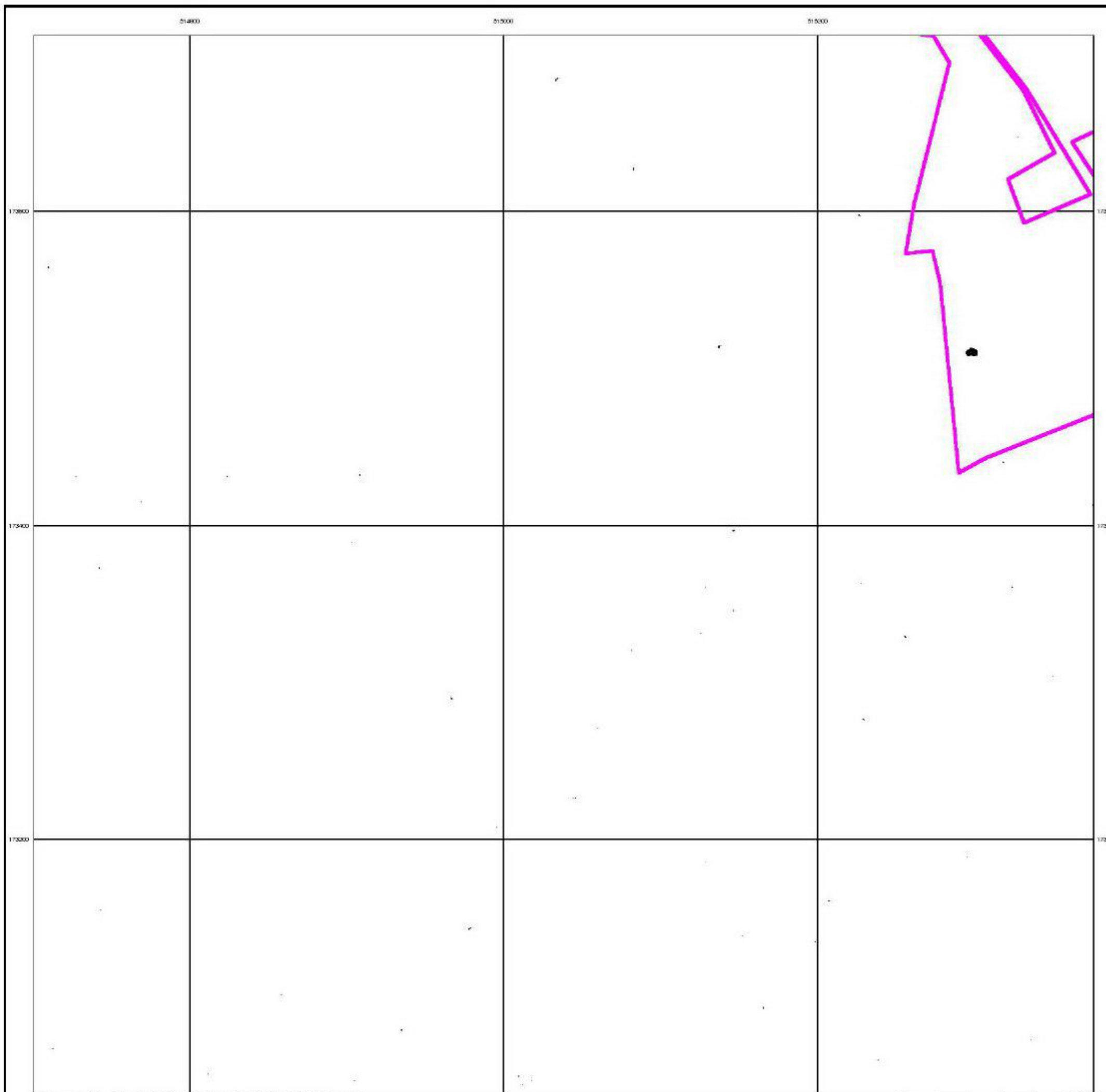
### Site Details

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0 100 m



## London

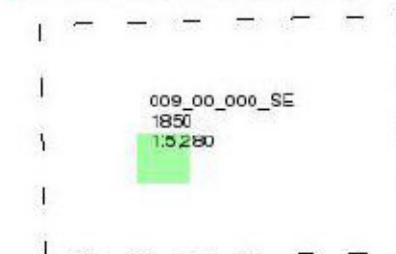
Published 1850

Source map scale - 1:5,280

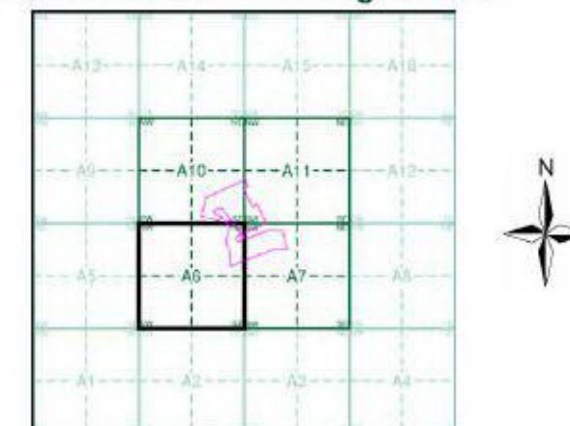
The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2640 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Osborne Estate of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards. The 1:5280 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of content similar to the more contemporary 1:10,560 mapping. The scale was also used for a reduction of the 1:1056 'skeleton survey' of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)



### Historical Town Plan - Segment A6



### Order Details

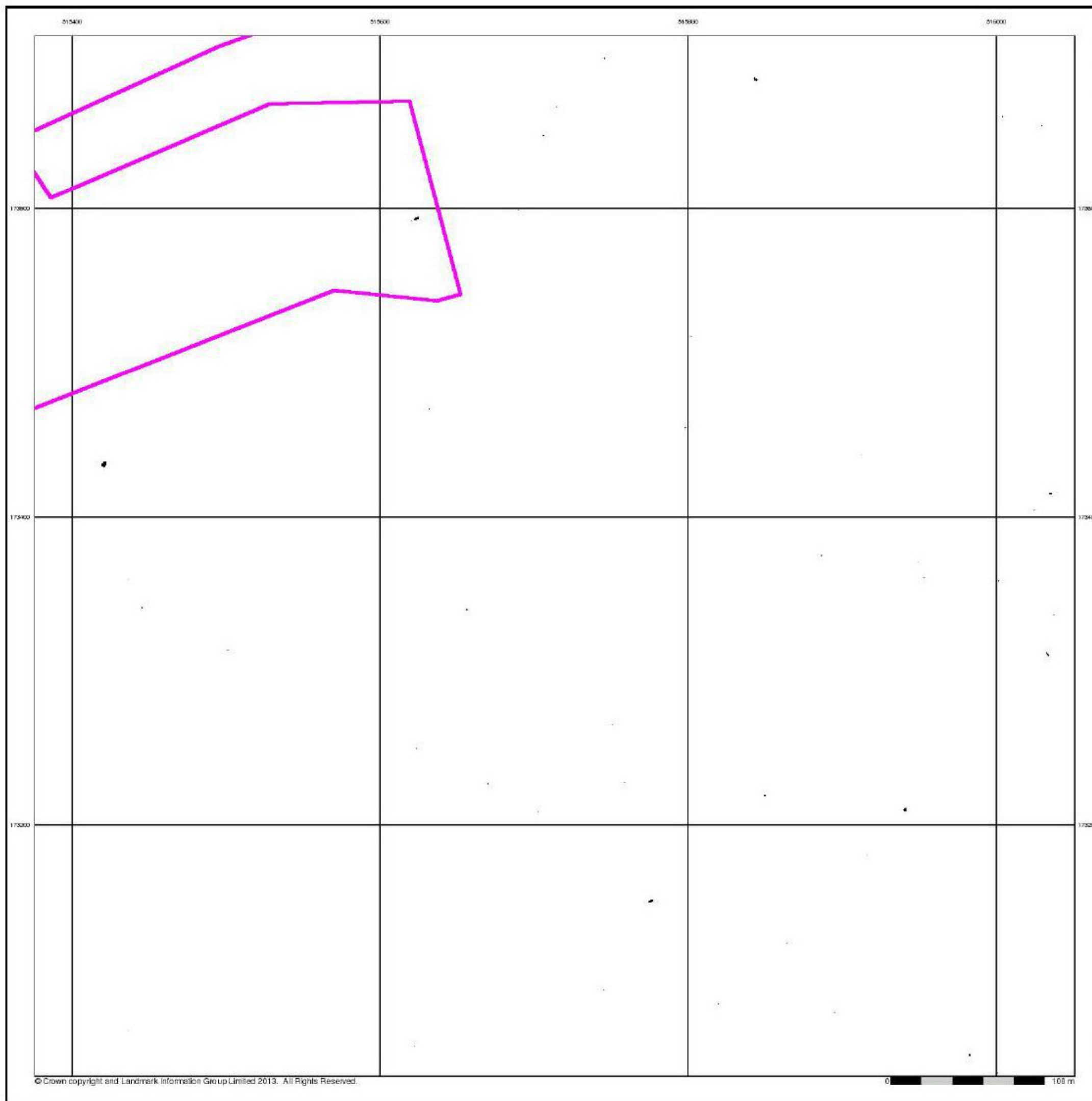
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 Search Buffer (m): 0

### Site Details

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 TWICKENHAM, TW2 7SJ



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 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



## London

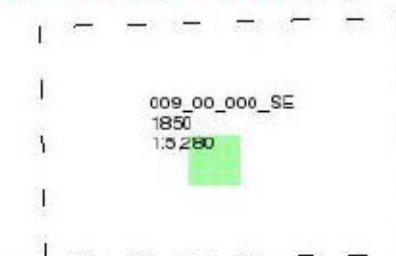
Published 1850

Source map scale - 1:5,280

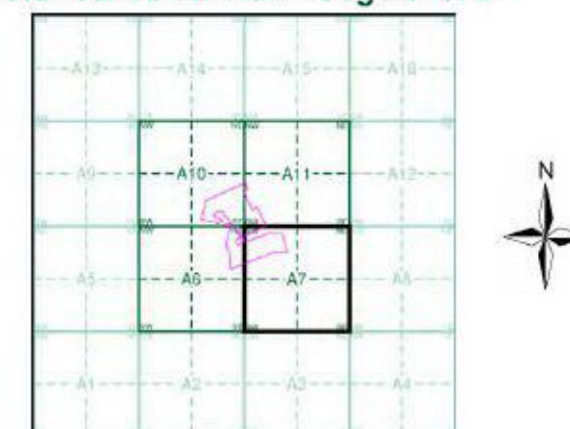
The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2640 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Osborne Estate of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards. 1:5280 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of content similar to the more contemporary 1:10,560 mapping. The scale was also used for a reduction of the 1:1056 'skeleton survey' of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

### Map Name(s) and Date(s)



### Historical Town Plan - Segment A7



### Order Details

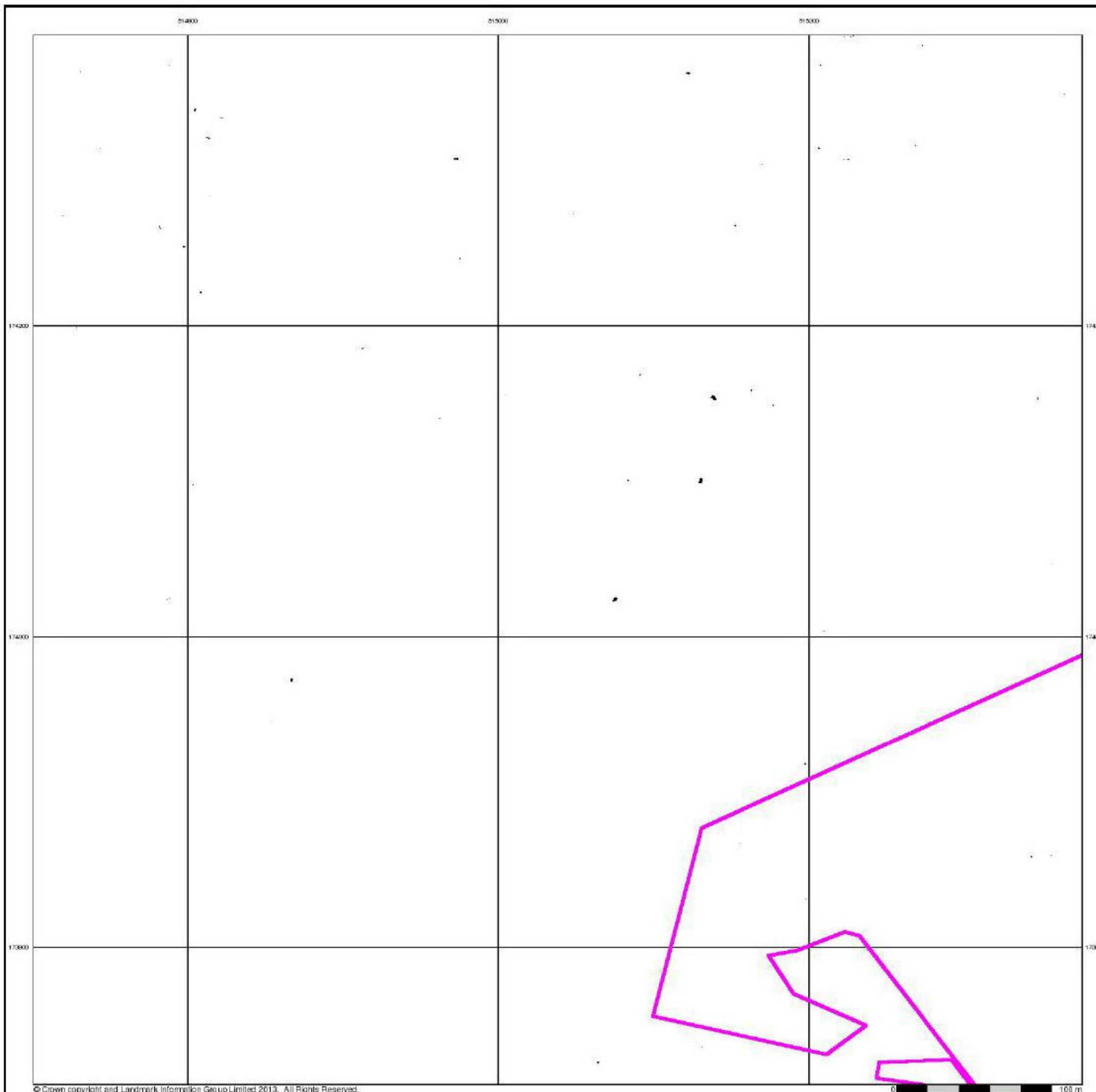
Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

### Site Details

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0 100 m



## London

Published 1850

Source map scale - 1:5,280

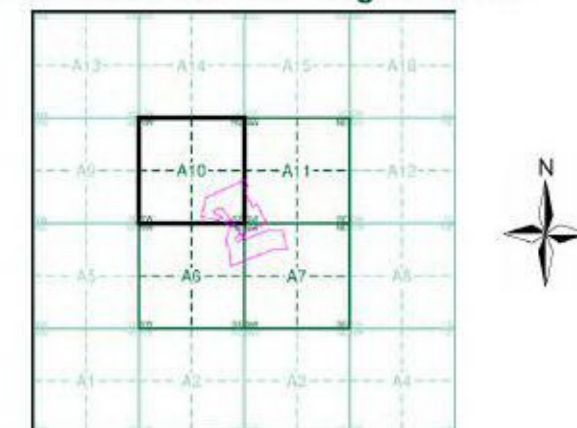
The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2640 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Osborne Estate of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards. 1:5280 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of content similar to the more contemporary 1:10,560 mapping. The scale was also used for a reduction of the 1:1056 'skeleton survey' of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

## Map Name(s) and Date(s)

009_00_000_SE
1850
1:5280

## Historical Town Plan - Segment A10



## Order Details

Order Number: 56081832\_1\_1  
 Customer Ref: CC747  
 National Grid Reference: 515370, 173700  
 Slice: A  
 Site Area (Ha): 12.71  
 Search Buffer (m): 0

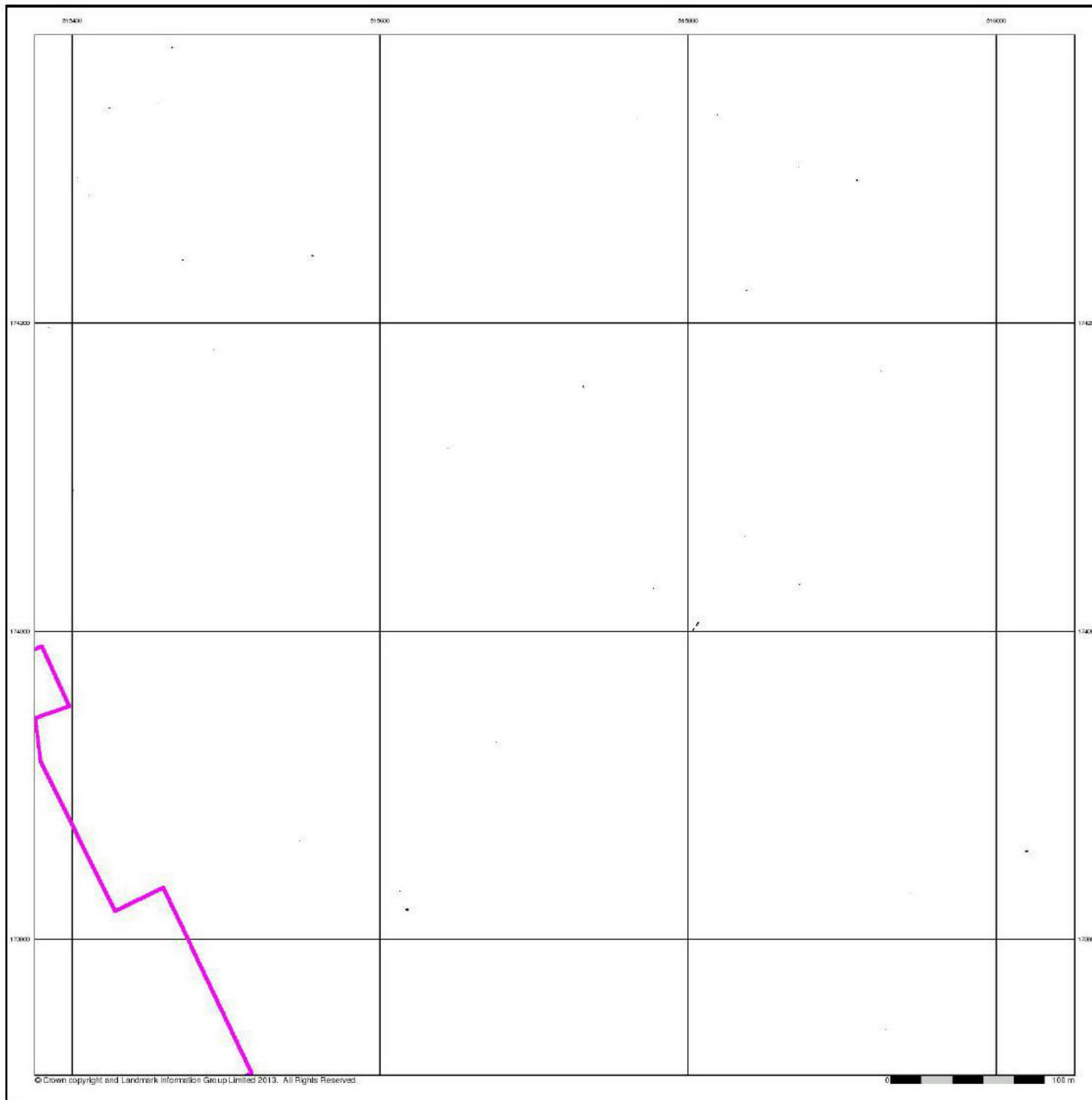
## Site Details

Richmond-upon-Thames College, Egerton Road,  
 TWICKENHAM, TW2 7SJ



Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk





## London

Published 1850

Source map scale - 1:5,280

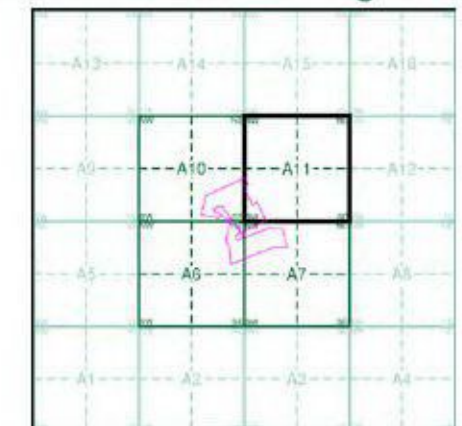
The historical town plans shown derive from Ordnance Survey mapping from the early to mid 1850s. The 1:2640 scale was introduced in the early 1850s, to survey districts covered by the Local Boards of Health and for a map of the Osborne Estate of Queen Victoria. The general style is similar to that of the early 1:2500s published shortly afterwards. 1:5280 scale was surveyed shortly afterwards in the mid 1850s as general purpose mapping with a standard of content similar to the more contemporary 1:10,560 mapping. The scale was also used for a reduction of the 1:1056 'skeleton survey' of London that was undertaken between 1848 and 1850.

Please note: Due to the partial coverage of Historical Town Plans, it is possible that not all segments within an order will contain mapping. Only the segments that have Town Plan coverage will be generated.

## Map Name(s) and Date(s)

009\_00\_000\_SE  
1850  
1:5280

## Historical Town Plan - Segment A11



## Order Details

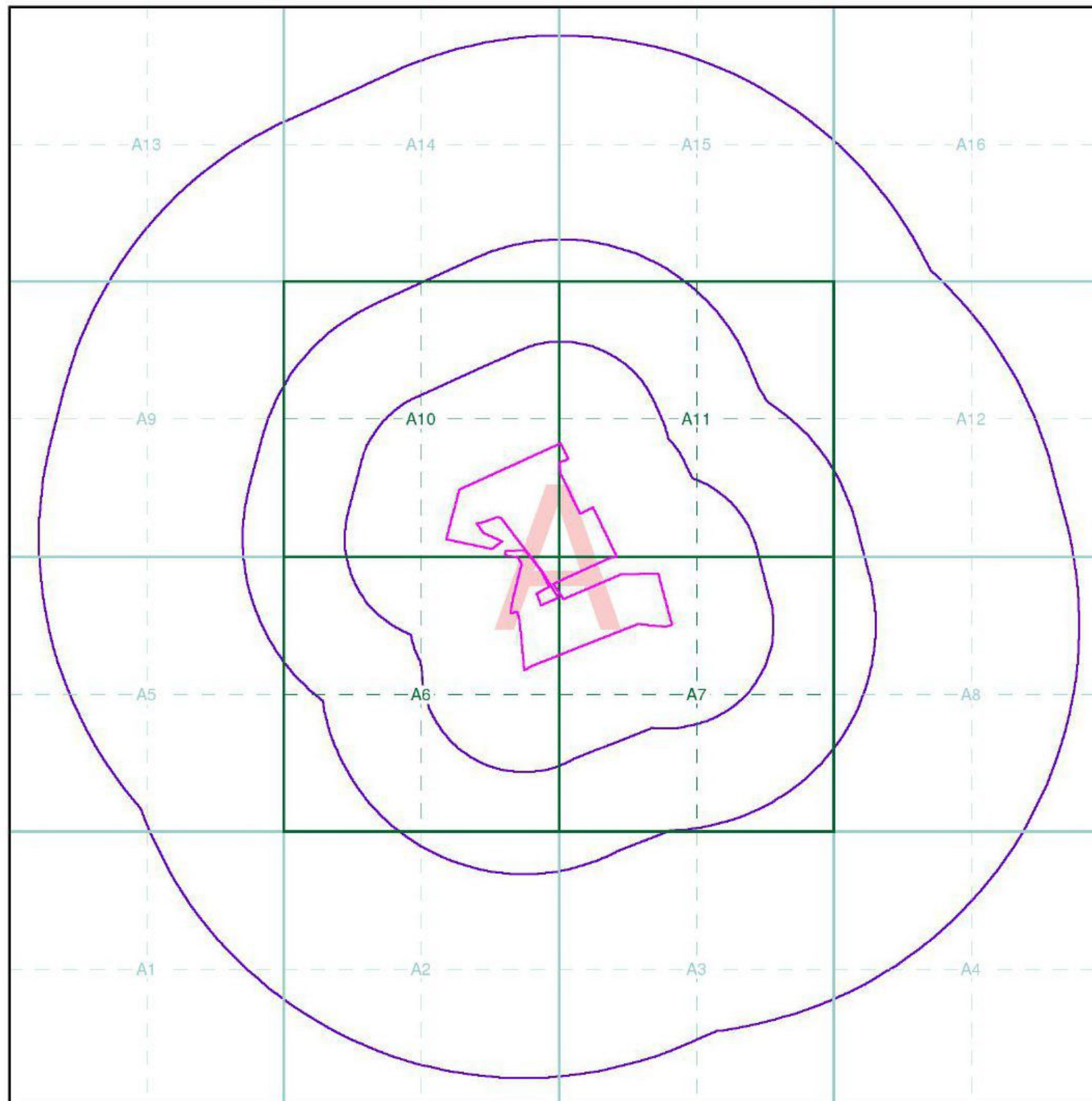
Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173700  
Slice: A  
Site Area (Ha): 12.71  
Search Buffer (m): 0

## Site Details

Richmond-upon-Thames College, Egerton Road,  
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## Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

### Slice

Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

### Segment

A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

### Quadrant

A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

## Client Details

Ms M ODea, Cascade Consulting, Enterprise House,  
Manchester Science Park, Lloyd Street North, Manchester,  
Greater Manchester, M15 6SE

## Order Details

Order Number: 56081832\_1\_1  
Customer Ref: CC747  
National Grid Reference: 515370, 173710  
Site Area (Ha): 12.71  
Search Buffer (m): 1000

## Site Details

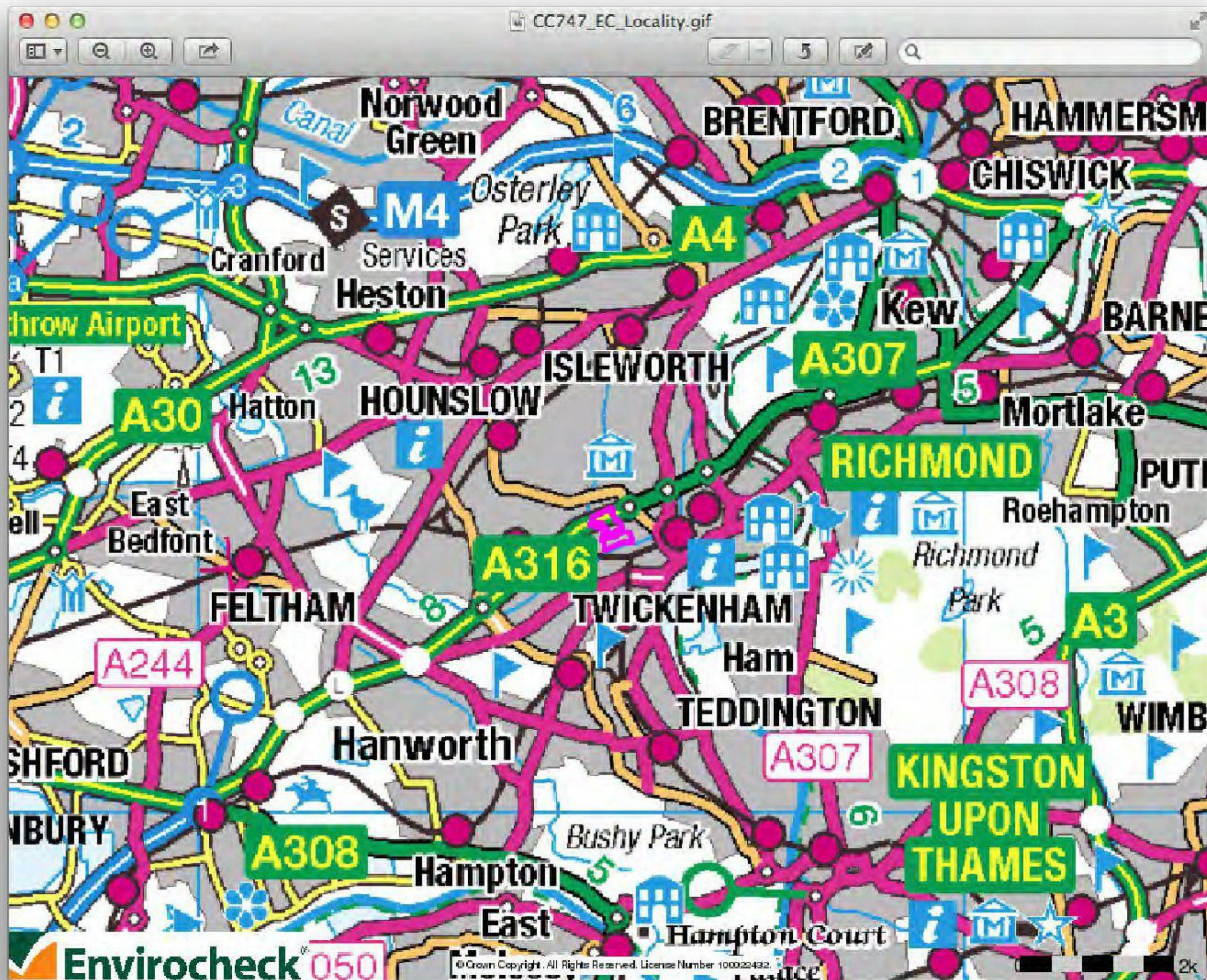
Richmond-upon-Thames College, Egerton Road,  
TWICKENHAM, TW2 7SJ

Full Terms and Conditions can be found on the following link:  
<http://www.landmarkinfo.co.uk/Terms/Show/515>

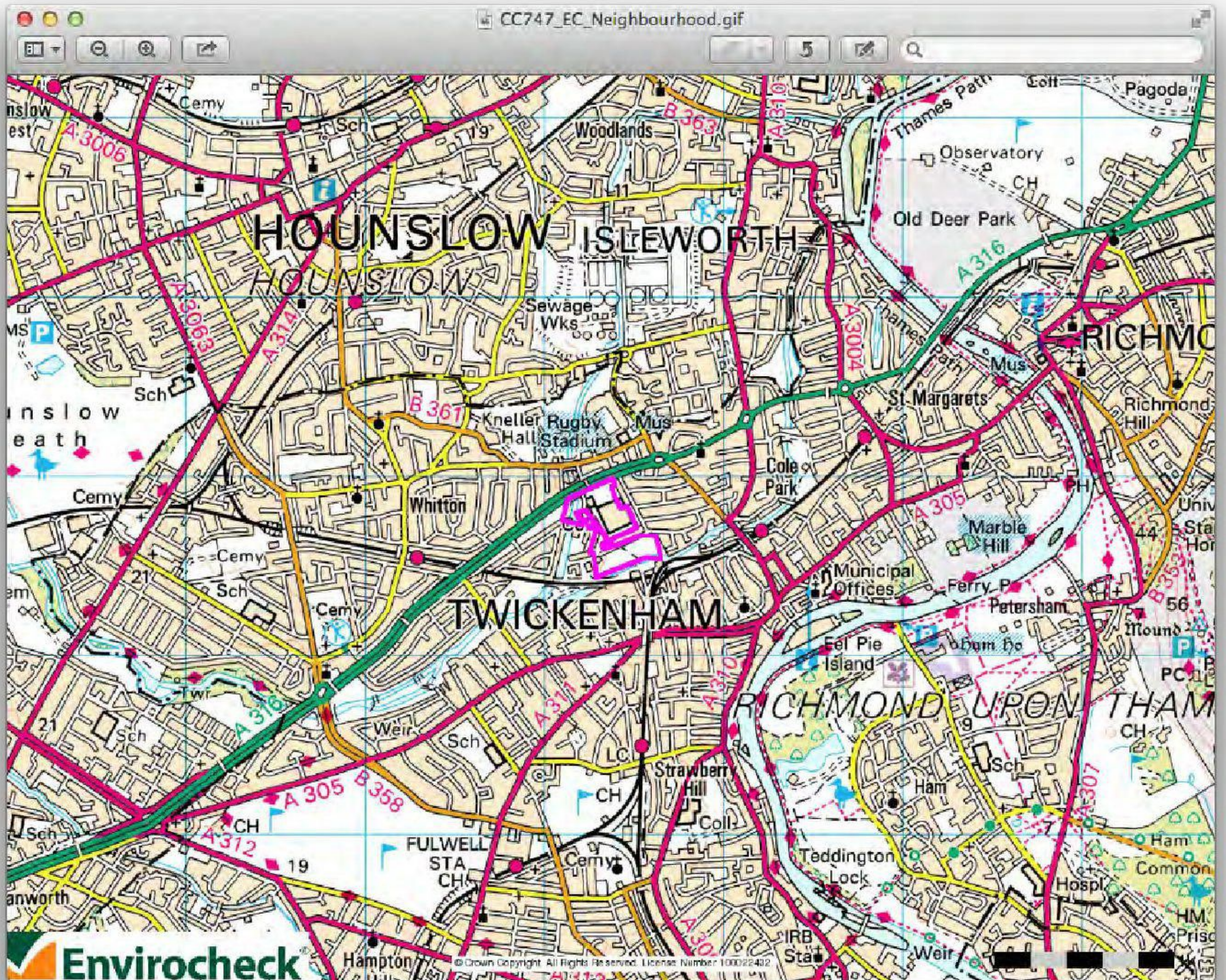


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Fax: 0844 844 9951  
Web: [www.envirocheck.co.uk](http://www.envirocheck.co.uk)
















## **Appendix 11.2: Soiltechnics Classification of Waste Soils for Off Site Disposal**

## **Proposed Redevelopment of Richmond Upon Thames College Egerton Road Twickenham**

### **REPORT ON THE CLASSIFICATION OF WASTE SOILS FOR OFF SITE DISPOSAL (Basic Categorisation – level 1)**

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Report Reference: STE1297R-L01		

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Report Issue					
Company	Name	Paper		Electronic	
		Issue	Date	Issue	Date
AKT	Joyce Ferng	Final Draft		Final Draft	22.07.08

## Aerial photograph of site



## Report status and format

Report section	Principal coverage	Report status		
		First draft	Final draft	Comments
1	Executive summary		22.07.08	
2	Introduction		22.07.08	
3	Description and history of the site and geology of the area		22.07.08	
4	Fieldwork		22.07.08	
5	Ground conditions encountered		22.07.08	
6	Laboratory testing		22.07.08	
7	The Landfill Directive and its consequences in relation to soils for disposal to landfills.		22.07.08	
8	Primary Classification		22.07.08	
9	Secondary assessment		22.07.08	
10	Naturally deposited soils not affected by artificial contaminants		22.07.08	
11	Basic categorisation		22.07.08	
12	Treatment of wastes		22.07.08	
13	Drawings		22.07.08	



## List of drawings

Drawing	Title	Revision
STE1297R-01	Site location plan	
STE1297R-02	Plan showing existing site features and approximate location of exploratory points.	

## List of appendices

Appendix	Contents
A	Fieldwork records
B	Copy of laboratory test result certificates (Total concentration of metallic and semi metals).
C	Copy of laboratory test result certificate (landfill waste acceptance criteria – table 5.1).
D	Hazard assessment spread sheet.
E	Comparison of test data with landfill waste acceptance criteria (table 5.1) (Secondary assessment procedures).
F	Basic categorisation schedules
G	Example of a pre treatment form

## **1. Executive Summary**

### **General**

We recommend the following executive summary is not read in isolation to the main report which follows.

### **Site description, history and development proposals**

The site is located towards the centre of Twickenham and is occupied by Richmond-Upon-Thames College. Prior to the college, historically OS maps record the site to be open space and a tram way was recorded run across the southern half of the site.

At this stage the proposals are being developed however we understand that the existing buildings are to be demolished to make way for the new college buildings.

### **Ground conditions encountered,**

Exploratory excavations generally encountered between 0.3-1.0m of topsoil or made ground grading into orange brown clays becoming sand and gravel considered to be Kempton Park Gravel to depths of between 4.2-5.3m and locally 9.3m. Stiff grey dark grey clay considered to be London Clay was encountered underlying the Kempton Park Gravel. Groundwater was encountered at between 1.1-3.5m during exploratory excavations and water levels of between 1.33-2.54m have been recorded in standpipes installed across the site.

### **Waste categorisation**

The Made Ground soils across the site are classified as inert with the exception of the soils from around trial pit TP14 which are classified as non-hazardous based on elevated concentrations of hydrocarbons. The extent of soils likely to be affected by hydrocarbon contamination (and thus classified as non hazardous) will be subject to further investigations

The Kempton Park Gravels are classified as inert

The underlying London Clays, considered to be unaffected by artificial contamination, can also be classified as inert for off-site disposal.



**SECTION 2 - CONTENTS**

<b>2</b>	<b>Introduction</b>
2.1	Objectives
2.2	Client instructions and confidentiality
2.3	Site location and redevelopment proposals
2.4	Classification of soil types
2.5	Report format and investigation standards
2.6	Status of this report
2.7	Report distribution

## **2 Introduction**

### **2.1 Objectives**

- 2.1.1 This report describes a ground investigation carried out for the redevelopment of Richmond-Upon-Thames College, Twickenham.
- 2.1.2 The principal objective of this report is to characterise soil waste generated by the above development for landfill purposes based on available investigatory data, following procedures described in current Environment Agency publications relating to the landfill directive.

### **2.2 Client Instructions and Confidentiality**

- 2.2.1 The investigation was carried out in May 2008 and reported in July 2008 acting on instructions received from Adams Kara Taylor (Consulting Civil and Structural Engineers), on behalf of our mutual client Richmond-Upon-Thames College.
- 2.2.2 This report has been prepared for the sole benefit of our above named instructing client, but this report, and its contents, remains the property of Soiltechnics Limited until payment in full of our invoices in connection with production of this report.
- 2.2.3 This report accompanies a general ground investigation report, which concentrates on geotechnical and geo-environmental issues.

## **2.3 Site Location and Development Proposals**

2.3.1 The National Grid reference for the site is 515350,173810. A plan showing the location of the site is presented on Drawing STE1297R-01

2.3.2 We understand the project will consist of the phased demolition of the existing buildings at Richmond Upon Thames College in combination with and followed by:-

- Construction of temporary accommodation block to the south of the existing campus
- A new four to five storey "L" shaped building approximately 250m long by 40m extending to playing fields to the north of the site and within the footprint of the existing college buildings, and

## **2.4 Classification of soil types**

2.4.1 Our investigations consider two soil types which are likely to be generated as wastes as part of construction operations. Firstly we carry out a full hazard assessment and subsequent testing for waste acceptance criteria on soils which are not considered to be naturally deposited or likely to be affected by artificial contamination. Secondly, where appropriate, we consider soils which are naturally occurring and not likely to be affected by artificial contamination, where no specific testing in relation to the classification process is considered necessary. Naturally occurring soils are considered separately in section 10.

## **2.5 Report Format and Investigation Standards**

2.5.1 Sections 2 to 6 of this report describe the factual aspects of the investigation. Section 7 describes the current background to generation and management of waste and need for classification. Sections 8 and 9, detail the analysis of test data, leading to the required 'basic categorisation' of waste for landfill in Section 11. Section 12 provides information for the requirement of treatment of waste.

2.5.2 Investigation standards are described in the text of this report.

## **2.6 Status of this Report**

2.6.1 This report is final based on our current instructions.

2.6.2 The investigation was carried out and reported based on our understanding of current guidance produced by the Environment Agency. Changes in guidance are likely, and thus may necessitate an alteration in the report, or indeed, supplementary investigations. Equally, if the nature of the development changes, Soiltechnics should be advised and reassessment carried out if considered appropriate.

## **2.7 Report distribution**

2.7.1 This report has been prepared to assist in the design and planning process of the development and will normally require distribution to the following parties, although this list may not be exhaustive:

<b>Party</b>	<b>Reason</b>
Client	For information / reference and cost planning
Developer / Contractor / project manager	To ensure procedures are implemented, programmed and costed
Planning department	Potentially to discharge planning conditions
Landfill operators	For acceptance of wastes to landfill
Waste recycling operators (if appropriate)	For recycling or reducing hazardous properties (if and where appropriate)
Project design team	To progress the design
CDM Coordinator	To advise in construction risk identification and management under the construction (design and management) regulations



**SECTION 3 - CONTENTS**

<b>3</b>	<b>Description and history of the site and geology of the area</b>
3.1	General
3.2	Brief description of the site
3.3	Brief history of the site
3.4	Geology of the area

### **3 Description and history of the site and geology of the area**

#### **3.1 General**

- 3.1.1 A full desk study for the site was carried out and is fully reported in our main ground investigation report. For completeness, however, a summary of the desk study in relation to characterising the site is provided in the following paragraphs.

#### **3.2 Brief Description of the Site**

- 3.2.1 The site is located in Twickenham within the main site occupied by Richmond-Upon-Thames College buildings, car parks and sports fields. The southern end of the site is on the opposite side of the road to the main college and is currently an area of former tennis courts surfaced in bituminous bound type material.

#### **3.3 Brief History of the Site**

- 3.3.1 Historical Ordnance Survey maps dating back to 1871 record the site to be open space with a tramway running across the southern third of the site circa 1915. Buildings recorded on the site circa 1938 and the site was first recorded as a college circa 1961.

### 3.4 Geology of the Area

3.4.1 Inspection of the geological map of the area (at 1:50000 scale) published by the British Geological Survey indicates the topography local to the site (based on borehole/observations recorded on the map) is formed in the following sequence of soils.

Strata	Approximate thickness (m)	Typical soil type	Likely permeability
Kempton Park Gravel	Not recorded	Silt, sand and Gravel	Moderate
London Clay	50m	Clay	Low
Lambeth Group	50m	Clay sands, and gravels	Low – Moderate
Upper Chalk	>50m	Chalk	High

**Table 3.5.1**

The soil types and assessment of permeability's are based on geological memoirs, in combination of our experience of investigations in these soil types.

**SECTION 4 - CONTENTS****4 Fieldwork****4 Fieldwork**

- 4.1 Fieldwork comprised the following activities:-
- Excavation of twenty six exploratory trial pits using hand tools with soil infiltration tests undertaken in eight of these
  - Excavation of six exploratory boreholes using cable and tool percussion drilling techniques
  - Excavation of twenty one exploratory boreholes formed using driven tube sampling equipment with infiltration tests undertaken in two of these
  - Dynamic cone penetration testing in thirteen locations
- 4.2 A plan of the site showing observed/existing site features and position of exploratory points is presented on Drawing STE1297R-02.
- 4.3 Fieldwork records are presented in Appendix A.
- 4.4 All soils/rocks exposed in exploratory excavations were described by an experienced geo-environmental engineer, in accordance with BS5930: 1999 '*Code of Practice for Site Investigations*'.
- 4.5 Soil samples from exploratory excavations were taken using clean stainless steel sampling equipment with a view to minimising cross contamination. Soil samples were at least 2kg and deemed representative of the soil layer exposed in the excavation. The soil sample was placed in a new plastic container, which was labelled and sealed. Samples were taken by an experienced geo-environmental engineer.

**SECTION 5 - CONTENTS**

<b>5</b>	<b>Ground conditions encountered</b>
5.1	Soils and stratigraphy
5.2	Composition of soil samples for classification testing

## **5 Ground conditions encountered.**

### **5.1 Soils and stratigraphy**

5.1.1 The exploratory excavations encountered soils, which, in our opinion, were identified as follows in order of superposition:-

**either**

- Dark to light brown grey and orange sandy silt or silty clays with gravels and cobbles of brick and flint gravels, between ground level and average depth of 1m locally 1.9m adjacent to existing foundations.

**or**

- Brown grey and orange gravelly sand and sandy clay or light to dark brown sandy silt between ground level to between 0.3-1.0m considered to be made ground or topsoil these deposits graded into:-
- Loose becoming medium dense orange brown clays and silts becoming sands, sands and gravels to an average depth of 5m, locally to a depth of 9.3m considered to be Kempton Park Gravels.
- Stiff becoming very stiff blue grey clay considered to be London Clay to a depth in excess of 25m.

With the exception of Made Ground, the investigation generally confirmed published geological records.



## 5.2 Composition of soil samples for classification testing

In addition to individual sampling and laboratory testing used to undertake our primary classification (ref Section 8), two composite samples were also produced for subsequent laboratory testing to aid our secondary assessment (ref Section 9). The source of each soil sample is detailed below.

Composition of soil samples for classification testing		
Strata	Source	Soil Type
Made Ground (Bulk 1)	TP05 0.3-0.4m, 0.7-0.8m TP13 0.3m TP09 0.4-0.5m TP04 0.5-0.6m TP07 0.3-0.4m TP01 0.2-0.3m DTS19 0.2-0.4m DTS18 0.2-0.4m DTS05 0.2-0.35m DTS13 0.2-0.3m DTS01 0.4-0.55m DTS06 0.05-0.2m DTS10 0.1-0.3m DTS20 0.7-0.9m DTS14 0.1-0.3m DTS07 0.05-0.1m DTS12 0.8-1.0m DTS03 0.06-0.2m DTS08 0.05-0.2m	Brown grey and orange gravelly sand and gravelly sandy clay
Kempton Park Gravel (Bulk 2)	DTS17 1.7-2.0m DTS13 0.7-0.9m DTS13 1.2-1.3m DTS10 1.2-1.7m DTS02 2.0-2.2m DTS01 1.8-2.0m DTS13 2.1-2.5 DTS06 1.5-2.0m DTS09 2.0-2.4m DTS01 1.0-1.5m DTS12 1.4-1.5m DTS20 1.2-1.5m DTS05 1.5-1.7m DTS15 2.0-2.5m DTS16 1.0-1.5m BH06 1.5m BH02 1.4m	Orange brown slightly clayey sand and gravel or flint



**SECTION 6 - CONTENTS**

<b>6</b>	<b>Laboratory testing</b>
6.1	Methodology
6.2	Quality assurance
6.3	Presentation

## **6 Laboratory testing**

### **6.1 Methodology**

6.1 Laboratory testing was carried out as deemed necessary to characterise soils likely to be produced as waste by the development. Testing was limited to the following:

- Using inductively coupled plasma – optical emission spectrometry (ICP-OES), determination of concentration of metals
- Using a combination of headspace GC-FID and hexane/acetone extraction, determination of "CWG" banded petroleum hydrocarbons.
- Using gas chromatography – mass spectrometry, determination of the concentration of Polycyclic Aromatic Hydrocarbons (PAH)
- Following methods based on and incorporating procedures published in HMSO '*Methods for the Examination of Water and Associated Materials*' determination of concentration of chemical contaminants on soil (refer Section 7 for discussion).
- Following methods described in the Environment Agency publication '*Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*' (April 2005) – suite of testing in accordance with Table 2.1.

### **6.2 Quality assurance**

6.2.1 Laboratory testing was carried out by an independent specialist testing house which operates quality assurance schemes and is progressing accreditation under the MCERTS scheme for the second (EA) testing suite.

**6.3 Presentation**

6.3 Copies of laboratory testing results are presented in Appendices B and C.

## **SECTION 7 - CONTENTS**

<b>7</b>	<b>The Landfill Directive and its consequence in relation to soils for disposal to landfill</b>
7.1	General
7.2	The Landfill Directive and implementation in the UK
7.3	Content of the regulations with respect to disposal of soils to landfill
7.4	Waste acceptance procedures
7.5	Waste acceptance criteria
7.6	European Waste Catalogue (EWC) coding

## **7 The Landfill Directive and its consequence in relation to soils for disposal to landfill.**

### **7.1 General**

7.1.1 The following is based on our understanding of current, and publicly available, information with relevant documents referred to in the text.

### **7.2 The Landfill Directive and Implementation in the UK**

7.2.1 The Landfill Directive represents an important change in the way we dispose of waste. It encourages waste minimisation by promoting increased levels of recycling and recovery. The Landfill Directive became law in July 1999 and transcribed into the Landfill (England and Wales) Regulations which came into force in August 2002. These Regulations were amended on 16<sup>th</sup> July 2005 by introducing criteria to classify soils for disposal to landfill.

### **7.3 Content of the Regulations with respect to disposal of soils to landfill**

7.3.1 The regulations require the Environment Agency to classify landfill sites for acceptance of hazardous, non-hazardous and inert wastes. These regulations also prohibit the following wastes from landfill.

- 1) Waste in liquid form
- 2) Wastes, which are explosive, corrosive, oxidising, flammable or highly flammable
- 3) Hospital or clinical wastes and other infectious wastes



- 4) Whole used tyres (from 2003) and shredded tyres (from 2006) other than bicycle tyres or tyres over 1.4m diameter
  - 5) Any other waste, which does not fulfil acceptance criteria
- 7.3.2 Mixing or dilution of the above type of wastes to meet acceptable criteria is prohibited.
- 7.3.3 It is a requirement of the landfill operator to accept materials for landfill, which has been subject to prior treatment unless:
  - a) It is inert waste for which treatment is not technically feasible; or
  - b) Waste, which cannot be treated to reduce its quantity or the hazards, which it poses to human health or the environment.
- 7.3.4 The operation of a landfill site for non-hazardous waste can accept:
  - a) municipal waste
  - b) non-hazardous wastes which meet acceptance criteria

## **7.4 Waste Acceptance Procedures**

- 7.4.1 It is a requirement of the waste producer to characterise the waste for landfill purposes under the following criteria:
  - a) Source and origin of the waste
  - b) Information on the process producing the waste
  - c) Description of the waste treatment applied or a statement of reasons why such treatment is not considered necessary
  - d) Date on composition of the waste, and where relevant, the leaching behaviour
  - e) Appearance of the waste (smell, colour, physical form)
  - f) Code according to the European Waste Catalogue
  - g) For hazardous waste – relevant hazard properties
  - h) Information to demonstrate waste is not a prohibited waste
  - i) Landfill class at which the waste may be accepted
  - j) Additional precautions to be taken at landfill
  - k) Check material can be recycled or recovered
- 7.4.2 The above is deemed level 1 and '*Basic Characterisation*', the production of which is the objective of this report. The landfill operator has a responsibility to be satisfied that the waste is consistent and compliant with the basic characterisation. This is deemed level 2 '*Compliance*'. Level 3 is on site verification.

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## **7.5 Waste Acceptance Criteria (WAC)**

- 7.5.1 The Environment Agency publication, *'Framework for the classification of contaminated soils as hazardous wastes'* (July 2004), provides an appropriate procedure for establishing if the soils are hazardous or non-hazardous.
- 7.5.2 The first stage is classifying a potentially 'contaminated' soil for disposal to landfill is to establish its chemical status by first identifying potential sources/types of chemical contamination (desk study) followed by intrusive site investigations to obtain samples for undefined testing of soil samples to measure concentrations of chemical contaminants. Such data will provide information to partly complete the basic characteristic checklist.
- 7.5.3 Laboratory test data is then compared with the Environment Agency publication *'hazardous waste – Interpretation of the definition and classification of hazardous waste (second edition, version 2.1)'*. Where the waste is suspected to contain oil, we have referred to the Environment Agency draft consultation paper *'How to Find Out if Waste Oil and Wastes that Contain Oil are Hazardous'* (Draft Version 2.5 – October 2006). With reference to these documents a hazard assessment has been carried out to enable categorisation of the material as hazardous or non-hazardous and to subsequently establish the European Waste Catalogue (EWC) code (ref Section 7.6 below).
- 7.5.4 If the soil is deemed hazardous then measurement of organic contaminants and leachable inorganic contaminants is necessary for comparison with values listed in the Environment Agency publication *'Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures'* (April 2005). Similarly should the soil be deemed as non hazardous then such testing may also be undertaken to determine if it is potentially inert. This document also provides guidance on sampling materials, and frequency as well as test procedures and quality assurance of testing.
- 7.5.5 The above procedures are described with respect to the subject site in Sections 8 and 9 of this report, leading to basic characterisation of soils for disposal. Subject to the results of the categorisation, and anticipated development methodology, consideration should be given by the developer to reduce volumes of disposal or treatment to allow reclassification.



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## 7.6 European Waste Catalogue (EWC) Coding

- 7.6.1 The EWC 2002 is a catalogue of all wastes, grouped according to generic industry, process or waste type. It is divided into twenty main chapters, each with a two digit code between 01 and 20. Following the EWC, in our opinion, soils considered as part of this investigation would be categorised within 'Group 17' of the EWC catalogue, which comprises 'Construction and Demolition Wastes (including excavated soils from contaminated sites)'.
- 7.6.2 The Catalogue further categorises the waste, such that soils considered as part of this investigation would be classified as either 17 05 04 defined as '*soil and stones (other than those mentioned in 17 05 03)\**'; or 17 05 03\* defined as soil or stones containing dangerous substances (where hazardous wastes are described by entries followed by an asterisk).
- 7.6.3 Where demolition/construction wastes, other than those defined by EWC code 17 05 04 or 17 05 03\* (for example, concrete, brick or wood) are produced, then the appropriate EWC code should also be applied. Such waste products are considered outside the investigation scope of this report (which describes the disposal of soil waste only), though we can provide assistance with such categorisations upon further instruction.
- 7.6.4 It should be appreciated that there is no obligation on any landfill operator to accept waste if they choose not to. The licence/permit entitles them to accept waste of particular descriptions but does not compel them to do so. Where they do, waste operators may require testing of untested waste soils prior to acceptance at landfill in accordance with the landfill regulations.

**SECTION 8 - CONTENTS**

<b>8</b>	<b>Primary Classification</b>
8.1	Soils types
8.2	Classification as hazardous or non hazardous waste

## **8 Primary Classification**

### **8.1 Soil Types**

- 8.1.1 Based on soils exposed in exploratory excavations, in combination with anticipated construction works, we assume soils generated for off-site disposal will comprise Made Ground, Kempton Park Gravel and London Clay.

### **8.2 Classification as hazardous or non-hazardous waste**

- 8.2.1 The Environment Agency publication '*Framework for the classification of contaminated soils as hazardous wastes*' (July 2004) provides the following procedure for establishing if the soils are hazardous or non-hazardous. The first stage in classifying a potentially 'contaminated' soil for disposal is to establish its chemical status by first identifying potential sources/types of chemical contamination (desk study) followed by intrusive site investigations to obtain samples for laboratory testing of soil samples to measure concentrations of chemical contaminants.
- 8.2.2 Historical records, do not indicate the site has been subject to industrial activities in tables 2.3 and 2.4 of Contaminated Land Report (CLR) no. 8. '*Potential contaminants for the Assessment of Land*' produced by the Department for Environment, Food, and Rural Affairs (DEFRA) in conjunction with the Environment Agency (EA). In addition we are not aware of any previous site activities, which would have generated specific contamination. We did however identify soils in two locations which exhibited a slight hydrocarbon type odour.
- 8.2.3 With reference to CLR8, and in the absence of any knowledge of historical site uses which may have generated specific contamination, we have scheduled testing to measure the concentration of metallic and semi-metallic contaminants listed in table 2.1 (of CLR8) when they are considered a risk to human receptors. In addition, we scheduled two samples taken from the suspected hydrocarbon compacted soils for



determination of total petroleum hydrocarbons with speciation. Copies of test result certificates are presented in Appendix B.

- 8.2.4 Following Contaminated Land Report (CLR) no. 7 '*Assessment of risks to human health from Land Contamination. An overview of the development of soil guideline values related to research*', we have carried out an analysis of test data for each chemical contaminant considered in this investigation. A conservative approach has been adopted for the analysis whereby the maximum test value for each contaminant has been adopted as a preliminary screening process to determine if the soils are hazardous or non-hazardous. Should the analysis indicate potentially hazardous properties then a process of zoning by further analysing the site history, geological conditions and analytical data may be undertaken.
- 8.2.5 Laboratory test data measures the concentration of anions, which are unlikely to exist in the pure metallic form in the soil, but probably exist on a compound. Following guidance provided in the '*framework for the classification of contaminated soils as hazardous wastes*,' we have reviewed a variety of compounds for each of the metallic and semi metallic elements from table 2.1 of CLR8, limiting our review to insoluble compounds (soluble compounds will have allowed soil leaching to reduce their concentration). Firstly, if the compound includes an anion of a 'light' molecular weight, and is listed in the *Approved Supply List* (seventh edition) (Published by the Health and Safety Executive) then this compound is used to convert the measured metallic concentration to the substance concentration using their respective molecular weights. This derived conversion factor is then used in the threshold concentration spreadsheet (refer paragraph 8.2.8 below).
- 8.2.6 The review of chemical compounds associated with each selected metallic and semi metallic element, includes selection of a 'worst case' substance from the approved supply list giving the most severe hazardous properties thus allowing a combined hazard assessment for all chemicals under consideration. For review of organic contamination, we have directly adopted the threshold concentrations for the appropriate organic compounds listed in the *Approved Supply List*.
- 8.2.7 Our assessment of each of the chemical substances is maintained on our files and is available for confidential review/audit by the Environment Agency.
- 8.2.8 A spreadsheet detailing the hazard assessment following the procedures described in '*framework for the classification of contaminated soils as hazardous wastes*' is presented in Appendix D.
- 8.2.9 The spreadsheet indicates the soils are **non hazardous**.



**SECTION 9 - CONTENTS****9                      Secondary assessment****9                      Secondary assessment**

- 9.1                      Following '*Guidance on sampling and testing of wastes to meet landfill waste acceptance procedures*' produced by the Environment Agency (Version 1, April 2005) we have scheduled testing of two samples to measure the parameters listed in table 5.1 (landfill waste acceptance criteria) included in the above publication. A copy of the test result certificate is presented in Appendix C.
- 9.2                      The samples were deemed representative of each soil type described in Section 5. Each sample was formed by combining individual samples taken from exploratory excavations within each soil type. The combined sample for each soil type then quartered in the laboratory to produce a representative sample for subsequent testing.
- 9.3                      Laboratory test data has been compared with the landfill waste acceptable criteria (table 5.1) to allow the secondary assessment to be completed. A copy of table 5.1 is presented in Appendix E with test result data added for ease of comparison.
- 9.4                      Elevated concentration of hydrocarbons were measured on a sample of soil taken from trial pit TP14, which exceeds the landfill waste criteria for inert, thus categorising the soil as **non-hazardous**. As part of our Ground Investigation we have recommended further investigations in this vicinity to establish the extent of this contamination thus potentially allowing zoning.
- 9.5                      With respect to the remainder of the site, comparison of test data with landfill waste acceptance criteria indicates the Made Ground and Kempton Park Gravels are classified as **inert** waste for off-site disposal.

## SECTION 10 - CONTENTS

### 10 Naturally deposited soils not affected by artificial contaminants

## 10 Naturally deposited soils not affected by artificial contaminants

- 10.1 With reference to the European Waste Catalogue and table 5.1 of the Environment Agency publication '*a better place – guidance for waste destined for disposal in landfills – version 2 June 2006*', naturally occurring soils not likely to be affected by contamination can be classified as inert waste, with a EWC code of 17 05 04. Should any of the naturally deposited soils be suspected to contain contamination (by virtue of visual or olfactory evidence) upon excavation, then such soils should be stockpiled appropriately and additional testing carried out as considered necessary. Based on evidence obtained during our investigations, we are of the opinion that the London Clay at the site are not likely to be affected by chemical contamination and thus can be classified as **inert waste**.

**SECTION 11- CONTENTS****11 Basic Categorisation****11 Basic Categorisation**

11.1 Based on the above we have produced four basic categorisation schedules relating to the Made Ground, hydrocarbon contaminated Made Ground (around trial pit TP14- extent subject to further instructions), Kempton Park Gravel and London Clay deposits, which are presented in Appendix F. These schedules should be provided together with a copy of this report to an appropriately licensed landfill facility to demonstrate the material can be deposited at this facility. In addition to this, a pre treatment confirmation form will be required (see section 12.4.1 below).

11.2 We understand that some landfill sites have licences which have restrictions on concentrations of chemical contaminants, and thus we recommend this report is provided to the selected landfill facility to confirm (or otherwise) it can accept the waste. Please be aware that landfill sites are obligated to undertake in house quality assurance tests, and thus may require further WAC testing for any soils encountered as part of this investigation. As discussed in Section 7.6.4 there is no obligation on any landfill operator to accept waste if they choose not to and waste operators may require additional testing of untested waste soils prior to acceptance at landfill in accordance with the landfill regulations.



**SECTION 12 - CONTENTS**

<b>12</b>	<b>Treatment of wastes</b>
12.1	Regulations
12.2	Treatment of inert wastes
12.3	Treatment of non hazardous wastes
12.4	Landfill operators
12.5	Waste management plans

## 12 Treatment of wastes

### 12.1 Regulations

- 12.1.1 Treatment of wastes is now a requirement of the landfill directive applied by the Landfill (England and Wales) Regulations 2002. Landfill cannot accept untreated waste (be it hazardous or non hazardous), thus waste producers have the choice of treating it themselves on site or treating it elsewhere prior to disposal to landfill. The regulations require:

*'10 – (1) The operator of a landfill shall ensure that the landfill is only used for landfilling waste which is subject to prior treatment unless:*

- a) It is inert waste for which treatment is not technically feasible; or*
- b) It is waste other than inert waste and treatment would not reduce its quantity or the hazards which it poses to human health or the environment.'*

- 12.1.2 Regulation 2 defines treatment as: *'physical, thermal, chemical or biological processes (including sorting) that change the characteristics of waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery.'*

- 12.1.3 A treatment option must comply with the definition of treatment. This involves a 'three point test' against which treatment is assessed ie:

1. It must be a physical, thermal, chemical or biological process including sorting

2. It must change the characteristics of the waste: and
3. It must do so in order to:
  - a) Reduce its volume: or
  - b) Reduce its hazardous nature: or
  - c) Facilitate its handling: or
  - d) Enhance its recovery.

## **12.2 Treatment of Inert wastes**

12.2.1 Inert waste does not need to be treated if it is not technically feasible however treatment should reduce the amount of waste which goes to landfill and enhance its recovery (by re-use or recycling). Inert wastes are often suitable for recycling, for example as an aggregate or an engineering fill material. A fact sheet on treatment of inert wastes is available on the following website [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

12.2.2 Excavations in the Made Ground (except in the locality of trial pit TP14), Kempton Park Gravel and London Clay (not affected by artificial contamination) will generate inert wastes which could be reused on site or off site for bulk filling, subject of course to maintenance of an acceptable water content.

## **12.3 Treatment of non hazardous waste**

12.3.1 Guidance and indeed examples of treatment is provided in the Environment Agency publication '*Treatment of non hazardous wastes for landfill - your waste – your responsibility*,' again available on the EA website.

## **12.4 Landfill operators**

12.4.1 It is a requirement of the landfill operator to check if the waste soils taken to the facility have been treated. An example of a pre treatment form is provided in Appendix G. This form is based on a similar form produced on page 35 of the publication referenced in paragraph 12.3.1 above. The form in Appendix G will require completion by the developer and will depend upon the pre treatment likely to be adopted for the project. We will be pleased to assist in deriving a pre treatment strategy, and indeed assist in producing a waste management plan as described below.

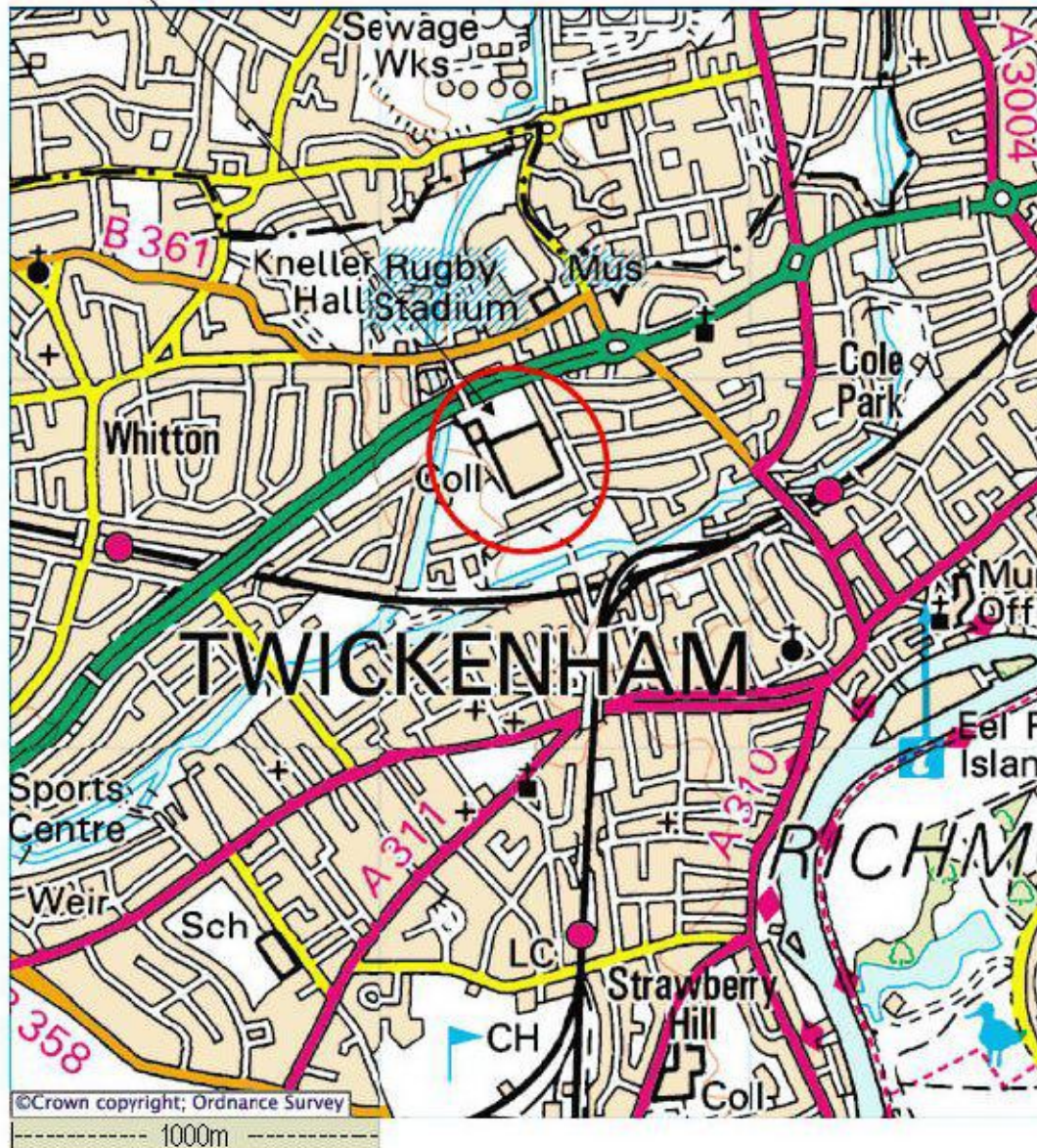


## **12.5 Waste management plans**

- 12.5.1 On the 6<sup>th</sup> April 2008, '*The Site Waste Management Plans Regulations 2008*' come into force. This requires the client to produce a waste management plan for construction projects which exceeds an estimated cost of £300,000 excluding VAT prior to commencement of the works. We will be pleased to assist in production of the waste management plan.

The Site,

Grid reference 515350, 173810



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**Project**  
 Richmond-Upon-Thames College, Egerton Road,  
 Twickenham


**Title**  
 Site Location Plan

scale	date	drawn by	checked by
As shown	16.06.08	RC	
project ref		drg no	revision
STE1297R		01	



Symbol	Type	Method	Depth	Objectives
DTS	Borehole	Driven Tube Sample	~4m	• Measure Mass Ground Frictions • Soil sampling / logging
DTS	Borehole	Driven Tube Sample	2m	• Measure Mass Ground Frictions • Soil sampling / logging • Infiltration test
DCP	Dynamic cone penetration testing	Dynamic cone penetration	4.5m	• In situ capacity testing
BH03-08	Borehole with water standpipe	Cable and box penetration drilling	20m	• Soil profile • Standard Penetration Testing • Soil shear strength testing • Water sampling / monitoring
BH01-42	Borehole with water standpipe	Cable and box penetration drilling	25m	• Soil profile • Standard Penetration Testing • Soil shear strength testing • Water sampling / monitoring
TP	Trail Pit	Hand tools	1-2m	• Exposed existing foundation • Measure Mass Ground Frictions • Soil sampling / logging • Measure Mass Ground Frictions • Soil sampling / logging • Infiltration test
SA	Trail Pit	Hand tools	0.5 - 1.5m	





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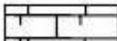

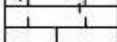
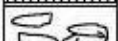
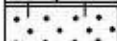
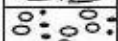
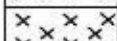
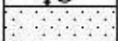
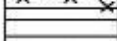
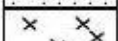

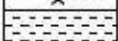

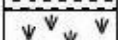
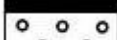
**Project**  
Proposed redevelopment of  
Richmond-Upon-Thames, Egerton Road,  
Twickenham

**Title**  
Plan showing existing site features and location of  
exploratory points

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project ref	dra No.	revision	
STE1297R	02		



## **KEY TO LEGENDS** (Extract from BS 5930:1999 table 11)

<b>SOILS</b>		<b>SEDIMENTARY ROCKS</b>	
	Topsoil		Chalk
	Made ground		Limestone
	Boulders & Cobbles		Sandstone
	Gravel		Siltstone
	Sand		Mudstone
	Silt		Shale
	Clay		Coal
	Peat/Organic clays		Conglomerate

Composite soil types are signified by combined symbols.

## **KEY TO SYMBOLS USED ON TRIAL PIT RECORDS**

### **SAMPLING**

<b>B</b>	bulk disturbed sample	<b>U (38)</b>	undisturbed (38mm) sample
<b>D</b>	disturbed sample	<b>W</b>	water sample
<b>J</b>	jar sample	<b>CBR</b>	undisturbed sample taken in CBR mould

## **NOTES ASSOCIATED WITH INSITU TESTING**

**Hand Held Shear Vane (V)** The hand held shear vane provides a quick and direct measurement of undrained shear strength and is calibrated in  $\text{kN/m}^2$  (Pa). The apparatus reads to a maximum shear strength of 150KPa. The results are reported in columns to the right of the trial pit legend.

**Pocket Penetrometer Results (P)** The pocket penetrometer is calibrated in  $\text{kg/cm}^2$  and is deemed to measure the unconfined compressive strength of the soil under test. Under most conditions the unconfined compressive strength of the soil is twice the undrained shear strength of a soil. Thus, an Unconfined compressive strength  $1\text{kg/cm}^2 = 0.009807 \times 100 \times 100 / 2 = 49.04$ , say  $50\text{KN/m}^2$  (equivalent undrained shear strength).

Tests are carried out in the sides of trial pits where access can be safely achieved otherwise testing is carried out on excavated intact lumps. Neither the hand held shear vane nor the pocket penetrometer is recognised in British Standard publications.



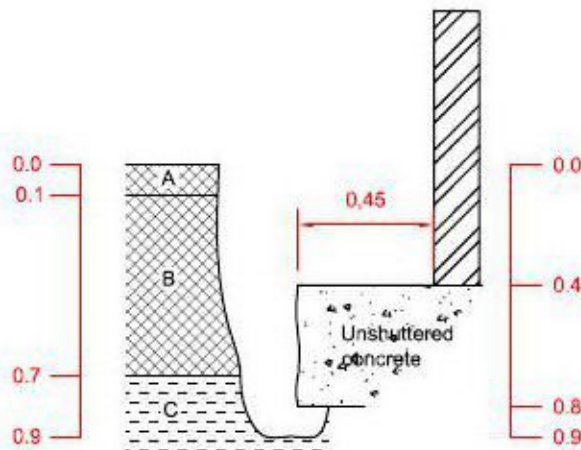
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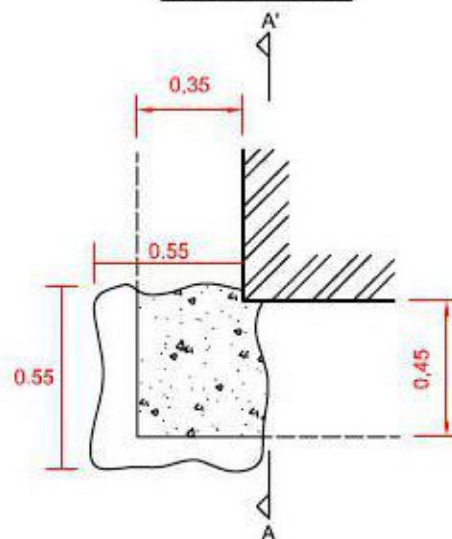
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## **STANDARD KEY TO TRIAL PIT RECORDS**

Section A - A' of trial pit TP01 facing east



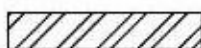
Plan of trial pit TP01



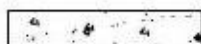
Photographic record of trial pit TP01



**Key**



Masonry



Concrete

- A 50mm thick concrete pavers onto 50mm sand (MADE GROUND)
- B Firm brown, grey and light brown gravelly sandy CLAY. Gravel consists of flint, brick, metal and concrete (MADE GROUND)
- C Firm orange and light brown gravelly sandy CLAY. Gravel consists of coarse flint. (KEMPTON PARK GRAVEL)

**Notes.**

- 1. Trial pit excavated using hand tools
- 2. Trial pit sides remained stable and no groundwater encountered.
- 3. All dimensions shown in metres



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**Project**

**Richmond-Upon-Thames College, Egerton Road, Twickenham.**

**Title**

**Detail of foundation exposed in Trial pit TP01**

**scale**

**1:25 @ A4**

**date**

**28.05.08**

**drawn by**

**MOW**

**checked by**

**project ref**

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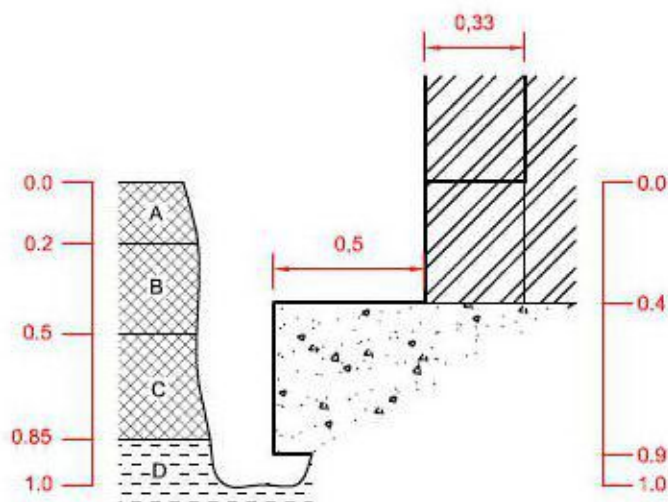
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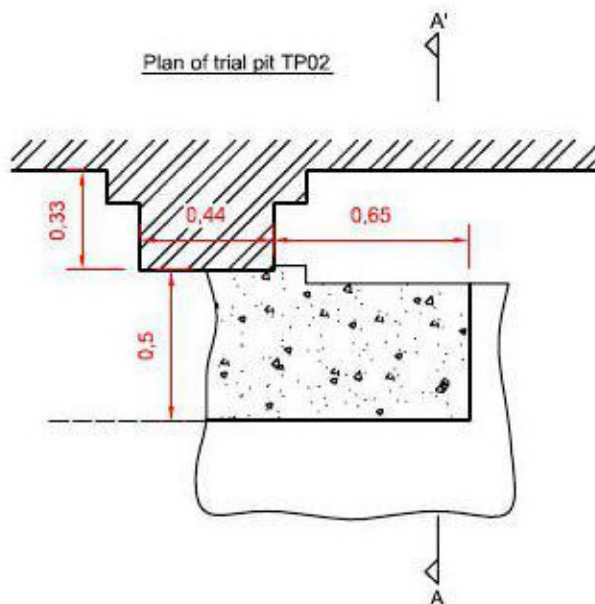
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Section A - A' of trial pit TP02 facing south



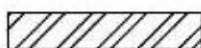
Plan of trial pit TP02



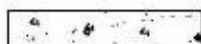
Photographic record of trial pit TP02



Key



Masonry



Concrete

- A Grass onto firm brown sandy SILT (MADE GROUND)
- B Medium dense brown and light brown clayey gravelly SAND. Gravel consists of flint, brick with some boulders of sandstone and timber (MADE GROUND)
- C Firm brown and orange brown sandy gravelly CLAY. Gravel consists of flint and brick. (MADE GROUND)
- D Firm orange and light brown gravelly sandy CLAY. Gravel consists of coarse flint. (KEMPTON PARK GRAVEL)

Notes.

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable and no groundwater encountered.
3. All dimensions shown in metres



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Title

Detail of foundation exposed in Trial pit TP02

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date

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checked by

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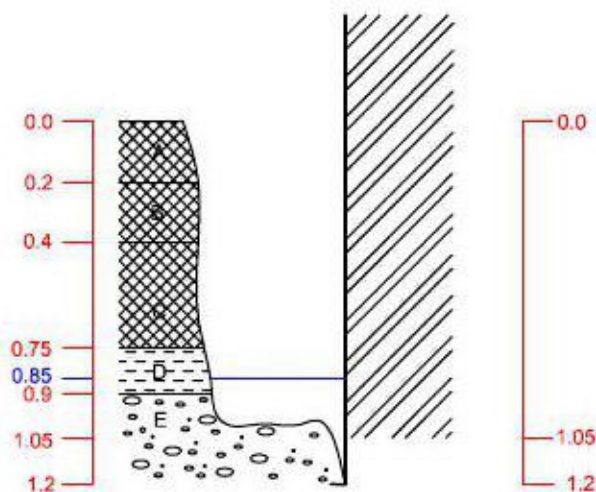
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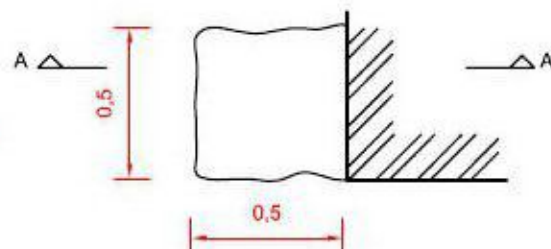
TP02

revision

Section A - A' of trial pit TP03 facing north



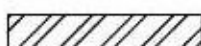
Plan of trial pit TP03



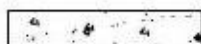
Photographic record of trial pit TP03



Key



Masonry



Concrete

- A Grass onto firm brown sandy SILT (MADE GROUND)
- B Medium dense brown and light brown clayey gravelly SAND. Gravel consists of flint, brick with some boulders of sandstone and timber (MADE GROUND)
- C Firm brown and dark grey sandy gravelly CLAY. Gravel consists of sandstone, flint and brick. (MADE GROUND)
- D Stiff orange and light brown sandy CLAY. (KEMPTON PARK GRAVELS)
- E Orange sandy GRAVEL. Gravel consists of flint. (KEMPTON PARK GRAVELS)

Notes.

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable
3. Groundwater encountered at 0.85m
4. All dimensions shown in metres
5. Unable to determine base due to water
6. Steel bar used to confirm concrete projection at approximately 1.2m depth
7. Trial pit relocated to TP04



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Title

Detail of foundation exposed in Trial pit TP03

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date

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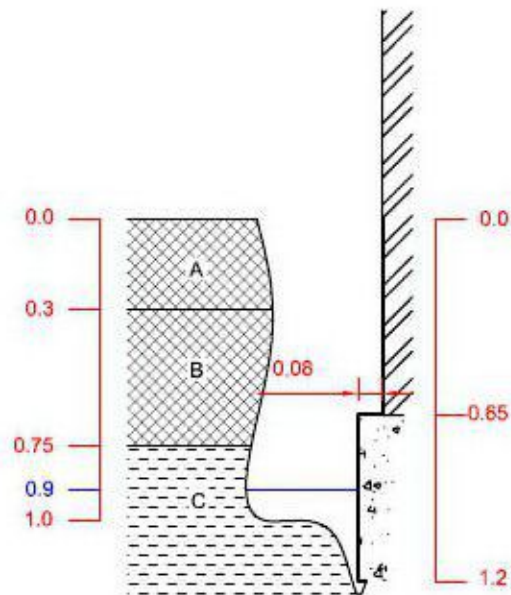
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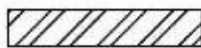
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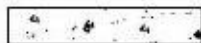
Section A - A' of trial pit TP04 facing east



Key



Masonry



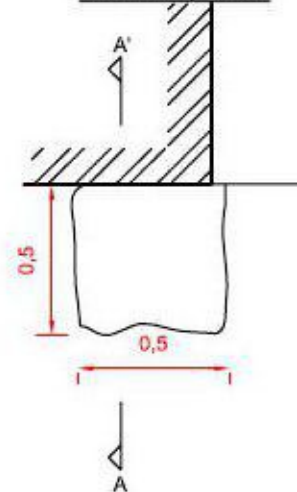
Concrete

- A Grass onto firm dark brown sandy SILT (MADE GROUND)
- B Firm brown and light brown gravelly sandy CLAY. Gravel consists of flint, brick and timber (MADE GROUND)
- C Firm orange and light brown gravelly sandy CLAY. Gravel consists of coarse flint. (KEMPTON PARK GRAVEL)

Photographic record of trial pit TP04



Plan of trial pit TP04



Notes.

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable
3. Groundwater encountered at 0.9m.
4. Trial pit terminated due to water inflow.
5. Steel bar used to probe below and confirm foundation depth
6. All dimensions shown in metres



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Project

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Title

Detail of foundation exposed in Trial pit TP04

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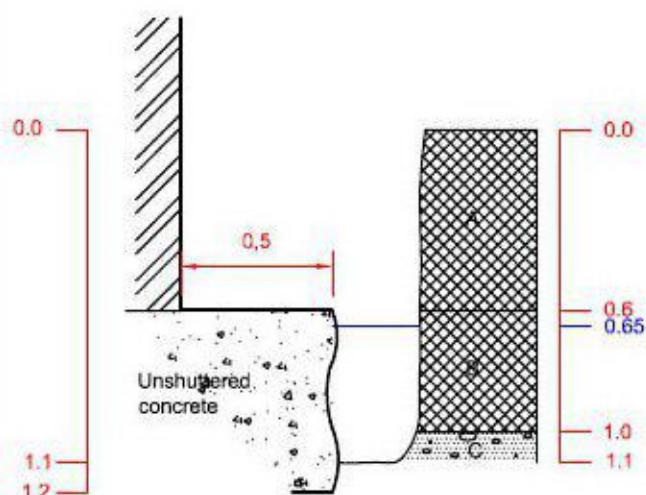
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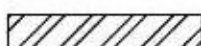
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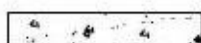
Section A - A' of trial pit TP05 facing west



Key



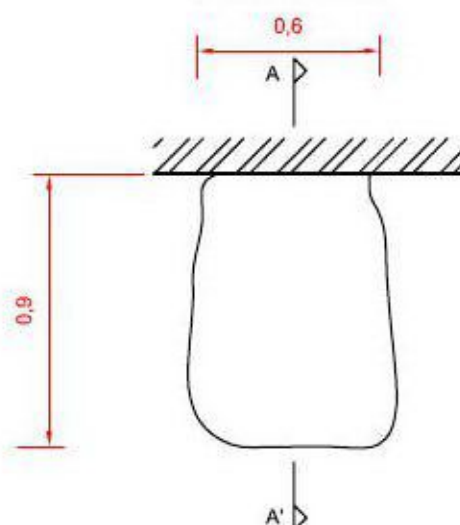
Masonry



Concrete

- A 50mm thick concrete pavior over 50mm sand over red and brown slightly clayey sandy GRAVEL with occasional cobbles of brick. Gravel consists of brick. (MADE GROUND)
- B Firm brown sandy gravelly CLAY. Gravel consists of brick and flint. (MADE GROUND)
- C Loose orange brown clayey SAND and GRAVEL. Gravel consists of coarse flint. (KEMPTON PARK GRAVEL)

Plan of trial pit TP05



Photographic record of trial pit TP05



Notes.

1. Trial pit excavated using hand tools
2. Trial pit sides remained stable
3. Groundwater encountered at 0.65m.
4. Trial pit terminated due to water inflow.
5. Steel bar used to estimate base of foundation.
6. All dimensions shown in metres



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Project

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Title

**Detail of foundation exposed in Trial pit TP05**

scale

**1:25 @ A4**

date

**28.05.08**

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