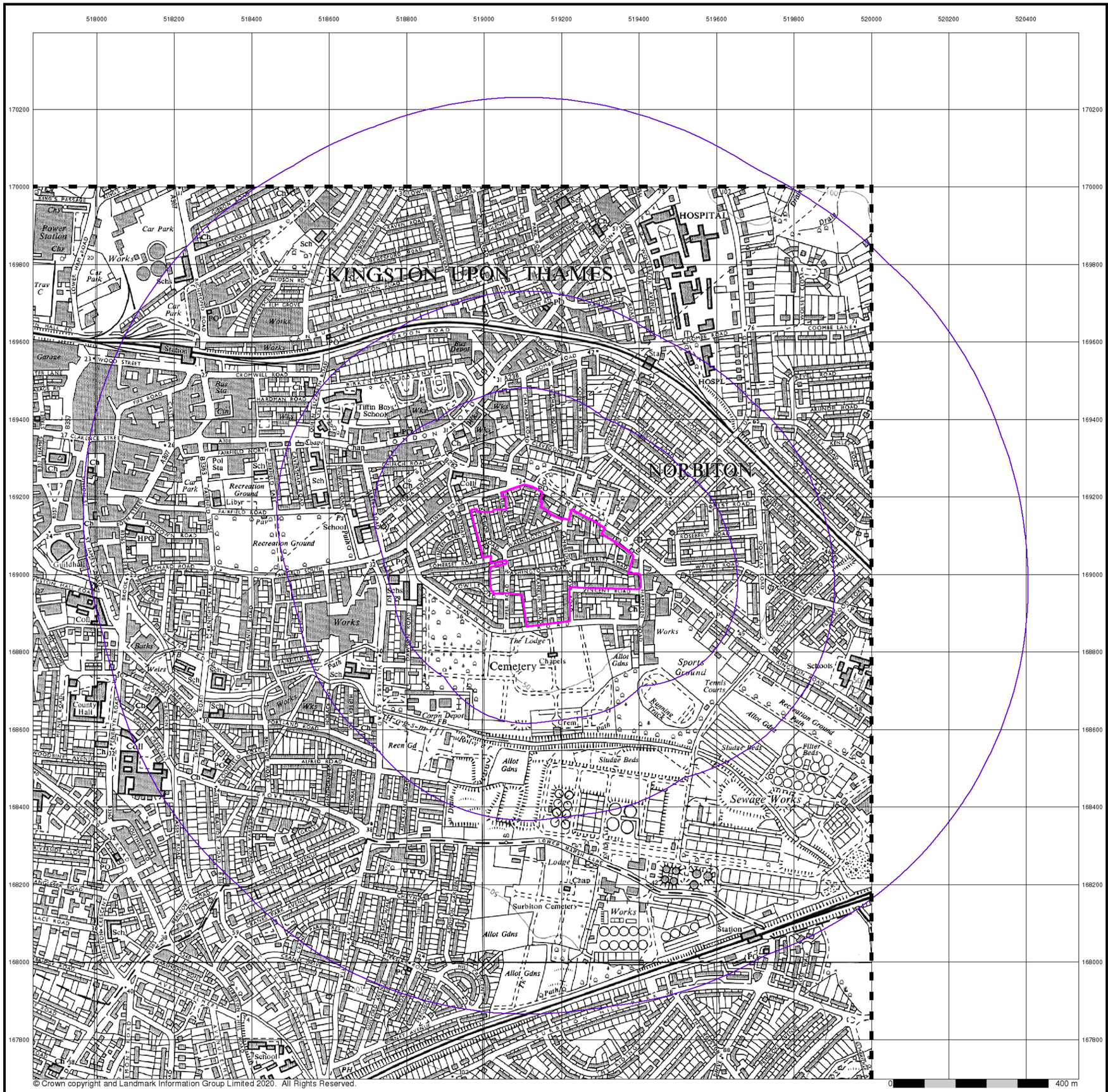

Geo-Environmental

Ordnance Survey Plan

Published 1968

Source map scale - 1:10,000

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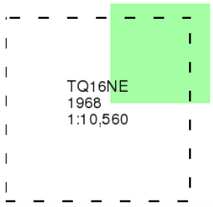
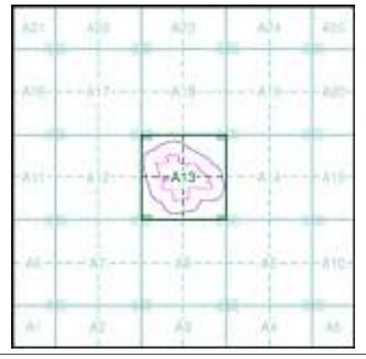


Historical Map - Slice A



Order Details

Order Number:	255509049_1_1
Customer Ref:	GE18530
National Grid Reference:	519170, 169040
Slice:	A
Site Area (Ha):	8.65
Search Buffer (m):	1000

Site Details

Land off Cambridge Road, Kingston upon Thames, KT1 3HY

Landmark INFORMATION GROUP
Tel: 0844 844 9952
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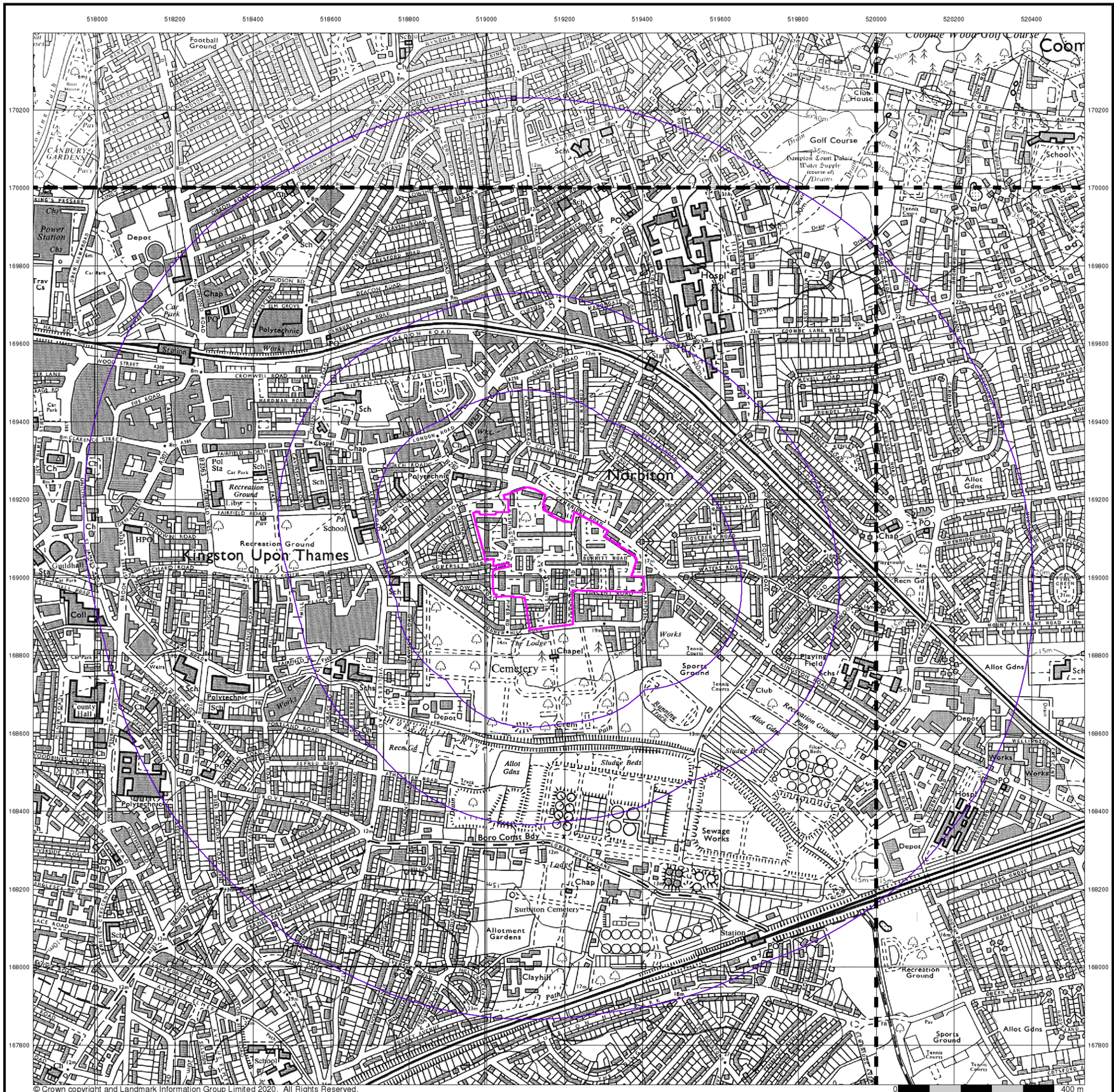
Web: www.envirocheck.co.uk



Geo-Environmental

Ordnance Survey Plan

Published 1975 - 1976

Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

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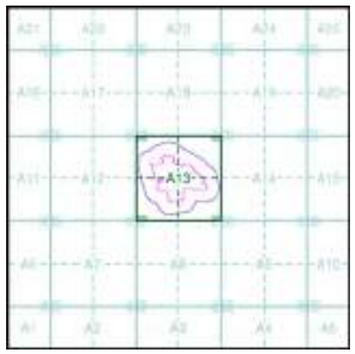
TQ16NE 1976 1:10,000	TQ26NW 1976 1:10,000

Historical Map - Slice A



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Geo-Environmental

London

Published 1985

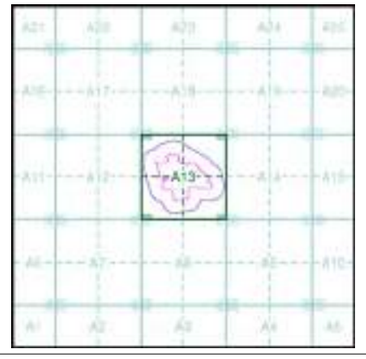
Source map scale - 1:25,000

These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed areas. Buildings are coloured black and important building uses (such as hospitals, post offices, factories etc.) are numbered, with a numbered key describing their use.
They were produced by the Russians for the benefit of navigation, as well as strategic military sites and transport hubs, for use if they were to have invaded the U.K. The detailed information provided indicates that the areas were surveyed using land-based personnel, on the ground, in the cities that are mapped.

Map Name(s) and Date(s)

TQ17 1985 1:25,000
TQ27 1985 1:25,000
TQ16 1985 1:25,000
TQ26 1985 1:25,000

Russian Map - Slice A



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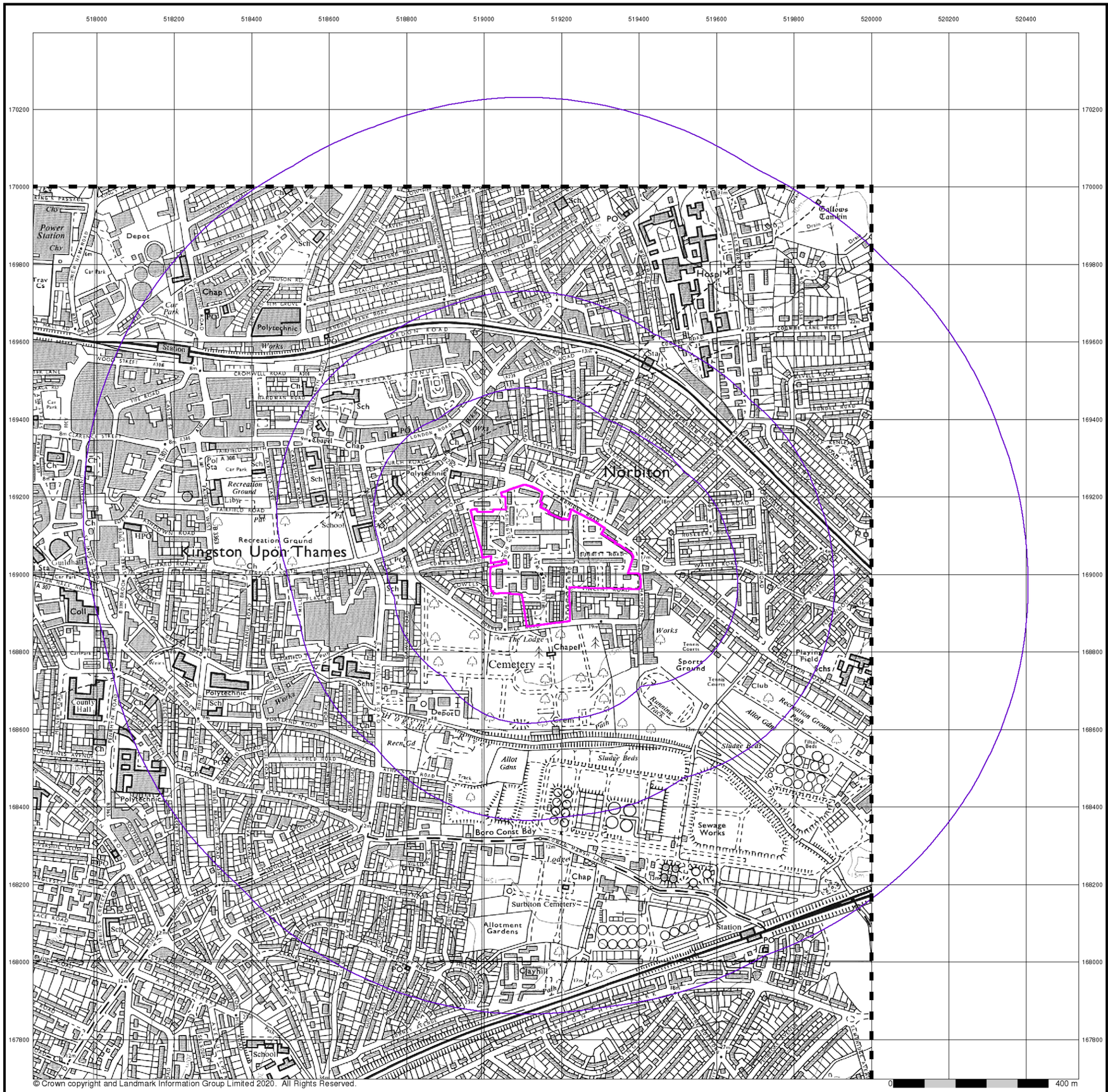

Geo-Environmental

Ordnance Survey Plan

Published 1987

Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

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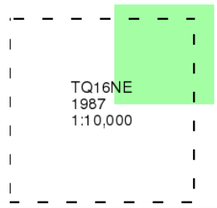
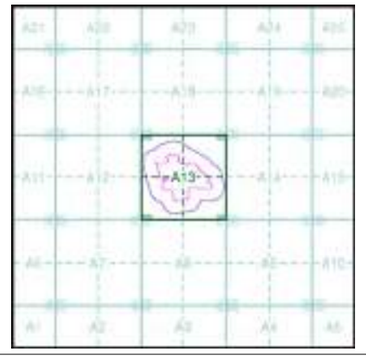


Historical Map - Slice A



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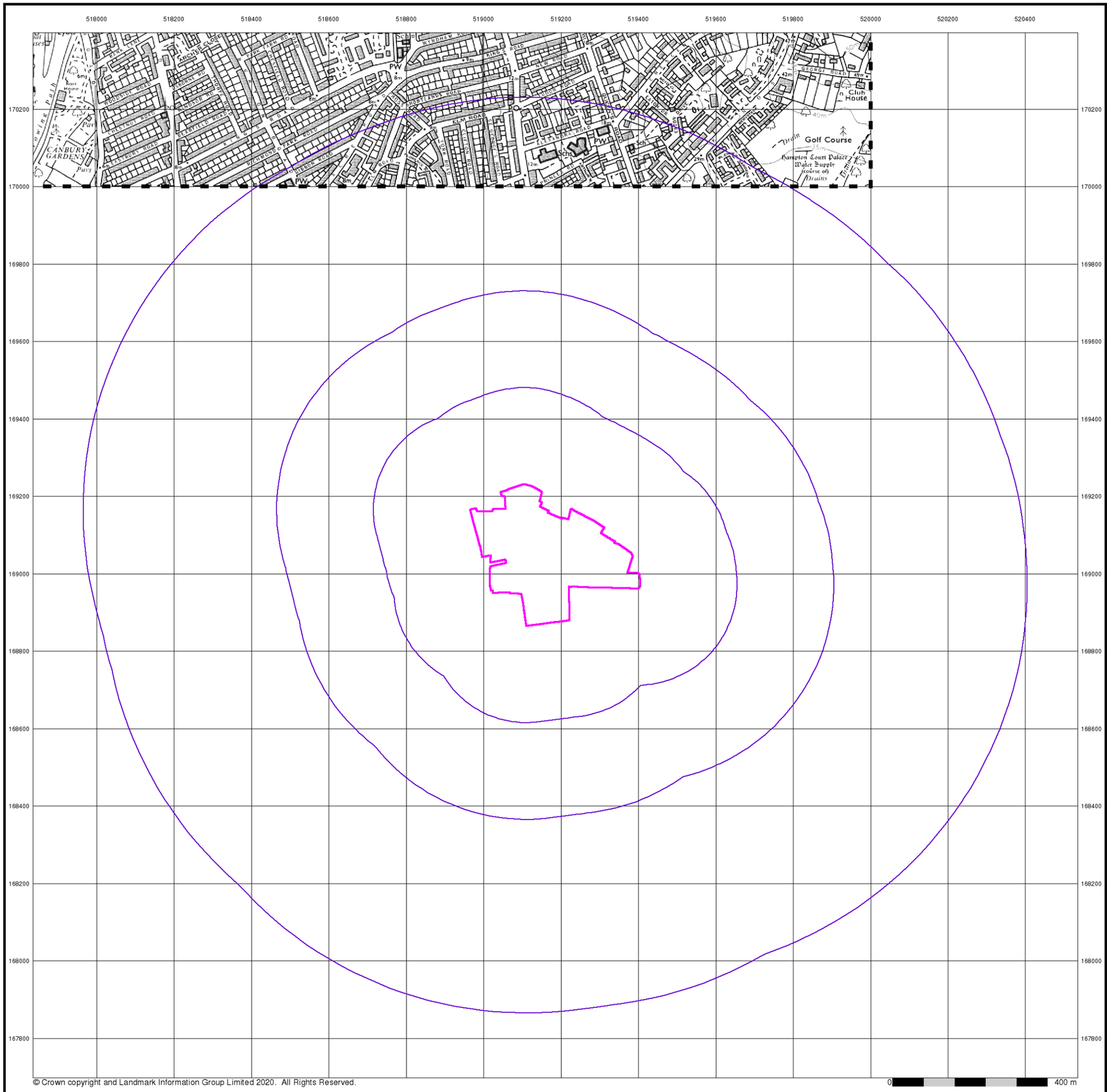

Geo-Environmental

Ordnance Survey Plan

Published 1992

Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

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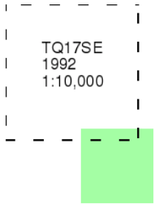
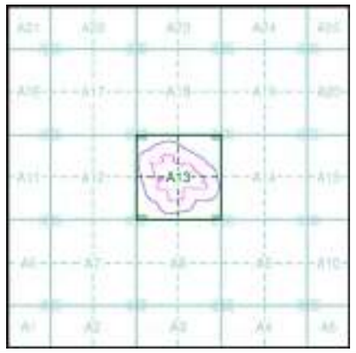


Historical Map - Slice A



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Geo-Environmental

10k Raster Mapping

Published 1999

Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

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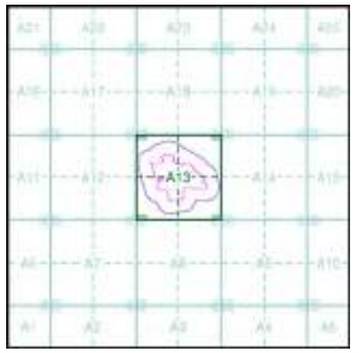
TQ16NE 1999 1:10,000	TQ26NW 1999 1:10,000

Historical Map - Slice A



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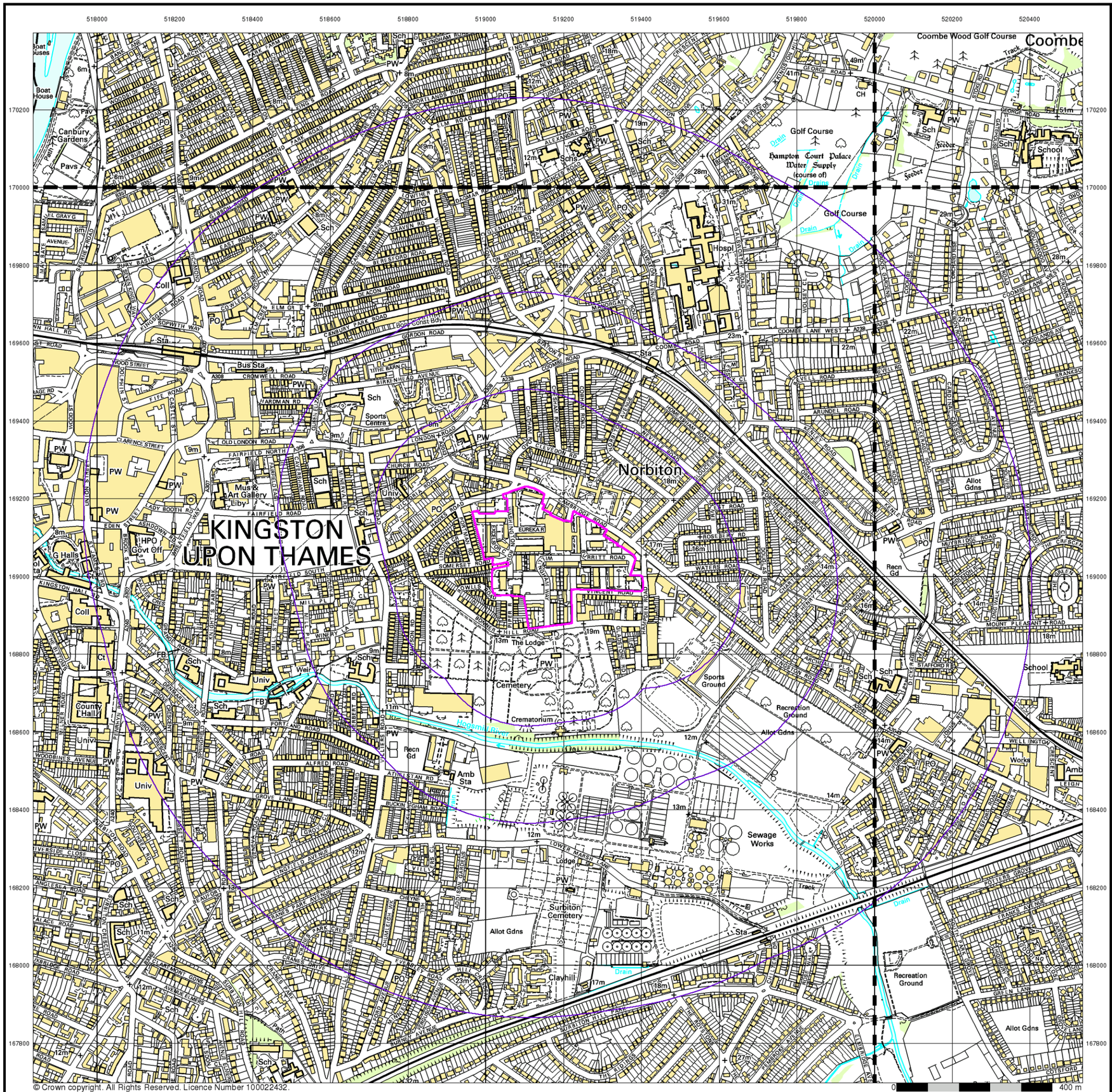

Geo-Environmental

10k Raster Mapping

Published 2006

Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

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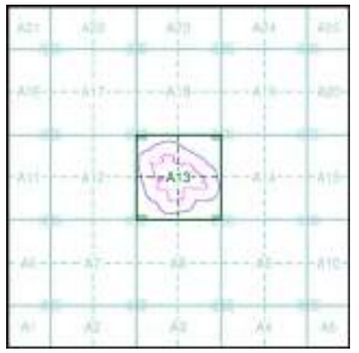
TQ16NE 2006 1:10,000	TQ26NW 2006 1:10,000

Historical Map - Slice A



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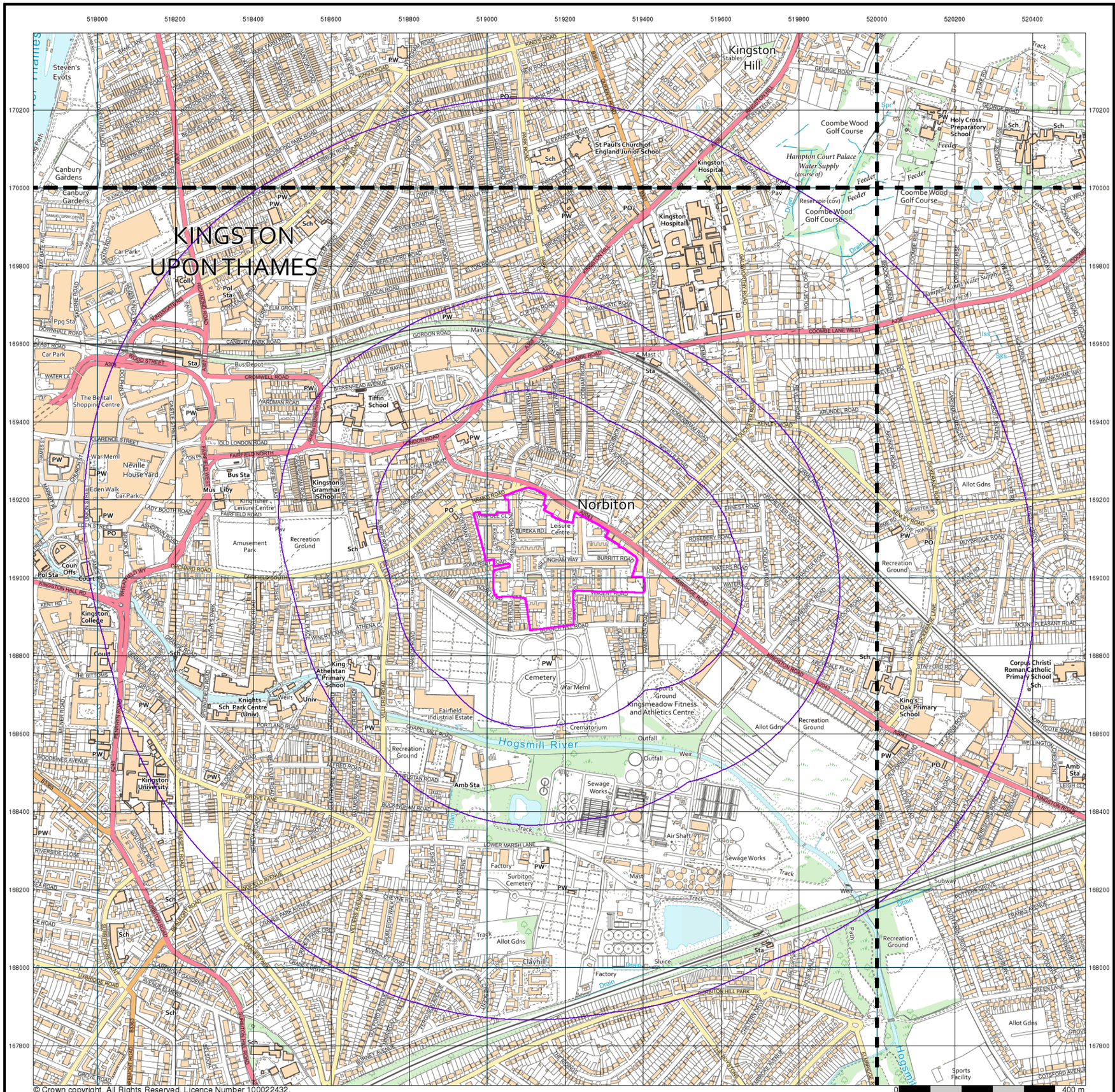


Geo-Environmental

VectorMap Local

Published 2020

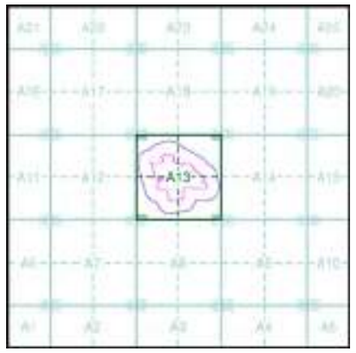
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

TQ17SE 2020 Variable	TQ27SW 2020 Variable
TQ16NE 2020 Variable	TQ26NW 2020 Variable

Historical Map - Slice A



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Geo-Environmental

GROUND INVESTIGATION REPORT

for the site at

PHASE 1, CAMBRIDGE ROAD,

KINGSTON UPON THAMES,

KT1 3LA

on behalf of

CAMBRIDGE ROAD (RBK) LLP

Report:	**GROUND INVESTIGATION REPORT**
Site:	**PHASE 1, CAMBRIDGE ROAD, KINGSTON UPON THAMES, KT1 3LA**
Client:	**CAMBRIDGE ROAD (RBK) LLP**
Date:	**6th October 2020**
Reference:	**GE18530/GIR/OCT20**
Version:	**2.0**
Prepared by:	
	LUCY HOLFORD, Bsc (Hons), FGS **CONSULTING ENGINEER**
Reviewed by:	
	KATIE BRAYNE CSci, BSc (Hons), MSc, FGS, MIEnvSc **REGIONAL MANAGER - EAST**
Authorised by:	
	JONATHAN TINGLEY CEnv, BEng (Hons), MSc, FGS, MIEnvSc **TECHNICAL DIRECTOR**

Geo-Environmental Services Limited
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AMENDMENT RECORD

Revision ref.	Date	Reasons for amendment	Author	Reviewed By	Authorised By
1.0	06/10/20	First issue	LH	KB	JT
2.0	29/10/20	Second Issue – client name change - Cambridge Road (RBK) LLP and updated Phasing drawing.	LH	KB	JT

CONTENTS

FIGURES

APPENDICES

EXECUTIVE SUMMARY		
Site Details	Site Address	Cambridge Road, Kingston Upon Thames, KT1 3LA
	National Grid Reference	519170, 169040
	Form of Development	It is proposed to regenerate the site by replacing the current housing stock with new purpose built reinforced concrete framed buildings, which range in height from three to thirteen storeys.
	Scope of works	An intrusive investigation in Phase 1 to confirm the ground conditions and to support the development of geo-environmental assessments of the site in relation to the proposed residential development.
Encountered Conditions	Ground Conditions	The ground conditions comprised Made Ground overlying Kempton Park Gravel/Langley Silt Member and London Clay at depth.
	Groundwater	Groundwater was recorded at one location (WS05) at 2.9m bgl within the Kempton Park Gravel at the time of the investigation. Four standpipes were installed during the investigation in WS01, WS07, WS10 and WS13. During the single return monitoring visit undertaken on 17th September 2020, groundwater was recorded at depths of between 2.59m and 2.96m bgl. WS01 was recorded as dry.
Environmental Considerations	Human Health	Made Ground soils at the site have been found to be impacted by lead, and locally, Arsenic, Benzo(a)pyrene and PCB contamination. The sample from WS14 at 0.50mbgl recorded asbestos in the form of Amosite (A.I.B). Remedial measures such as the implementation of a clean soil cover system within the soft landscaped areas proposed are likely to be required for the protection of end users.
	Groundwater	Based on the results no remedial measures are considered necessary with respect to groundwater at this stage.
	Ground Gas	A single ground gas monitoring visit was conducted on 17th September 2020 and marginally elevated carbon dioxide exceeded the CS1 limiting value check (5%). It is recommended additional visits are completed in line with best practice to fully characterise the ground gases on the site.
	Built Environment	The results of the chemical testing indicate that barrier pipe is likely to be required for the protection of potable water supplies. It is recommended that the results of the chemical testing be forwarded to the water utility company to confirm their requirements on pipe material.
	Waste Disposal	The chemical test results were initially assessed using the Atkins CatWaste tool, which indicated that the Made Ground soils had potentially hazardous properties based on the lead concentrations at four locations. It should also be noted further testing and sampling should include quantification of any asbestos identified to aid classification for disposal. In addition to the above, four samples of Made Ground soils were submitted to the laboratory for Waste Acceptance Criteria (WAC) testing. The results indicated that the Made Ground soils tested would likely be suitable for disposal at a landfill licenced to accept stable non-reactive hazardous waste on account of elevated pH, Total Organic Carbon, and antimony within the leachate.

		Natural uncontaminated soil arisings of the Kempton Park Gravel/Langley Silt Member and London Clay Formation are likely to be classified as 'inert' waste. However, if there is any visual or olfactory evidence of contamination encountered during works, further testing will be required to confirm this assessment.
Further Action: • Additional ground gas monitoring in line with best practice. • Additional investigation post demolition beneath the building footprints. • Remediation Strategy and Verification Plan (RSVP) will be required by the Local Authority. • Geotechnical investigation for foundation design parameters.		
This Executive Summary is intended to provide a brief summary of the main findings and conclusions of the investigation. For further information, reference should be made to the main report ref. GE18530/GIR/OCT20		

1.0 INTRODUCTION

1.1 General

Geo-Environmental Services Limited was instructed by CTP Consulting Ltd on behalf of Cambridge Road (RBK) LLP to undertake an investigation into the geo-environmental factors pertaining to Phase 1, Cambridge Road, Kingston Upon Thames, KT1 3LA (National Grid Coordinates at centre: 519170, 169040), herein referred to as the 'site'. The site's location is presented in Figure 1.

A desk study report for the wider Masterplan area (Phases 1-5) was undertaken by Geo-Environmental in September 2020, referenced GE18530-DSR-SEPT20. A summary of the risks identified by the desk study can be found within section 2.1 of this report.

1.2 Form of Development

It was understood that at the time of writing the Phase 1 development comprises the demolition of existing residential properties and the construction of approximately three residential apartments blocks ranging between 3 and 13 storeys in height, with communal gardens, car parking, access roads and associated infrastructure.

1.3 Objectives

The analysis comprised an intrusive investigation into the geo-environmental conditions pertaining to the site. Analysis for geotechnical parameters was outside the scope of works.

In terms of the environmental investigation, a Preliminary Risk Assessment (PRA) was undertaken within the Desk Study in accordance with CLR11, in order to provide a basis for the scope and rationale of the subsequent Phase II environmental investigation. The objective of the risk assessments was to evaluate the risks posed to the proposed redevelopment, adjacent land uses, and the wider environment, in the context of the development options, immediate liabilities under the Environment Act 1990, and risks posed to Controlled Waters under the Water Resources Act.

1.4 Site Description

The site was located at National Grid Reference 519170, 169040 and extended to approximately 8.86ha in area. The topography of the site slopes gently down from the south east boundary towards the north west with an overall fall in level of c.7.5m across the whole site.

The northern half of the site was mostly occupied by tower blocks and 4-5 storey blocks of apartments whereas the southern half was mostly occupied by terraced housing. For ease of reference, the site has been split into the northern and southern halves for the description.

Northern Portion

At the time of the site walkover in September 2020, the northern part of the site was occupied by four 16 storey tower blocks interspersed with numerous five storey blocks of apartments. The style of the buildings indicated they were most likely constructed in the 1960s.

Between the apartment buildings there was a mix of soft and hard landscaping with several play areas noted. The limited soft landscaping comprised open lawned amenity space which included several mature trees between many of the lower level apartment blocks. Some of the apartment blocks were noted to have garages on the ground floor running along the length of the building. Most of the lower rise apartment blocks were joined by pedestrian bridges.

A large hotel (Bull and Bush) with a hotel garden and parcel locker facility was noted within the north west of the site.

Further east the buildings were arranged in rows trending north-south with the first row being an apartment block and the next few rows were terraced houses with several small blocks of six apartments.

Southern Portion

The southernmost portion of the site entirely comprised terrace properties with areas of both soft and hard landscaping. Many mature and semi mature trees were noted in the landscaped areas. The western portion of the site was occupied by relatively new terraced houses as well as a new apartment block known as Ely Court. West of Ely Court was a community centre (Piper Community Hall) and carpark. The western portion of site comprised an additional apartment block with a series of shops at ground level. the shops appeared predominantly disused with the exception of the housing office.

The site was bounded to the south by the Kingston-upon-Thames cemetery, to the east and west by a continuation of residential properties, to the north by Cambridge Road and then beyond a line of shops with residential properties.

1.5 Standards

Where practicable, the ground investigation and subsequent environmental assessments were undertaken in accordance with the following documents and guidance:

- British Standards Institute - Code of Practice for Site Investigations (BS5930:2015).
- British Standards Institute - Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BS8485:2015+A1:2019).
- British Standards Institute - Eurocode 7 – Geotechnical Design - Parts 1 & 2 (BS EN1997-1:2004 & BS EN1997-2:2007).
- British Standards Institute - Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs) (BS8576:2013).
- British Standards Institute - Investigation of Potentially Contaminated Sites - Code of Practice (BS10175:2011+A1:2013).
- British Standards Institute - Soils for Civil Engineering Purposes (BS1377:1990).
- British Standards Institute - Specification for Topsoil and Requirements for Use (BS3882:2015).
- Building Research Establishment - The Performance of Building Materials in Contaminated Land (BRE255) (1994).
- Construction Industry Research and Information Association - Assessing risks posed by hazardous ground gases to buildings (C665) (2007).
- Department for Communities and Local Government - National Planning Policy Framework (2012).
- Department for Environment Food and Rural Affairs and CL:AIRE - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (SP1010) (2014).
- Department for Environment Food and Rural Affairs and Environment Agency - Model Procedures for the Management of Contaminated Land (CLR11) (2004).
- Department of Environment - Industry Profiles (1995 - 1996).
- Environment Agency - Guidance for waste destined for disposal in landfills (2006).
- Environment Agency - Guidance on Requirements for Land Contamination Reports (2005).

- National House Building Council, Environment Agency & Chartered Institute of Environmental Health - Guidance for the Safe Development of Housing on Land Affected by Contamination (R&D Publication 66) (2008).
- National House Building Council - Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (10627-R01[04]) (2007).
- National House Building Council – Standards, Chapter 4.1 Land Quality - Managing Ground Conditions (2020).

1.6 Conditions

This report does not purport to be a "Geotechnical Design Report" as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004) and some of the data used may not be fully compliant with that design code. It is considered necessary that further detailed ground investigations would be required to facilitate the detailed geotechnical assessment.

The data collected from the investigations have been used to provide an interpretation of the environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occurs between or under points of physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative, and liability cannot be accepted for its accuracy.

It should be noted that in particular the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore only be representative of the conditions at the time of sampling. This report should not be taken as any guarantee that a site is free of hazardous or potentially contaminative materials.

Information contained in this report is intended for the use of the Client, and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever express or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

Assessment criteria or other parameters developed for the evaluation of contamination on this site are based on a number of assumptions regarding exposure and toxicology, and exposure to contaminants and levels of adverse effects may therefore vary. Whilst every care and expertise has been employed in the development of such criteria, no liability is accepted in this respect. Other criteria or guidance on the development of assessment criteria may be published in the future, and no liability is accepted in this respect.

2.0 PRELIMINARY RISK ASSESSMENT SUMMARY

Geo-Environmental was not made aware of any previous investigation at the site.

2.1 Preliminary Risk Assessment

A summary of the preliminary risk assessment (taken from ref: GE18530-DSR-SEPT20) is presented in Table 2.1 overleaf.

The desk study process identified plausible potential pollutant linkages that exist in relation to the proposed redevelopment of the site. The risks relate to the potential for contamination within any near surface soils or Made Ground, potential for ground gases and aggressive ground conditions. The potential pollutant linkages have been preliminarily assessed as falling into moderate to low, low and very low risk ratings.

For further details please see the Desk Study Report ref: GE18530-DSR-SEPT20.

Potential Source/Media	Potential Receptors	Potential Pathways	Probability	Consequence	Risk and Justification
Shallow soils and shallow Made Ground (on and off site)	End users	Direct contact and inhalation of soil derived dust	Likely	Mild	**Moderate to Low** End users likely to come into contact with soils via direct contact in areas of soft landscaping/gardens on the proposed residential development, albeit that gross contamination is not anticipated based on desk study information. Soft landscaping would be completed with uncontaminated soils in the near surface root zone.
	Soft Landscaping	Root Uptake	Likely	Mild	**Moderate to Low** The proposed development is likely to include areas of soft landscaping including private gardens. However, landscaping would be completed with uncontaminated soils in the near surface root zone and no evidence of harm to the existing vegetation was observed.
	Adjacent land users	Direct contact	Unlikely	Minor	**Very Low** Adjacent site users are unlikely to come into contact with soils within areas of proposed soft landscaping.
	Water supply pipes	Direct contact	Likely	Mild	**Moderate to Low** Water supply pipes could come into contact with impacted soils depending upon depth of installation and extent of soil impact.
	Buildings and infrastructure	Direct contact	Likely	Minor	**Low** Foundations and utilities will be placed within potentially aggressive soils (e.g. sulphate). However, the consequence is anticipated to be minor.

Potential Source/Media	Potential Receptors	Potential Pathways	Probability	Consequence	Risk and Justification
	Groundwater	Vertical migration	Low	Mild	**Very Low** Shallow groundwater (<5m bgl) or perched groundwater may be present within more granular parts of the Head Deposits. The strata beneath the site are classified as an Unproductive Aquifer and is outside any Source Protection Zones.
Ground Gases and Vapours	End users	Inhalation	Low	Medium	**Moderate to Low** Ingress of hazardous ground gas into buildings could occur where ground gases are identified on site. This is only considered to present a risk from on-site sources should a plausible source be identified. However, the possible presence of deep made ground on-site could also be another source of ground gas.
	Adjacent land users	Inhalation	Unlikely	Mild	**Low** It is considered to be unlikely that adjacent land users will come into contact with ground gases and vapours originating on site. Should ground gases and vapours be identified, on-site service routes should be constructed in line with best practice to prevent the creation of preferential pathways off site. In addition, if gross contamination is identified that could represent a source of gas/vapour which could impact adjacent land users then remedial action would be required to reduce, remove or otherwise mitigate the source or break the exposure pathway(s).
	Buildings and infrastructure	Gas accumulation and potential	Unlikely	Minor	**Very Low**