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07T653a/GP/LA/corrout006
Ref: AN/2008/104910/01-L01

15 May 2008

Environment Agency
Waterside House
Waterside North Lincolnshire
Lincolnshire
LN2 5HA

FAO LAURA RICHARDSON

Dear Sirs

RE: PROPOSED DEVELOPMENT AT WINDSOR CRESCENT, CROWLE, NORTH LINCOLNSHIRE (NGR 476800, 412700).

Further to our telephone conversation yesterday, we are Civil/Structural Consultant Engineers presently engaged in the above project, for our client, South Yorkshire Housing Association (SYHA). We are writing in response to the Environment Agency (EA) letter sent to North Lincolnshire Council Building Control, referenced above, and in particular the condition covering 'potential land contamination'.

As discussed with Suzy Bateman, of the EA, we include herewith copies of relevant pages taken from the Contamination Risk Assessment report undertaken for this site. We consider that this report together with the Site Investigation report provides the necessary information to address the condition raised within your letter.

In summary, we confirm historical mapping, dating back to 1886 through to present day shows the site has remained undeveloped agricultural land. A summary of the site history is included herewith along with a copy of the historical maps dated 1886, 1908, 1971 & 2008.

A conceptual model and risk assessment has been undertaken for the site and we include the table of results for reference. The conceptual model identifies the risk from sources, pathways and receptors all to be categorised as low. In addition, the geological assessment also identifies the risk rating as low. Further the contamination analysis of samples taken from the made ground were free from contaminants confirming that no remediation of the site is required. Briefly the site is overlain with agricultural topsoil and has remained so through its history.

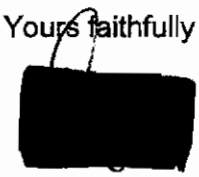
Given the above information and the attached detailed pages, along with the findings from the Contamination Assessment, undertaken as part of the Phase II intrusive investigation, it is clearly evident the risk to controlled waters in the vicinity of the site is low. There are no contamination issues with the existing ground.

We would be grateful if you could review the attached information and confirm in writing that the EA are satisfied with the information provided and that your objection can now be removed for the scheme.

Please note your objection under Points 1 & 2, of your letter, relating specifically to the Flood Risk Assessment (FRA) & Sequential Test are currently being reviewed by the organisation that carried out the original FRA report. Pending their response and comments we will provide some further information to help clarify and address your points.

In the meantime should you require any further information or clarification herein, please do not hesitate to contact me in the first instance.

Yours faithfully



Gareth Phillips
For and on Behalf of Billinghurst George & Partners

cc Christine Davies (SYHA)

Enc Contamination Risk Assessment

Windsor Crescent, Crowle, North Lincolnshire

Contamination Risk Assessment

South Yorkshire Housing Association

Solmek Report Number S70637/RA

May 2008

Solmek
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Windsor Crescent, Crowle, North Lincolnshire

Contamination Risk Assessment

Contract Number: S70637/RA
Date: May 2008

Status	Prepared by	Checked by	Date
Final	A Cutts	D. Simpson	May 2008
	[redacted]	[redacted]	

Windsor Crescent, Crowle, North Lincolnshire

Contamination Risk Assessment

1 INTRODUCTION AND SCOPE OF WORKS

1.1 Solmek were instructed by Billinghurst George & Partners on behalf of South Yorkshire Housing Association Ltd to undertake a contamination assessment on land located to the south west of Windsor Crescent, Crowle in North Lincolnshire.

1.2 A Phase 2 site investigation has previously been carried out by Solmek (Report No S70637 August 2007) and should be read in conjunction with this report. The contamination information from the previous report has been summarised and collated with details of the previous uses of the site to produce a conceptual model and contamination risk assessment.

1.3 The area in question is to be developed with twelve houses and three bungalows with car parking/driveways and garden areas.

1.4 This assessment has been undertaken with due regard to contaminated land guidance, issued by the Royal Institution of Chartered Surveyors (RICS) and BS 10175: 2001, *"Code of Practice for the Investigation of Potentially Contaminated Land"*. Selected elements of BS 5930: 1999, *"Code of Practice for Site Investigations"* has also been included.

2 SITE DESCRIPTION

2.1 The preliminary site inspection, as recommended in BS 5930 and BS 10175, was undertaken on 3rd July 2007. A site plan is presented in Appendix A, Figure 1.

2.2 Access to the site was gained from the south east off Windsor Lane. The site generally comprises tall grasses, which were boggy in areas. The site is relatively flat in topography. An electrical substation was present and positioned centrally along the southern boundary. An overhead cable cuts through the southern area and is aligned from north east to south west.

2.3 The site is positioned in rural setting on the outskirts of Crowle to the west. Housing is present to the east and south, with open farmland present to the north and west.

3 SITE HISTORY

3.1 In order to determine the history of the site, previous editions of Historical Maps and Ordnance Survey Plans were inspected. Selected map extracts are presented in Appendix 2. Table 1 presents a summary of the history of the site from 1886 to 2008. The summary focuses on the historical land uses and changes relevant to the site and the proposed end use. All distances quoted are approximate and from the site centre.

OS MAP	SCALE	ON SITE FEATURES	OFF SITE FEATURES
1886	1:2,500	The site is undeveloped and is within agricultural land. A number of field boundaries cross the site from south east to north west.	The site is generally positioned in a rural setting with some drainage ditches. A collection of houses are shown 150m to the south labelled Windsor. Housing is also depicted 180m to the north east along an unnamed road. A church lies 400m to the north east.

1893	1:2,500	No onsite changes noted.	No further changes.
1907	1:2,500	No onsite changes.	No significant offsite changes.
1908	1:10,560	The field boundaries are no longer shown. The eastern boundary is marked by the edge of a field.	The village of Crowle is shown over 500m to the east with a railway line beyond. The Old River Don lies 500m to the north west. One of the field drains to the north of the site stretches towards The Sheffield and South Yorkshire Navigation Canal over 1km to the south.
1947/50	1:10,560	No onsite changes.	Housing has been developed in the adjacent field to the east of the site. No other obvious changes.
1956	1:10,000	No onsite changes.	No changes.
1971	1:2,500	The site remains relatively unchanged. A drain is shown along the eastern boundary and an electrical sub station encroaches in to the southern boundary.	The housing has extended along the southern and eastern boundaries of the site forming Windsor Crescent and Windsor Lane. Further housing development has taken place to the north, south and east of the site. A pump house is shown to the south east of the site. A sewage works is depicted 250m to the west of the site; filter beds and various other buildings are shown.
1993	1:2,500	No onsite changes.	No obvious changes other than further housing development to the east.
2000	1:10,000	No onsite changes.	Overhead pylons lie 400m to the south. No other obvious changes.
2008	1:10,000	No onsite changes.	No obvious changes.

TABLE 1: SUMMARY OF THE SITE HISTORY

3.2 The site has remained undeveloped over the coverage of the above historic maps. By the 1970's an electrical substation slightly encroaches into the southern boundary and a pump house is shown along the eastern boundary.

3.3 The surrounding land comprised fields with a number of field drains. The land to the west has remained largely undeveloped. The village of Crowle lies to the east and has mainly been developed with housing. Windsor Crescent was developed sometime between the mid 1950's and early 1970's.

4 MINING REPORT

4.1 A mining report dated 4th July 2007 was sourced from David Bellis Consulting for the site in question. The mining report states that there are no previous recorded coal workings in the likely zone of physical influence at the surface. There are no future workings likely. The solid geology given in the report is Keuper Marl. There are no faults or abnormal features relevant to the site. There are no shafts, adits, tips or lagoons in the vicinity. The report states that there is no evidence of coal mining related subsidence claims in relation to the site in the last 10 years. The mining report is presented in Appendix 3.

5 FIELDWORK AND GROUND CONDITIONS

5.1 Four small percussive boreholes (referenced BH1 to BH4), with associated sampling and insitu testing were carried out in July 2007. The insitu testing comprised a series of standard penetration tests (SPT), which were carried out at regular intervals. The boreholes were drilled to depths of up to 3.45m below ground level (mbgl). Laboratory testing was undertaken on selected representative samples.

5.2 A gas and water monitoring standpipe was installed in BH1 and BH3, and two monitoring visits were made during July and August 2007. The position of the boreholes is shown on a site plan included in Appendix A, Figure 1 The borehole logs are presented in Appendix 4.

Ground Conditions

5.3 Made ground was encountered in all four boreholes to depths of 0.4 and 0.5mbgl as sandy soil (inferred topsoil). Underlying the Made Ground, natural deposits of medium dense sand was proven in all four boreholes to termination depths of 2.45mbgl in BH1, and 3.45mbgl in BH's 2 and 4. The medium dense sand in BH's 2 and 4 was described as becoming dense with depth. In BH3, the medium dense sand was proven to 2.6mbgl and overlies dense grey sand to 3.45mbgl.

5.4 Groundwater was encountered in all four boreholes at depths of between 0.3 and 0.5mbgl. Given the absence of any clay sub strata, groundwater cannot be classed as perched. In BH1, the groundwater was encountered within the natural sand. In BH's 2 and 3, groundwater was encountered at the made ground/natural sand interface, and in BH4, groundwater was encountered within the made ground.

6 CONTAMINATION AND GROUND GAS ASSESSMENT SUMMARY

6.1 To provide information upon the possibility of residual contamination, two samples of made ground were submitted for analysis. Soil samples were tested for a range of potential contaminants, based on CLEA Soil Guideline Values (SGV's) parameters listed by the Environment Agency. In addition, two samples were subject to polyaromatic hydrocarbon (PAH) testing and two samples were subject to asbestos screening. Two samples were subject to leachate analysis. Results are presented in Appendix 5.

6.2 This type of development is sensitive to contamination, given that sensitive receptors will use the soft landscaped areas. However, the ground will mostly be covered over by buildings giving minimal exposure to possible contaminated soil, other than in gardens, landscaped or exposed areas. The domestic SGV's with plant uptake have therefore been used and where applicable EA derived threshold values for gardens. These are considered a conservative option taking into account the setting of the new development.

6.3 Group A heavy metals, potentially harmful to humans, were below SGV in all samples tested. Group B heavy metals such as copper, zinc, boron and nickel were present at variable concentrations below threshold levels. These metals are regarded as phytotoxic elements (harmful to plant growth) and as such pose little risk to human health.

6.4 Levels of phenol, cyanide and PAH were all below detection limits. Sulphate and sulphide concentration levels were generally low. From the two samples subject to asbestos screening, no fibres were detected.

6.5 From leachate analysis, it was revealed that from the two samples tested, all concentration levels were low and below detection limits. The leachate results were compared against the Environment Agency Leachate Quality Threshold levels.

Contamination Assessment

6.6 A qualitative approach using the statutory definition of Contaminated land, as defined within Section 78A (2) of Part 11A of the Environmental Protection Act (1990), has been adopted. This defines contaminated land as:

"Any land which appears to the local authority in whose area it is situated to be in such a condition by reason of substances in or on or under the land that "Significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled waters is being or is likely to be, caused".

6.7 The concept of "significant harm" is dealt with via Government guidance (DETR circular 02/2000 Contaminated Land). The statutory guidance uses the concept of pollutant linkages set out in Section 2.4 of the Circular. Before the local authority can make a judgment on whether "significant harm" and the significant possibility of harm is being caused they are required to identify a "significant pollution linkage". This means effectively that three elements (a source of contamination, a relevant receptor and a pathway) must be present. Without identification of all three elements together, land should not be regarded as "contaminated" in the statutory sense. See Appendix 6 for additional notes on contamination guidelines.

Users of the Site Once Development is Complete

6.8 The users of the site may potentially be exposed to contaminants present in the soils beneath the site, as soft landscaping and garden areas may form part of the final development. Potential exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children).

6.9 No elevated contaminants were located in the samples tested.

6.10 The ground will be covered over by the new development and assumed soft landscaped areas. Within the area of the proposed development, the levels of all contaminants tested fall below the threshold values used to assess risk to human health from long term exposure to contaminants. Given the test results, no risk should be posed by the made ground.

6.11 If any zones of odorous, brightly coloured or suspected contaminated ground is encountered then work should cease in that area until the material has been tested. The results of the tests will determine whether or not remediation will be required. Any highly contaminated material would have to be removed off site to an approved landfill. The current legislation on waste involves the categorization of materials into inert waste, non reactive hazardous wastes and hazardous wastes. The determination of the category depends on DEFRA landfill directive waste acceptance criteria (WAC). The material on this site may be subject to WAC by the appropriate waste disposal company.

Construction Workers and Users of Surrounding Sites

6.12 Short term human exposure to contaminants present in soils can occur via several pathways during the construction and ground works phase of the development. These include dermal absorption after contact with contaminated ground, inhalation of soil or dust (including windblown dust), inhalation of volatised compounds, inadvertent soil ingestion and contact with contaminated groundwater.

6.13 Using guidance published in the HSE publication *"Protection of Workers and the General Public during the Development of Contaminated Land"*, the made ground on site **based on this publication** should generally be regarded as contaminated given the sulphide concentration levels. In our opinion the levels of contamination will not pose a risk to construction workers and users of surrounding sites provided PPE is employed in accordance with HSE good practice and that safeguards are taken to limit dust during ground works, limiting public access.

Vegetation

6.14 Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants identified as being highly phytotoxic include boron, cadmium, copper, lead, nickel, and zinc.

6.15 To establish if the levels of contaminants present on site may pose a risk to vegetation the results of the contamination testing have been compared to a series of threshold values published in *"Notes on the Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing"*. Following comparison, the levels of the phytotoxic determinants are all below the threshold values. As such it is considered that the low levels of contaminants in the made ground will not pose a risk to vegetation on site.

6.16 The layer of made ground across this area should not pose a risk to human heath with regards to contamination. The topsoil and subsoil on site can be reused within garden areas. Any undesirable material, such as rubble, concrete, wood etc., if encountered during excavations in the made ground for proposed garden areas, should be screened, removed and placed beneath areas of hard standings.

Groundwater and Surface Water

6.17 The principal pathway by which soil contamination may reach the water environment is through a slow seepage or leaching to groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body. Groundwater was encountered at depths of between 0.3 and 0.5 during the drilling of four boreholes, and from depths of between 0.25 and 0.47mbgl from subsequent monitoring visits.

6.18 The test results from both soil and leachate analysis were low and within acceptable limits.

Construction Materials

6.19 Materials at risk from potential soil contamination include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and elevated levels of sulphates can accelerate the corrosion of building materials. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

6.20 BRE Special Digest One: *"Concrete in Aggressive Ground"* has been used to assess the risks posed to underground concrete and to establish the design measures required to mitigate the risks. The results of the pH and sulphate tests fall into Class DS-1, ACEC (Class AC-1) assuming mobile groundwater conditions.

6.21 The levels of potential contaminants detected have been compared to thresholds supplied in the Water Regulations Advisory Scheme Guidance Note 9-04-03 *"The Selection of materials for Water Supply Pipes to be laid in Contaminated Land"*. The thresholds enforced by the various water authorities vary however. Based on the testing, no contaminants were elevated, however as a minimum services should be placed in clean trenches and consultation with the utility providers is recommended.

Ground Gas

6.22 The gas was monitored by measuring emissions from two monitoring points installed in BH1 and BH3 during the site investigation. The results are tabulated in Appendix 5. The monitoring was generally carried out in accordance with current guidance provided within CIRIA C665:2007.

6.23 The atmospheric pressure has an impact on the concentrations of gas released. Atmospheric pressure ranged between 1005 and 1018 millibars during the surveys. This is considered to be average for the time of year, so gas results during the surveys are likely to be representative of normal weather/atmospheric conditions.

6.24 Maximum carbon dioxide concentrations were recorded as 0.2% volume, and oxygen levels did not fall below 20.0% volume. Methane was not detected. No significant flows were recorded.

6.25 The proposed development involves the construction of low rise traditional housing, the NHBC Traffic light system has been used to assess the gas regime. Using Gas Screening Values (GSV), the site would be classified as **Green**; where no gas protective measures are required.

7 CONCEPTUAL MODEL AND RISK ASSESSMENT

7.1 The conceptual model (Table 2) collates the salient aspects of the site to form a model. This model identifies the potential pollution linkages that may influence the proposed development and the relevant geological considerations.

SOURCES	PATHWAYS	RECEPTORS	MITIGATION	RISK RATING
Site has remained a field with no development on the site. An electrical substation encroaches onto the south eastern corner. The surrounding area has remained fields to the west with residential development to the east associated with Crowle. A sewage works is present 250m to the west. Low levels of contamination in shallow made ground. Made ground comprises sandy topsoil to 0.4 and 0.5mbgl.	Dermal absorption Inhalation of soil/volatised compounds Ingestion of soil Contact with contaminated groundwater	Proposed residential development, children and adults. Permanent and transient residents within the proposed structure.	The site to be capped by the development including residential units and hard cover parking areas. Levels of contamination are unlikely to pose a risk to the current and future users of the site provided the made ground remains beneath hard cover. Made ground should be screened of any deleterious material, if encountered, and placed beneath hard cover.	**LOW**
Site in mining area, no known worked coal seams beneath site. No methane recorded CO2 0.0%-0.2% O2 above 20.0% No flow rates	Ground gas migration. Made ground over highly permeable sand.	Proposed residential areas, children and adults. Permanent and transient residents within the proposed structure.	NHBC Traffic Light System = Green. No gas protection measures necessary.	**LOW**

Low levels of contamination in shallow topsoil made ground. Low leachate concentrations.	Dermal absorption Inhalation of soil/volatised compounds (dust) Ingestion of soil Contact with contaminated groundwater	Construction workers.	Made ground on site classed as contaminated due to elevated sulphide - appropriate PPE should be employed as a matter of course. Limit dust during ground works and demolition.	**LOW**
Low levels of contamination in shallow topsoil made ground. Low leachate concentrations.	Dermal absorption Inhalation of soil/volatised compounds (dust) Ingestion of soil	Surrounding areas comprise residential areas and open fields.	Damping down of site in dry/windy conditions and limit access by the public. .	**LOW**
Low levels of contamination in shallow topsoil made ground. Low leachate concentrations.	Uptake via roots and leaf surfaces	Soft landscaping or garden areas.	Levels of determinants below threshold values Reuse existing topsoil and subsoil for garden areas after screening.	**LOW**
Low levels of contamination in shallow topsoil made ground. Low leachate concentrations.	Seepage or leaching of contaminants. Made ground over low permeable clay onto siltstone. Accumulation of contaminated sediments in water body.	Surface Water – field drains. No major water courses in close vicinity.	The site to be capped by the development including hard cover parking areas.	**LOW**
Low levels of contamination in shallow topsoil made ground. Low leachate concentrations.	Seepage or leaching of contaminants Made ground over highly permeable sand.	Groundwater recorded between 0.3 and 0.5mbgl.	The site to be capped by the development including hard cover parking areas. Low levels soil contamination concentrations and leachate.	**LOW**
Low levels of contamination in shallow topsoil made ground. Low leachate concentrations.	Contact with contaminated soil/deleterious material.	Construction Materials and service fabrics	Class DS-1, AC-1. Consultation with utility providers recommended.	**LOW**

TABLE 2: CONCEPTUAL MODEL AND RISK ASSESSMENT

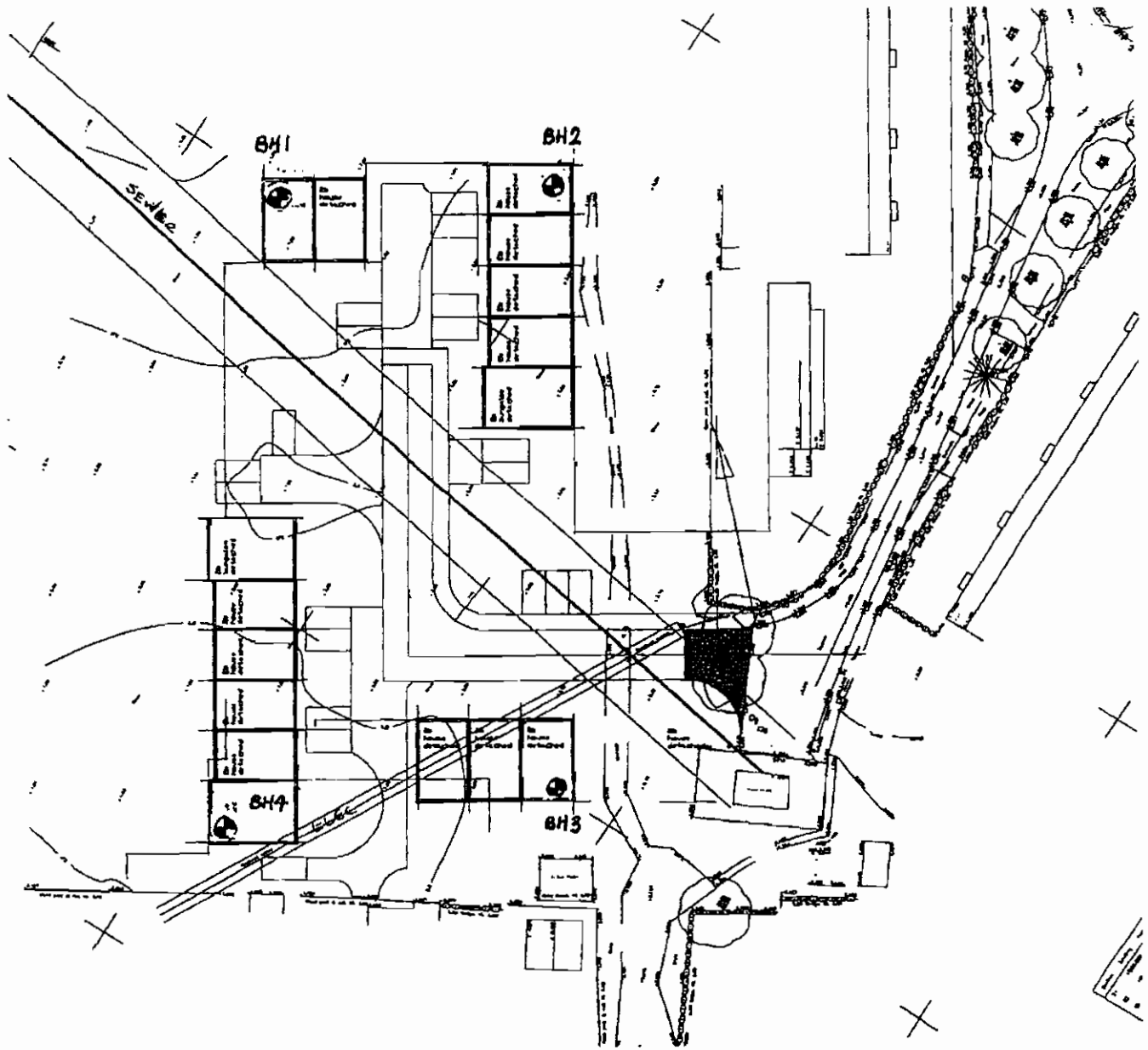
FACTOR	ON SITE DESCRIPTION	RISK RATING
MADE GROUND	Very thin made ground (maximum depth of 0.5mbgl).	LOW
NATURAL SOILS	Medium dense to dense sand	LOW
SOLID GEOLOGY	Not encountered	NA
MINING	No risks associated with coal mining.	LOW
SOIL GAS	Situation 'Green' from NHBC Traffic Light System.	LOW

TABLE 3:GEOTECHNICAL ASSESSMENT

7.2 Taking into account the available data the results of the contamination assessment shows that the site has an overall low risk.

SOLMEK

APPENDIX 1



Title	Borehole Location Plan
Project	Windsor Crescent, Crowle
Client	South Yorkshire Housing Ltd
Date	May 2008
DRG No	Figure 1
Scale	NTS

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SOLMEK

APPENDIX 2

Pit

Pit

Clay Pit

Shingle

Refuse Heap

Sloping Masonry

Flat Rock

Reeds

Osiers

sture

Furze

Wood

ood

Brushwood

Orchard

Fir

Ford

Stepping Stones

Ferry

Waterfall

Lock

Trig. Station

507 Altitude at Trig. Station

Bench Mark

342 Surface Level

Arrow denotes flow of water

Antiquities (site of)

Cutting

Embankment

crossing
ad

Level Crossing

Road crossing Railway

crossing
r Canal

Road over single stream

Road over River or Canal

County Boundary (Geographical)

County & Civil Parish Boundary

Administrative County & Civil Parish Boundary

County Borough Boundary (England)

3dy.

County Burgh Boundary (Scotland)

Bdy

or Inactive Quarry, Chalk Pit or Clay Pit

Active Quarry, Chalk Pit or Clay Pit

Rock

Boulders

Slopes

Cliff

Top

Top

Top

Roofed Building

Glazed Roof Building

Top

Sloping Masonry

Archway

Non-Coniferous Tree (surveyed)

Coniferous Tree (surveyed)

Non-Coniferous Trees (not surveyed)

Coniferous Trees (not surveyed)

Orchard Tree

Scrub

Bracken

Coppice, Osier

Reeds

Marsh, Saltings

Rough Grassland

Heath

Culvert

Direction of water flow

BM Bench Mark

Antiquity (site of)

Cave Entrance

Triangulation Station

Electricity Pylon

Electricity Transmission Line

County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

Admin. County or County Bor. Boundary

L B Bdy

London Borough Boundary

Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge

Cliff

Top

Top

Rock

Rock (scattered)

Boulders

Boulders (scattered)

Positioned Boulder

Scree

Non-Coniferous Tree (surveyed)

Coniferous Tree (surveyed)

Non-Coniferous Trees (not surveyed)

Coniferous Trees (not surveyed)

Orchard Tree

Scrub

Bracken

Coppice, Osier

Reeds

Marsh, Saltings

Rough Grassland

Heath

Culvert

Direction of water flow

Triangulation Station

Antiquity (site of)

Electricity Transmission Line

Electricity Pylon

BH 238.60m Bench Mark

Buildings with Building Seed

Roofed Building

Glazed Roof Building

Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge

Lincolnshire

Yorkshire

Lincolnshire

Ordnance Survey Plan

Additional SIMs

Additional SIMs

Additional SIMs

Large-Scale National Grid Data

Large-Scale National Grid Data

Large-Scale National Grid Data

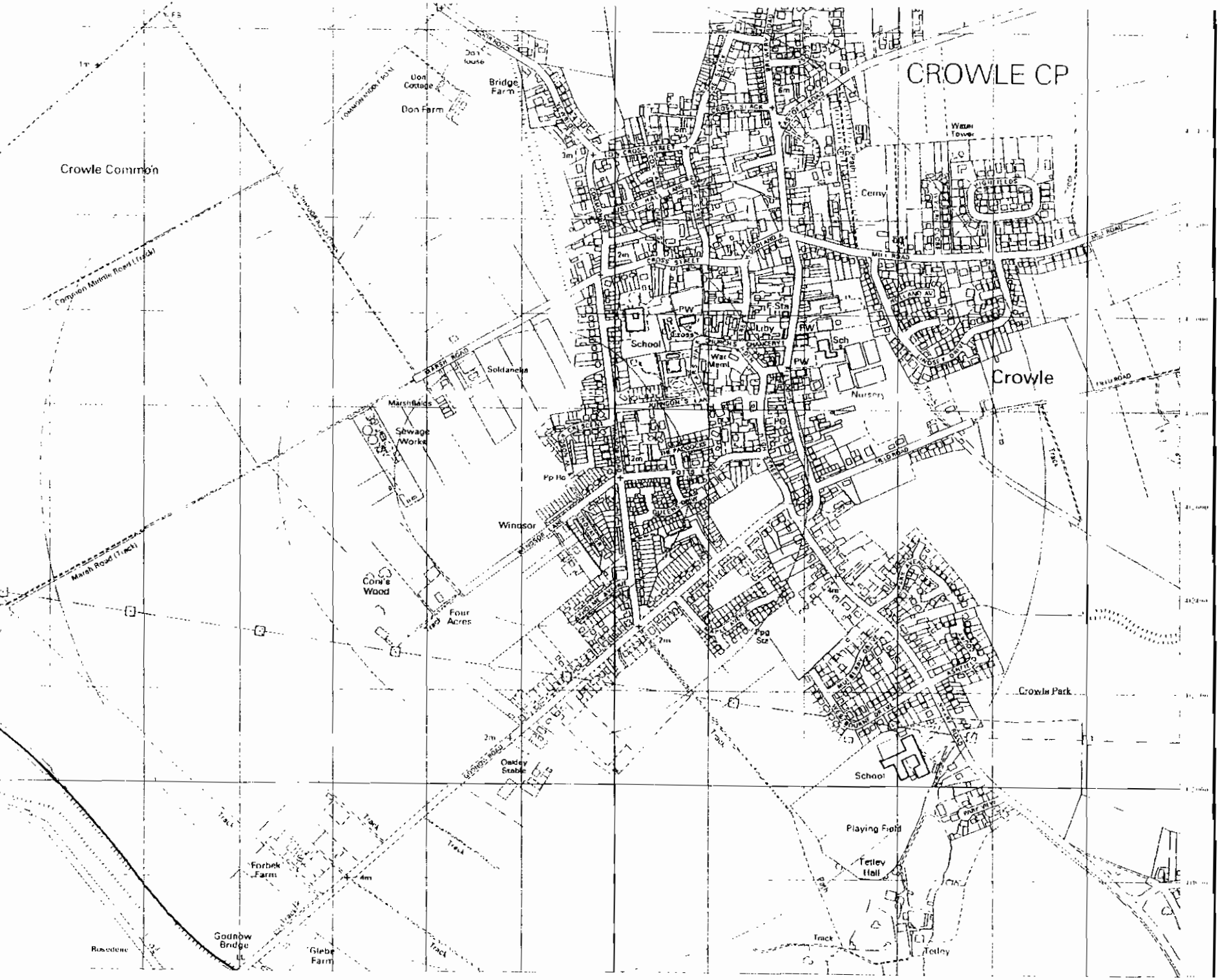
Historical Map - Segi

A13

Order Details

Order Number:	25
Customer Ref:	S7
National Grid Reference:	47
Slice:	A
Site Area (Ha):	0 8
Search Buffer (m):	10

Site Details



Source map scal

The historical maps shown were proc
1:10 000 colour raster mapping. Thes
replaced the old 1:10,000 maps origi
detailed showing buildings, fences a
tracks and paths. Road names are al
number and classification. Boundary
unitary authority, district, civil parish

Map Name(s) and D

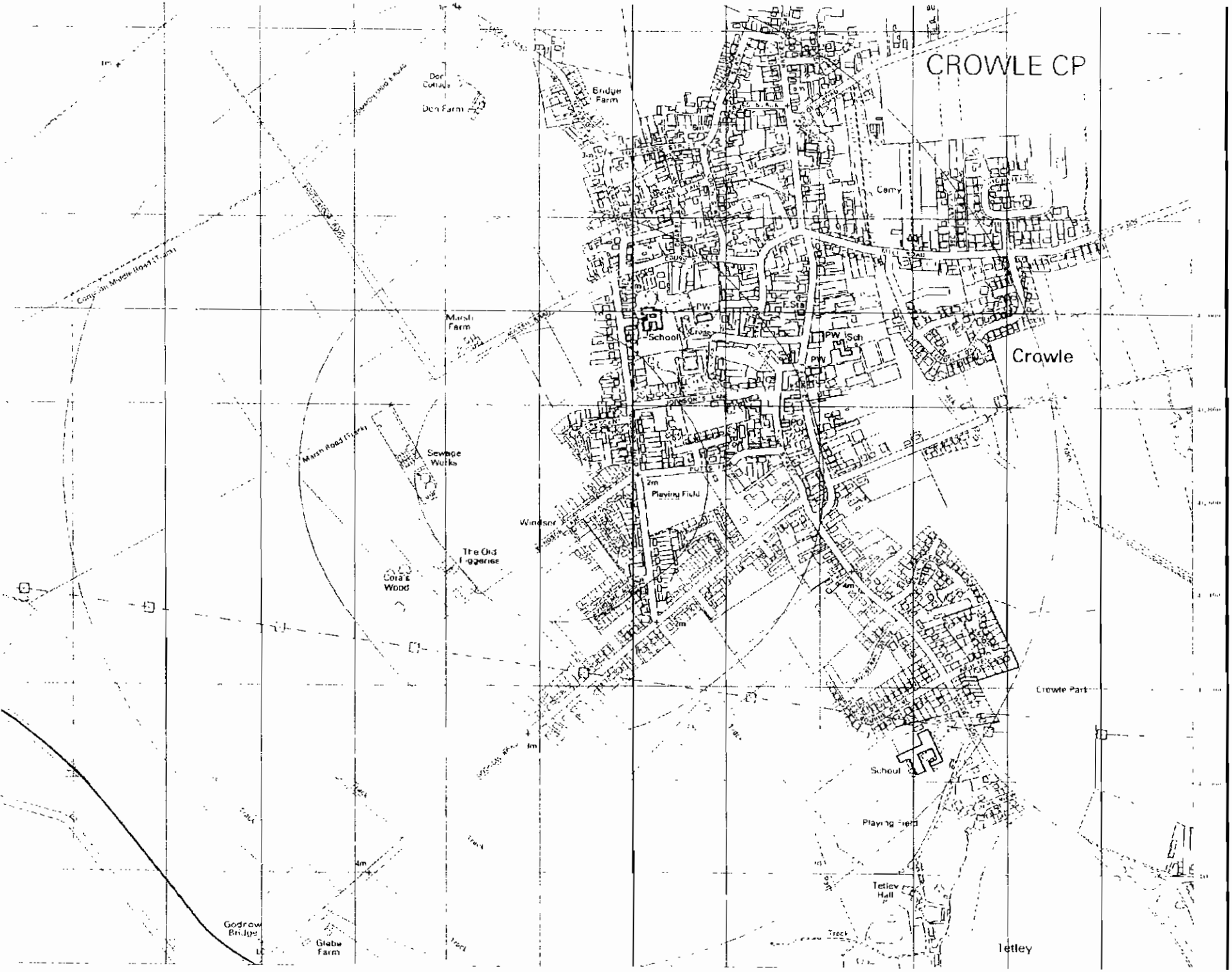
SE71SE
2008

Historical Map - Slic

Order Details

Order Number:	25
Customer Ref:	S7
National Grid Reference	47
Slice:	A
Site Area (Ha):	0 8
Search Buffer (m)	10

Site Details



Source map sca

The historical maps shown were p
1 10,000 colour raster mapping. Tl
replaced the old 1 10,000 maps or
detailed showing buildings fences
tracks and paths. Road names are
number and classification. Bounda
unitary authority district civil pans

Map Name(s) and

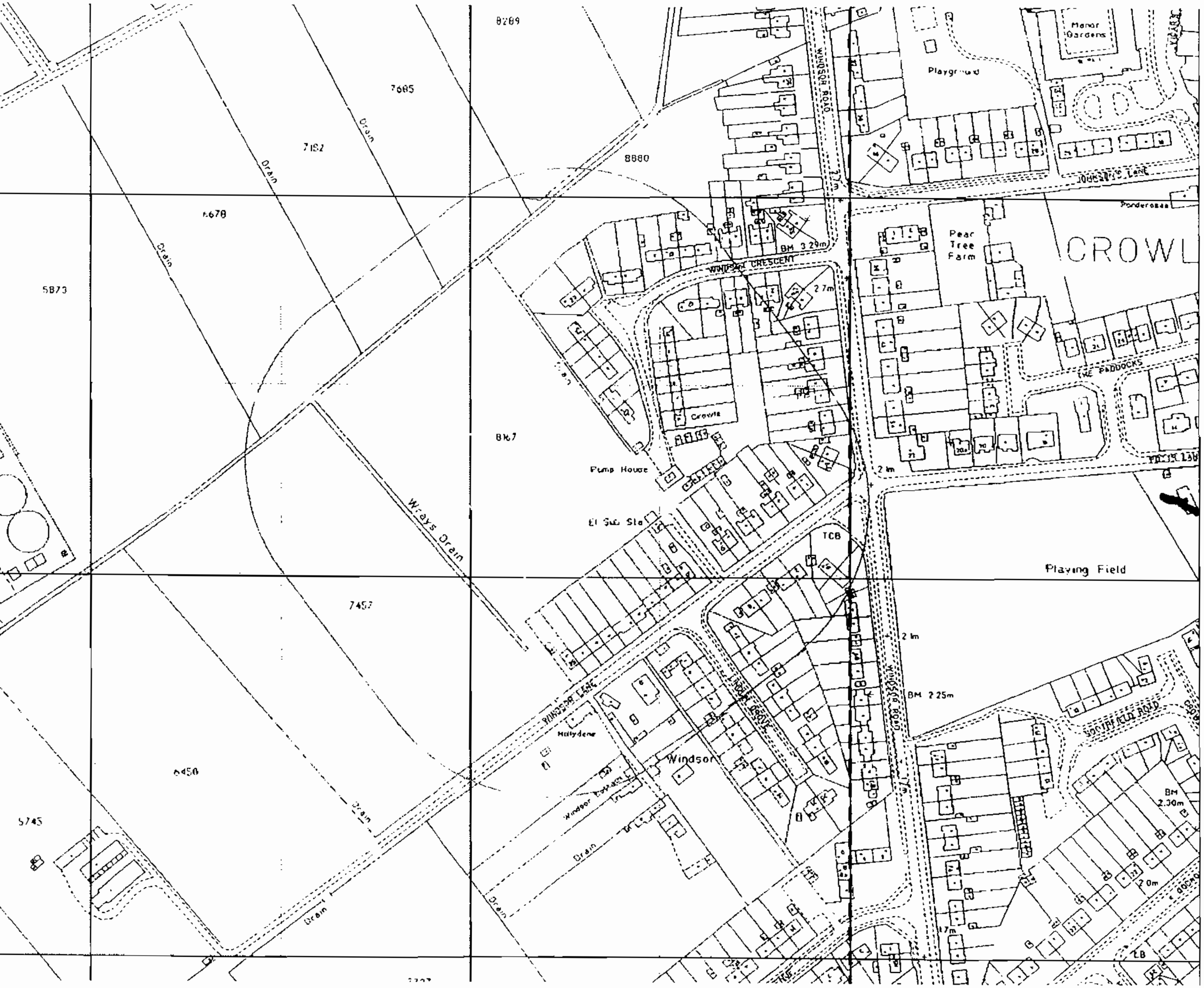
SE71SE
2000

Historical Map - SI

Order Details

Order Number:
Customer Ref
National Grid Reference
Slice.
Site Area (Ha)
Search Buffer (m):

Site Details



Source map scal

Large Scale National Grid Data su
Survey of Information on Microfilm'
until 1999. These maps were the lo
provide detailed information on hou
topographic features such as veget
1:2,500 and 1:1,250 scales

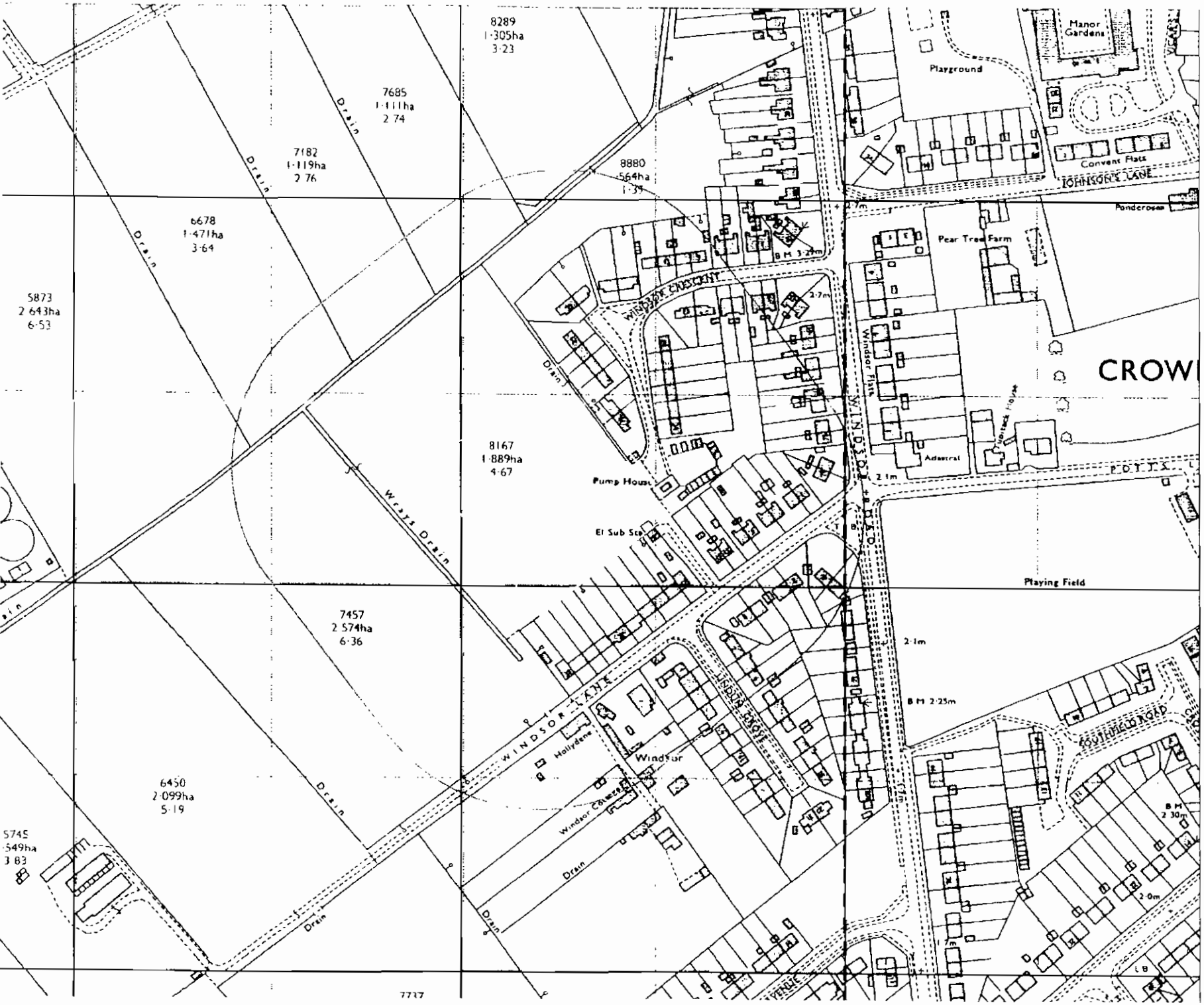
Map Name(s) and D

Historical Map - Seg

Order Details

Order Number: 2
Customer Ref: S
National Grid Reference: 4
Slice: A
Site Area (Ha): 0
Search Buffer (m): 1

Site Details



Source map scale -

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The published date given below is often
date Before 1938 all OS maps were b
independent surveys of a single county
significant inaccuracies in outlying area

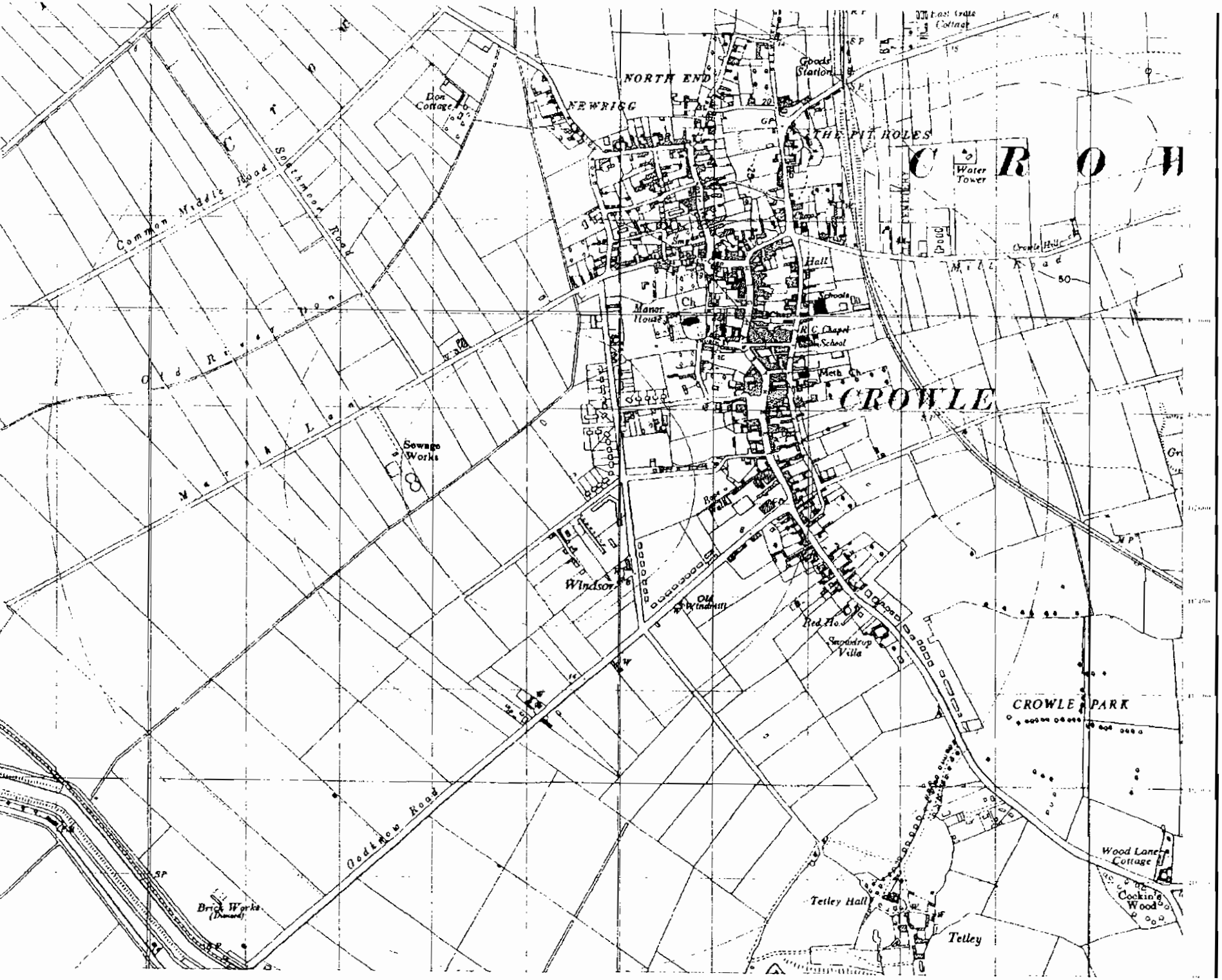
Map Name(s) and Date

Historical Map - Segm

Order Details

Order Number:	2529
Customer Ref	S706
National Grid Reference	4768
Slice	A
Site Area (Ha)	0 86
Search Buffer (m)	100

Site Details



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continued until recently, with new ec
urban areas

Map Name(s) and D

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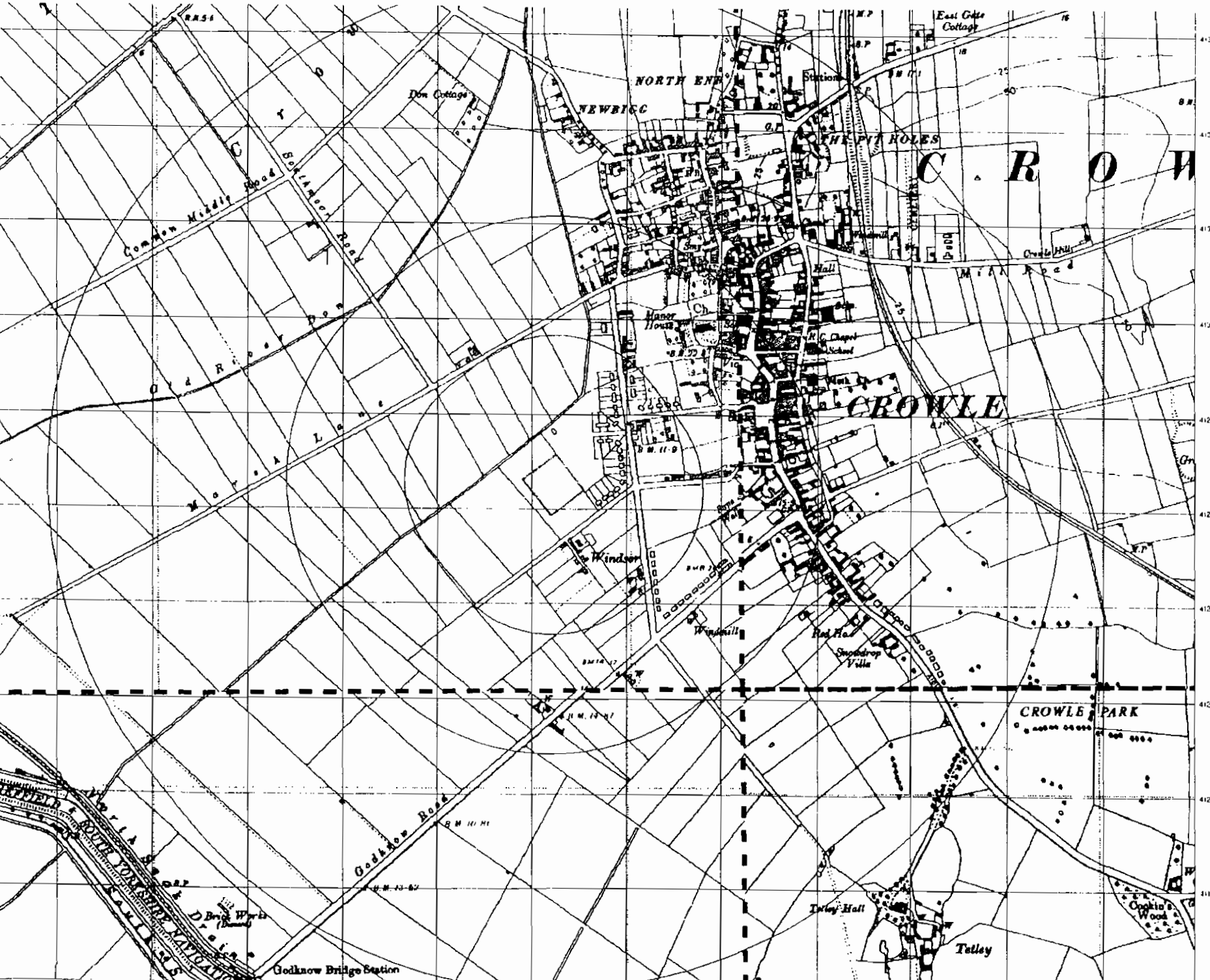
1956

Historical Map - Sli

Order Details

Order Number:	25
Customer Ref:	S
National Grid Reference	47
Slice:	A
Site Area (Ha):	0
Search Buffer (m):	1(

Site Details



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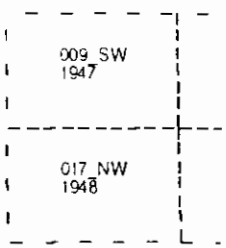
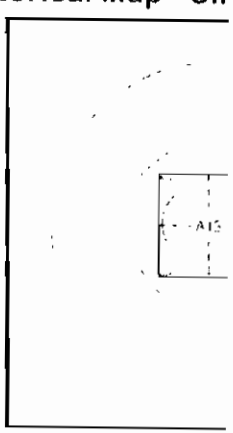


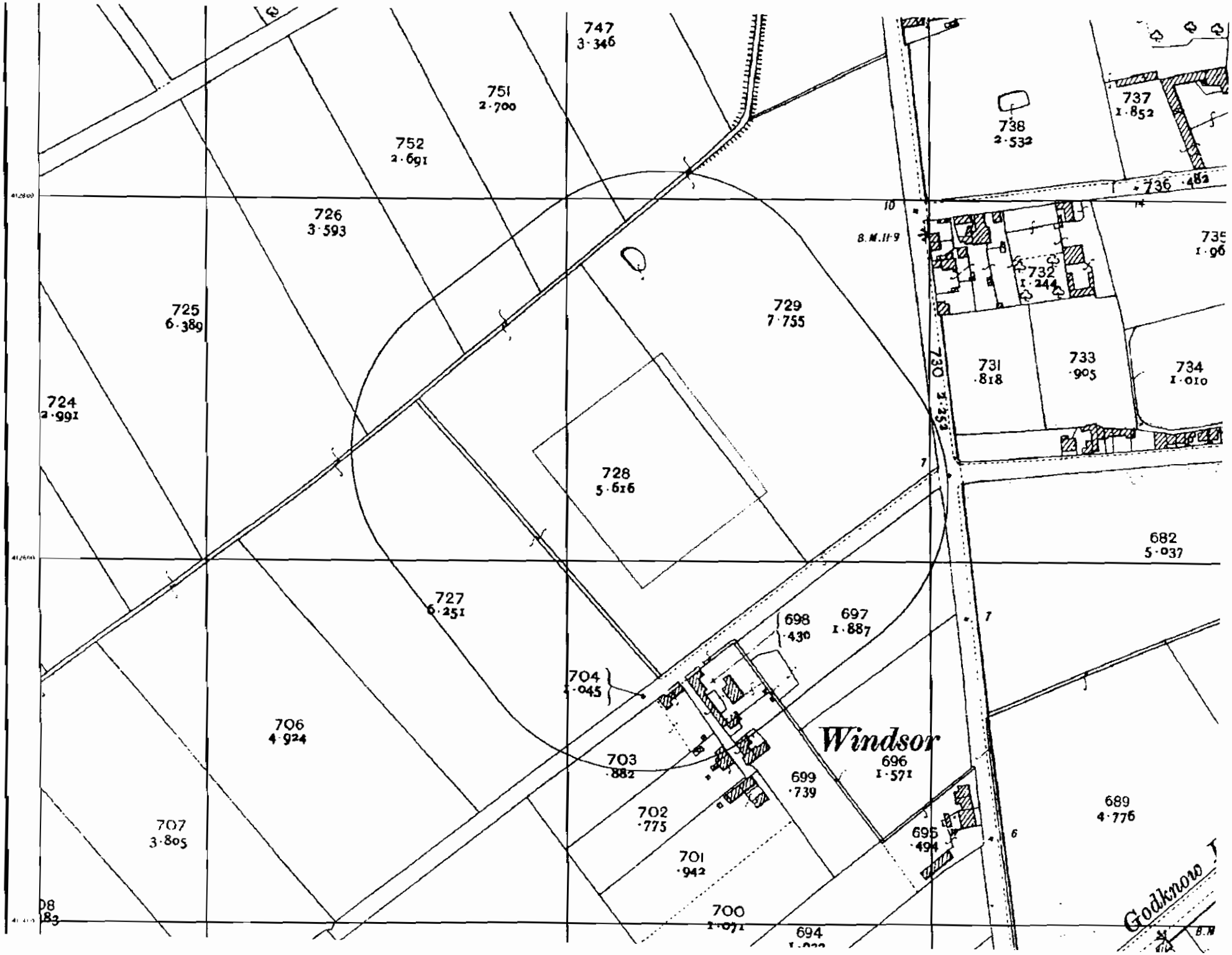
Historical Map - Sli



Order Details

Order Number:	2
Customer Ref:	S
National Grid Reference:	4
Slice:	A
Site Area (Ha):	0
Search Buffer (m):	1

Site Details


747
3·346
751
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752
2·691
738
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737
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736
726
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735
1·96
732
1·244
725
6·389
729
7·755
731
·818
733
·905
734
1·010
730
724
2·991
728
5·616
682
5·037
727
6·251
698
·430
697
1·887
704
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706
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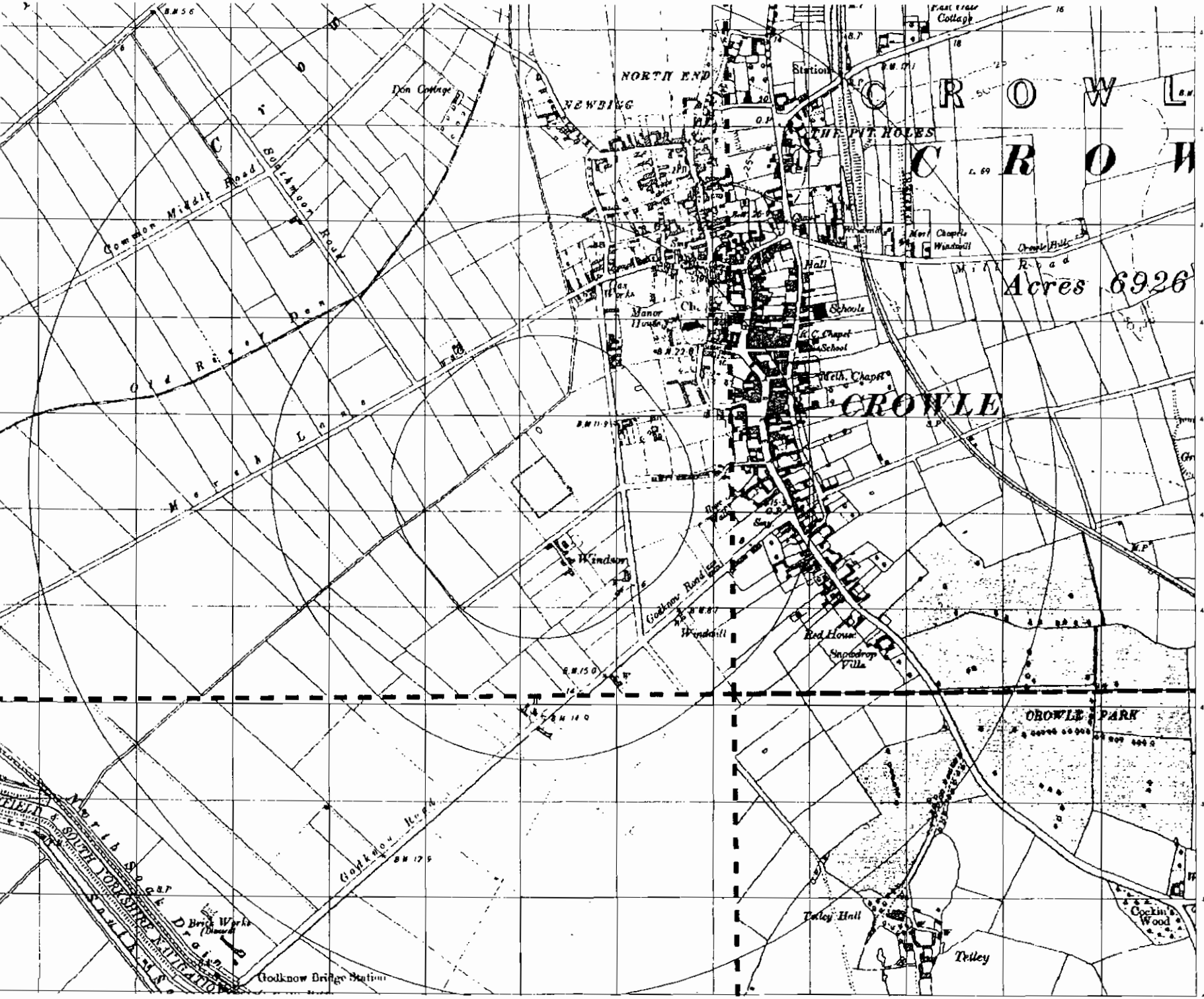

Source map scale

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urban areas.

Map Name(s) and Dat

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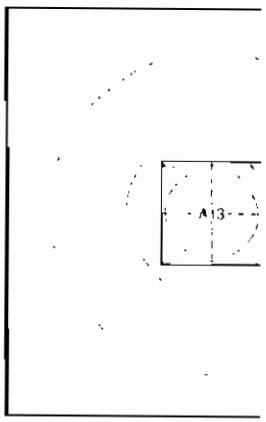
017_NW 1908	01 19

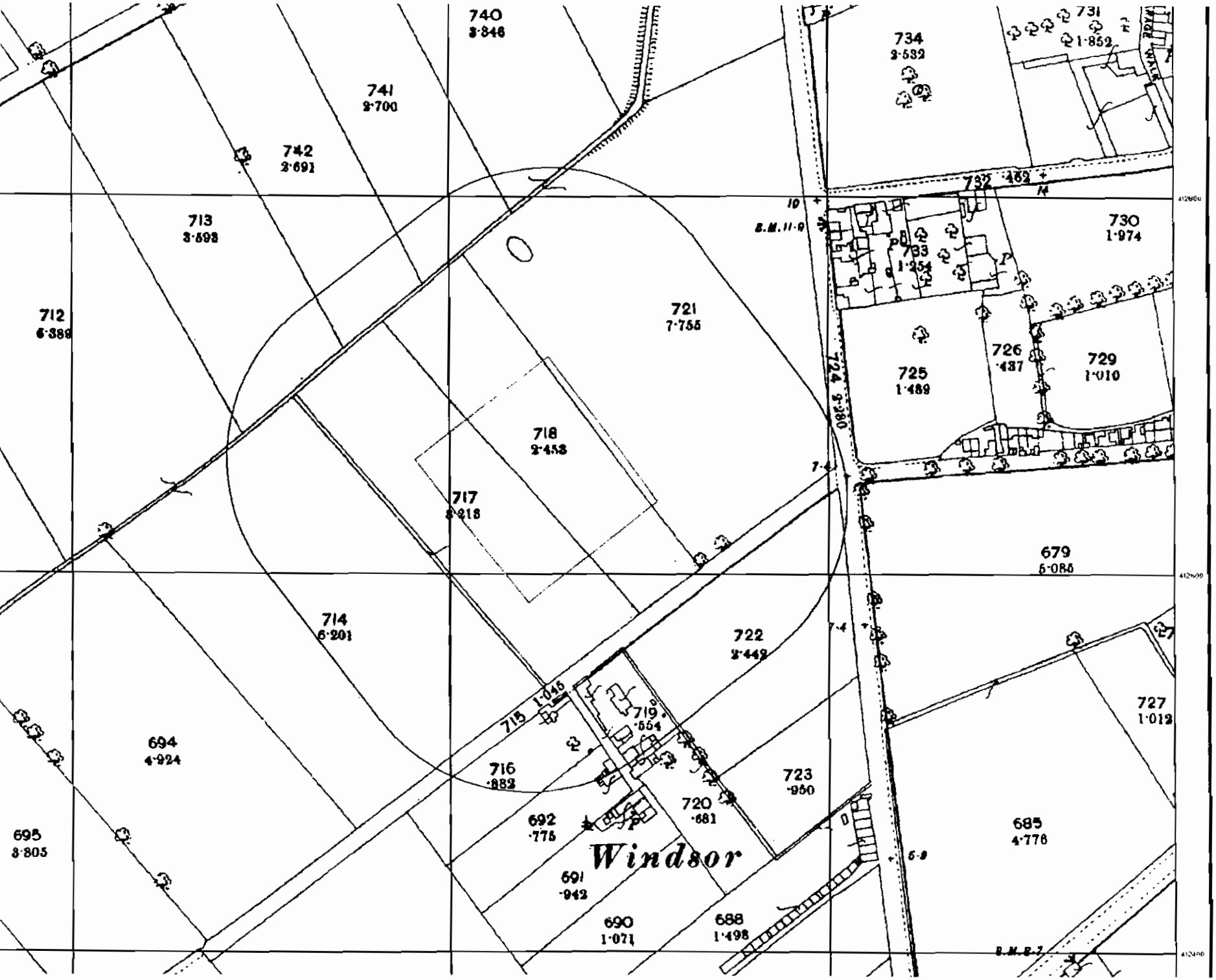
Historical Map - Slice



Order Details

Order Number:	2529
Customer Ref:	S706
National Grid Reference:	4768
Slice:	A
Site Area (Ha):	0.86
Search Buffer (m):	1000

Site Details



Source map scale

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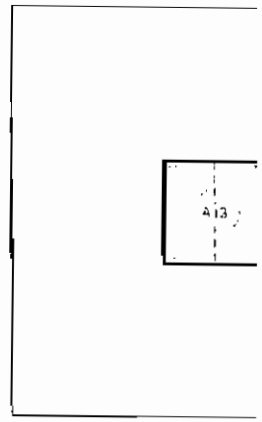
Map Name(s) and Dat

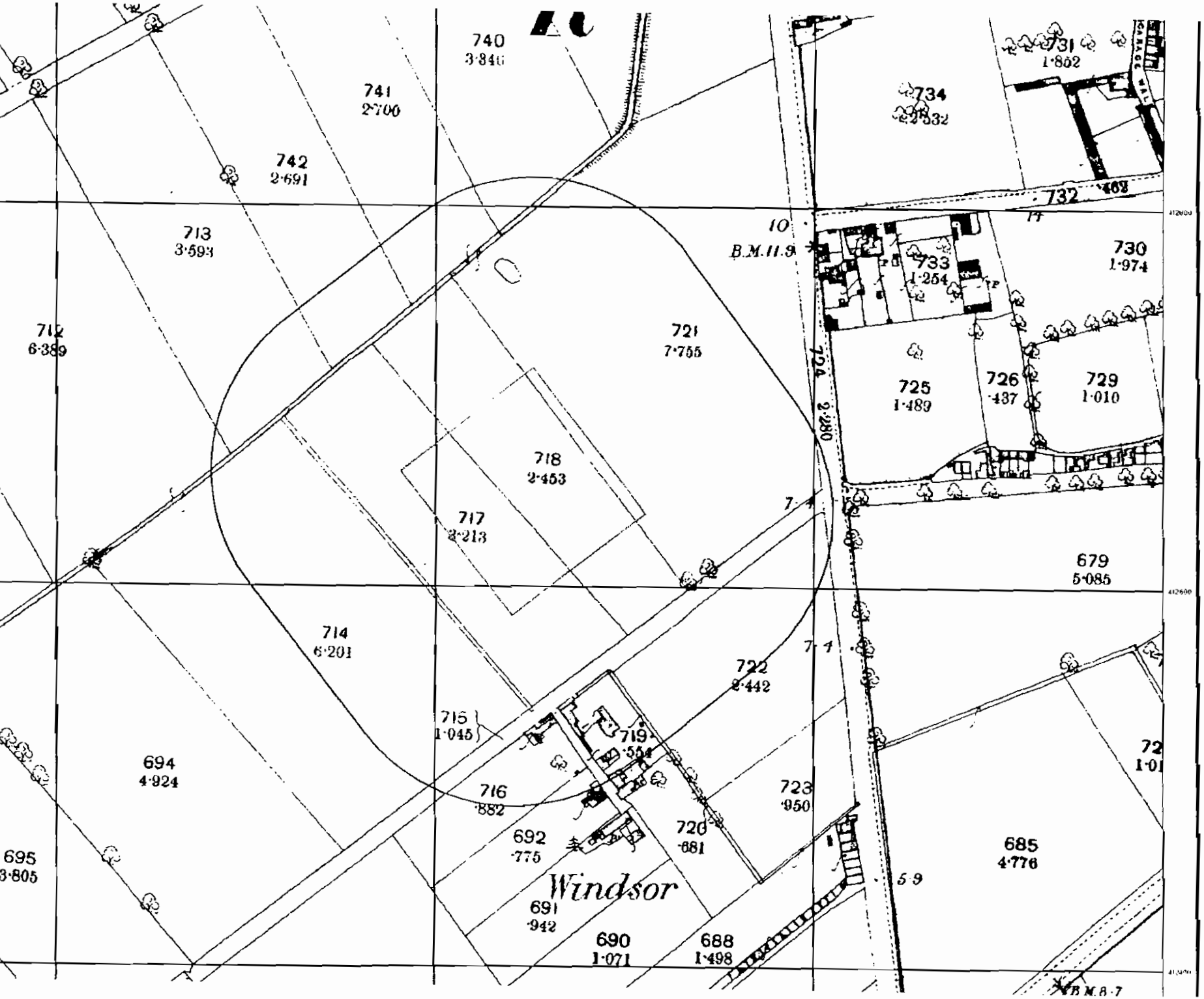
Historical Map - Segn



Order Details

Order Number:	252
Customer Ref:	S70
National Grid Reference:	476
Slice:	A
Site Area (Ha):	0.8
Search Buffer (m):	100

Site Details



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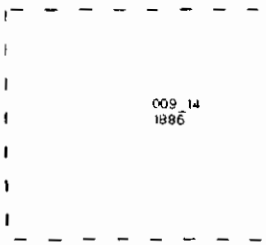
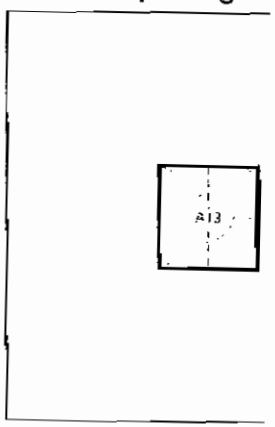
Map Name(s) and Date(



Historical Map - Segme



Order Details

Order Number:	2529
Customer Ref:	S706
National Grid Reference:	4768
Slice:	A
Site Area (Ha):	0.86
Search Buffer (m):	100

Site Details

Pit

Pits

Shingle

Orchard

Reeds

Marsh

Deciduous

Brushwood

Furze

Rough Pasture

Arrow denotes flow of water

Trigonometrical Station

Site of Antiquities

Bench Mark

Pump, Guide Post, Signal Post

Well, Spring, Boundary Post

Surface Level

Instrumental Contour

Fenced

Un-Fenced

Minor Roads

Fenced

Un-Fenced

Sunken Road

Raised Road

Road over Railway

Railway over River

Railway over Road

Level Crossing

Road over River or Canal

Road over Stream

Road over Stream

County Boundary (Geographical)

County & Civil Parish Boundary

or Quarry

Sand Pit

Disused Pit or Quarry

Refuse or Slag Heap

Lake, Loch or Pond

Dunes

Boulders

Coniferous Trees

Non-Coniferous Trees

Orchard

Scrub

Coppice

Bracken

Heath

Rough Grassland

Marsh

Reeds

Saltings

Building

Direction of Flow of Water

Shingle

Sand

Glasshouse

Pylon

Sloping Masonry

Electricity Transmission Line

Pole

Cutting

Embankment

Standard Gauge Multiple Track

Standard Gauge Single Track

Road Under

Road Over

Level Crossing

Foot Bridge

Siding, Tramway or Mineral Line

Narrow Gauge

Geographical County

Administrative County, County Borough or County of City

Municipal Borough, Urban or Rural District, Burgh or District Council

Borough, Burgh or County Constituency

Shown only when not coincident with other boundaries

Civil Parish

Shown alternately when coincidence of boundaries occurs

BP, BS Boundary Post or Stone

Pol Sta Police Station

or slag heap

Rock

Rock (scattered)

Boulders

Boulders (scattered)

Shingle

Mud

Sand

Sand

Sand Pit

Slopes

Top of cliff

General detail

Underground detail

Overhead detail

Narrow gauge railway

Multi-track railway

Single track railway

County boundary (England only)

Civil, parish or community boundary

District, Unitary, Metropolitan, London Borough boundary

Constituency boundary

Area of wooded vegetation

Non-coniferous trees

Non-coniferous trees (scattered)

Coniferous trees

Coniferous trees (scattered)

Positioned tree

Orchard

Coppice or Osiers

Rough Grassland

Heath

Scrub

Marsh, Salt Marsh or Reeds

Water feature

Flow arrows

Mean high water (springs)

Mean low water (springs)

Telephone line (where shown)

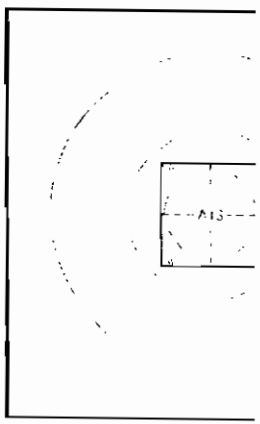
Electricity transmission line (with poles)

Bench mark

Triangulation

Yorkshire	
Lincolnshire	
Yorkshire	
Lincolnshire	
Yorkshire	
Yorkshire	
Lincolnshire	
Ordnance Survey Plan	
Ordnance Survey Plan	
Ordnance Survey Plan	
10K Raster Mapping	
10K Raster Mapping	

Historical Map - Slice



Order Details

Order Number:	252
Customer Ref:	S70
National Grid Reference:	476
Slice:	A
Site Area (Ha):	0.86
Search Buffer (m):	100

Site Details

APPENDIX 3

Coal Mining Search Report

Incorporating Cheshire Brine Enquiries

Serial Number 214426

Client detail :

Solmek
(Site Investigations) Ltd
12 Yarm Road
Stockton on Tees
Cleveland
TS18 3NA

CoalSearchPlus+ by David Bellis Consulting Surveyors
8 Mornington Terrace
Harrogate
North Yorkshire
HG1 5DH
(DX 720352 Harrogate)

Tel 01423 529911
Fax 01423 529922

Practice Principal M J Peace BSc PgDip FGS

Property details:

Windsor Crescent
Crowle
North Lincolnshire
DN17 4EQ

Your ref : Stephen Telford
Purchaser :
Vendor :

In accordance with your instructions received 28 Jun 2007 we have inspected plans and records of coal mine workings and have made enquiries with respect to Cheshire brine extraction in relation to the above property and can report as follows :

1. **SEAM DETAILS FOR PAST UNDERGROUND COAL MINING :** In relation to the property the undermentioned seam(s) have been worked within the likely zone of physical influence on the surface.

Seam	Depth (m)	Sect (cm)	Date	Remarks
See Remarks				No previous recorded coal workings.

2. **SEAM DETAILS FOR CURRENT AND FUTURE UNDERGROUND COAL MINING :** The undermentioned seam(s) are currently being worked, or licenses to work are being determined, or have been granted to work, within the likely zone of physical influence on the surface in relation to the property.

Seam	Depth (m)	Sect (cm)	Date	Remarks
				No future workings likely.

3. **UNDERLYING GEOLOGY :**

The property is situated in an area of Keuper Marls.
There are no faults or abnormal features relevant to the property.

4. **OPENCAST COAL MINING :**

Serial Number 214426

Past Opencast Workings : The property is not situated within the boundary of a former opencast coal mining site.

Present Opencast Workings : The property is not situated within 200m of the boundary of a currently operating opencast coal mining site.

Future Opencast Workings : The property is not situated within 800m of the boundary of an opencast site for which a license to extract coal by opencast methods has been granted or a license to do so is currently being determined.

5. SHAFTS, ADITS (MINE ENTRIES) AND ADDITIONAL INFORMATION :

We have no knowledge of any shafts or adits within 20 metres of the property or the boundary of the property.

There are no tips or lagoons in the vicinity of the property.

6. NOTICES IN RELATION TO FUTURE COAL MINING ACTIVITY :

We have no knowledge of any intention to work coal by underground methods , within influencing distance on the surface in the vicinity of the property, for which notices have been issued under the Coal Mining Subsidence Act 1991.

7. PAST COAL MINING RELATED SUBSIDENCE :

Our investigations have shown no evidence of coal mining related subsidence claims in relation to the property in the past 10 years.

8. CONCLUSION (COAL MINING) : In the light of the above facts we conclude that in relation to coal mining :

In our opinion it is unlikely that coal will be worked in the forseeable future.

COAL MINING RISK LEVEL : We recommend that the transaction is treated as :

If development of the site is intended then it would be wise in our opinion to undertake all necessary enquiries and investigations prior to the commencement of works.

Please note that the overall coal mining risk level above is based upon an assessment of the detailed information contained in the body of the report. The risk assessment must be used in conjunction with the detailed report.

CHESHIRE BRINE EXTRACTION INFORMATION :

The property lies outside the Cheshire Brine Compensation District as prescribed by the Cheshire Brine Pumping (Compensation for Subsidence) Act 1952.

Serial Number 214426

With respect to coal mining there is nothing to prevent a claim being made under the provisions of the Coal Mining Subsidence Act 1991 and subsequent legislation, but it must not be inferred that the Coal Authority or their licensees will necessarily accept that any damage has been caused as a result of mining subsidence.

If you require any further information or amplification please contact CoalSearchPlus+ on 01423 529911 or via our website www.coalsearch.plus.com.

Note:
This search report is based upon plans and records currently available from third party organisations and the CoalSearchPlus+ mining record database. Third party organisations reserve the right to vary their proposals and intentions as to their future mining operations without prior notice save as provided in the Coal Mining (subsidence) Act 1991 and the Coal Industry Act 1994.

This is a Coal Mining Search Report and is not to be interpreted as being part of an Environmental Assessment of the property.

We cannot be held responsible for the accuracy of the information provided to us by third party organisations.

The information and/or material supplied is composed from data based in many cases on measurements and records of various standards of reliability and age. We cannot be held responsible for the accuracy of such information.

This report is prepared in accordance with the CoalSearchPlus+ terms and conditions as published on the CoalSearchPlus+ website (www.coalsearch.plus.com) on the date of issue of this report.

Date : 04 Jul 2007 Signed : *M. J. Peace*

APPENDIX 4

Solmek/Hymas Geo
12 Yarm Road, Stockton on tees
TS 18 3NA

Tel 01642 607083
Fax 01642 612355

BOREHOLE LOG

Project				BOREHOLE No
Windsor Crescent, Crowle				BH1
Job No	Date	Ground Level (m)	Co-Ordinates ()	
S70637	03-07-07 03-07-07			
Contractor				Sheet
RJH Geo-Drilling Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.40	D					(0.40) 0.40	MADE GROUND: Sandy soil		
0.40-0.70	D		1				Medium dense dark brown SAND with slight clayey bands (Borehole backfilling with sand had to sample through it)		
0.70-1.00	D								
1.00-1.50 1.00	D SPT	16 blows				(2.05)			
1.50-2.00	D								
2.00	SPT	29 blows				2.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Water @ 0.50m. Pipe 2.00m

All dimensions in metres Scale 1:22.5	Client Billinghurst George	Method/ Plant Used	Logged By

GRD_BOREHOLE_LOG 670637.GPJ AGS3_ALL.GDT 12/07/07

Solmek/Hymas Geo
12 Yarm Road, Stockton on tees
TS 18 3NA

Tel 01642 607083
Fax 01642 612355

BOREHOLE LOG

Project				BOREHOLE No
Windsor Crescent, Crowle				BH2
Job No	Date	Ground Level (m)	Co-Ordinates ()	
S70637	03-07-07 03-07-07			
Contractor				Sheet
RJH Geo-Drilling Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.30	D					(0.40)	MADE GROUND: Sandy soil		
0.30-0.60	D		▼1			0.40	Medium dense becoming dense dark brown SAND (Borehole backfilling with sand had to sample through it)		
0.60-1.00	D								
1.00-1.50 1.00	D SPT	17 blows							
1.50-2.00	D					(3.05)			
2.00-2.50 2.00	D SPT	30 blows							
2.50-3.00	D								
3.00	SPT	36 blows							
						3.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Water @ 0.40m

All dimensions in metres Scale 1:22.5	Client Billinghurst George	Method/ Plant Used	Logged By

GRD_BOREHOLE_LOG S70637.GPJ AGS3_ALL.GDT 12/07/07

Solmek/Hymas Geo
12 Yarm Road, Stockton on tees
TS 18 3NA

Tel 01642 607083
Fax 01642 612355

BOREHOLE LOG

Project				BOREHOLE No
Windsor Crescent, Crowle				BH3
Job No	Date	Ground Level (m)	Co-Ordinates ()	
S70637	03-07-07 03-07-07			
Contractor				Sheet
RJH Geo-Drilling Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.25	D						MADE GROUND: Sandy soil		
0.25-0.50	D					(0.50)			
			▼1			0.50			
0.50-1.00	D						Medium dense dark brown SAND with slight clayey bands		
1.00-1.50 1.00	D SPT	10 blows							
1.50-2.00	D					(2.10)			
2.00-2.60 2.00	D SPT	22 blows							
						2.60			
2.60-3.00	D						Dense grey SAND (Borehole backfilling with sand had to sample through it)		
3.00	SPT	34 blows				(0.85)			
						3.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Water @ 0.50m. Pipe 3.00m

All dimensions in metres Scale 1:22.5	Client Billinghurst George	Method/ Plant Used	Logged By

GRD_BOREHOLE_LOG S70637.GPJ AGS3_ALL.GDT 12/07/07

Solmek/Hymas Geo
12 Yarm Road, Stockton on tees
TS 18 3NA

Tel 01642 607083
Fax 01642 612355

BOREHOLE LOG

Project				BOREHOLE No
Windsor Crescent, Crowle				BH4
Job No	Date	Ground Level (m)	Co-Ordinates ()	
S70637	03-07-07 03-07-07			
Contractor				Sheet
RJH Geo-Drilling Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.40	D					(0.40) 0.40	MADE GROUND: Sandy soil		
0.40-0.70	D						Medium dense becoming dense dark brown SAND with slight clayey bands (Borehole backfilling with sand had to sample through it)		
0.50-1.00	D								
1.00-1.50	D								
1.00	SPT	14 blows							
1.50-2.00	D								
						(3.05)			
2.00-2.50	D								
2.00	SPT	21 blows							
2.50-3.00	D								
3.00	SPT	37 blows							
						3.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Water @ 0.30m

All dimensions in metres Scale 1:22.5	Client Billinghurst George	Method/ Plant Used	Logged By

GRD_BOREHOLE_LOG S70637.GPJ AGS3_ALL.GDT 12/07/07

APPENDIX 5

chemtech environmental

ANALYTICAL TEST REPORT

for

Solmek

12 Yarm Road, Stockton

Cleveland, TS18 3NA

Contract name:	Windsor Crescent, Crowle, Lincs
Contract no:	SOLS/34752

Copies to:
Deryck Simpson

mCERTS

2531

Unit 25a - 25b, Number One Industrial Estate, Medomsley Road, Consett, Co. Durham DH8 6TJ
Tel: 01207 581260 Fax: 01207 581582 Email: info@chemtech-env.co.uk www.chemtech-env.co.uk

Vat Reg. No. 772 5703 18 Registered in England Number 4284013

Comments:

Determinations marked ! in this report are not included in the UKAS Accreditation schedule for the laboratory.

Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.

Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation.

All analysis was carried out using Chemtech Environmental Ltd methods unless otherwise agreed.

Methods, procedures and performance data are available on request.

Tests marked $ have been subcontracted.

The test results in this report relate only to the actual samples on which testing has been performed.

This report is confidential and is provided for use by the client and the use of their clients only.

Date submitted for analysis:	11 July 2007
Date tests started:	11 July 2007
Client reference:	S70637

Report Approval

Authorised by:	[redacted]
Name:	Karan Campbell
Position:	Director
Report date:	18 July 2007

SOILS

Solmek
12 Yarm Road
Stockton
Cleveland
TS18 3NA

	Lab Number	34752-1	34752-2
	Sample id	BH 1	BH 3
	Depth (m)	0.00-0.40	0.25-0.50
Determinands	***Units***		
Arsenic (total)	mg/kg As	7	8
Boron (water soluble)	mg/kg B	2.3	2.6
Cadmium (total)	mg/kg Cd	0.2	0.3
Chromium (total)	mg/kg Cr	8	10
Copper (total)	mg/kg Cu	13	17
Lead (total)	mg/kg Pb	25	33
Mercury (total) ‡	mg/kg Hg	<0.5	<0.5
Nickel (total)	mg/kg Ni	7	10
Selenium (total)	mg/kg Se	<0.3	<0.3
Zinc (total)	mg/kg Zn	38	58
pH	units pH	7.1	7.7
Sulphate (2:1 water soluble)	mg/l SO_4	<10	<10
Sulphide	mg/kg S^{2-}	28	67
Cyanide (total)	mg/kg CN	<2	<2
Phenols (total)	mg/kg PhOH	<0.5	<0.5
PAH (total) ‡	mg/kg	<5	<5
Asbestos $	-	NAF	NAF

LEACHATES

Solmek
12 Yarm Road
Stockton
Cleveland
TS18 3NA

	Lab Number	34752-1L	34752-2L
	Sample id	BH 1	BH 3
	Depth (m)	0.00-0.40	0.25-0.50
Determinands	***Units***		
Arsenic	mg/l As	0.003	0.005
Boron	mg/l B	<0.2	<0.2
Cadmium	mg/l Cd	<0.001	<0.001
Chromium	mg/l Cr	<0.003	<0.003
Copper	mg/l Cu	0.011	0.007
Lead	mg/l Pb	<0.009	<0.009
Mercury !	mg/l Hg	<0.001	<0.001
Nickel	mg/l Ni	<0.003	<0.003
Selenium	mg/l Se	<0.001	<0.001
Zinc	mg/l Zn	0.049	0.030
pH	units pH	6.0	6.6
Sulphate	mg/l SO_4	<10	10
Sulphide	mg/l S^{2-}	<0.1	<0.1
Cyanide (total)	mg/l CN	<0.02	<0.02
Phenols (total)	mg/l PhOH	<0.01	<0.01
PAH (total) !	mg/l	<0.0001	<0.0001

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TEST	:	GAS SURVEY
CONDITIONS	:	CLOUDY, GROUND - WET
ATMOSPHERIC PRESSURE	:	1018mb
REGIONAL TREND	:	RISING
CLIENT	:	SOUTH YORKSHIRE HOUSING ASSOCIATION
LOCATION	:	WINDSOR CRESENT, CROWLE, NORTH LINCOLNSHIRE
DATE	:	27/07/07
VISIT	:	1 OF 2
OPERATOR	:	RW
EQUIPMENT	:	LANDSURVEYOR II

RESULTS

Position	CH_4		CO_2		O_2 (%v/v)	VOC ppm	Flow Litres/hr	Groundwater level (mbgl)
	(%v/v)	GSV (l/hr)	(%v/v)	GSV (l/hr)				
BH1	ND	0.0	0.0	0.0000	20.5	*	ND	0.25
BH3	ND	0.0	0.2	0.0002	20.2	*	ND	0.40

KEY

CH_4 = Methane, **CO_2** = Carbon Dioxide, **O_2** = Oxygen, **GSV** = Gas Screening Value

ND = Not Detected, * = not measured, **N/A** = Not applicable, **%** = By volume, **mbgl** = m below ground level, **VOC** = Volatile Organic Compounds (measured using a PID metre)

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TEST	:	GAS SURVEY
CONDITIONS	:	SUNNY INTERVALS, GROUND - DAMP
ATMOSPHERIC PRESSURE	:	1005mb
REGIONAL TREND	:	FALLING
CLIENT	:	SOUTH YORKSHIRE HOUSING ASSOCIATION
LOCATION	:	WINDSOR CRESENT, CROWLE, NORTH LINCOLNSHIRE
DATE	:	02/08/07
VISIT	:	2 OF 2
OPERATOR	:	RW
EQUIPMENT	:	LANDSURVEYOR II

RESULTS

Position	CH_4		CO_2		O_2 (%v/v)	VOC ppm	Flow Litres/hr	Groundwater level (mbgl)
	(%v/v)	GSV (l/hr)	(%v/v)	GSV (l/hr)				
BH1	ND	0.0	0.1	0.0001	20.4	*	ND	0.31
BH3	ND	0.0	0.2	0.0002	20.0	*	ND	0.47

KEY

CH_4 = Methane, **CO_2** = Carbon Dioxide, **O_2** = Oxygen, **GSV** = Gas Screening Value

ND = Not Detected, * = not measured, **N/A** = Not applicable, **%** = By volume, **mbgl** = m below ground level, **VOC** = Volatile Organic Compounds (measured using a PID metre)

APPENDIX 6

Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2008)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek. Solmek is a trading name of Hymas Geoenvironmental Ltd.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2001 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 7% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.

CONTAMINATION GUIDELINES

A qualitative approach using the statutory definition of Contaminated land as defined within Section 78A (2) of Part 11A of the Environmental Protection Act has been adopted. This defines contaminated land as:

"Any land which appears to the local authority in whose area it is situated to be in such a condition by reason of substances in or on or under the land that "Significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled waters is being or is likely to be, caused" "

The concept of "significant harm" is dealt with via the Government guidance DETR Circular 02/2000 Contaminated Land: "*Implementation of Part IIA of the Environmental Protection Act 1990*". The statutory guidance uses the concept of pollutant linkages set out in Section 2.4 of the Circular. Before the local authority can make a judgment on whether "*significant harm*" and the significant possibility of harm is being caused they are required identify a "*significant pollution linkage*". This means effectively that three elements (a source of contamination, a relevant receptor and a pathway) must be present. Without identification of all three elements together, land should not be regarded as "*contaminated*" in the statutory sense. See Appendix 6 for additional notes on contamination guidelines.

The contamination testing results have been compared to a range of site specific threshold values devised in relation to the nature of the site and the proposed development. These thresholds are based on the CLEA Soil Guideline Values (SGV). Current soil guideline values are given in the DEFRA and Environment Agency's R&D Publications SGV 1, 3, 4, 5, 7, 9, and 10.

Contaminated Land Report 10 *"The Contaminated Land Exposure Assessment Model (CLEA): Technical basis and algorithms"* and the various SGV Reports describe residential land use as land on which a people live in a wide range of dwellings including for example detached, semi detached, terraced, converted and purpose built flats. The land use takes into account several different house designs including houses based on suspended floors and ground bearing slabs. It assumes that residents have access to private gardens and/or community open space close to the home. Two SGV are provided, calculated with and without a contribution from eating home grown vegetables. This represents the key difference in potential exposure to contamination between those living in a house with or without a private garden.

Pathways and Receptors

The receptors listed below are considered in CLR8 to be potentially at risk from contamination related to industrial land due to the pathways also described.

Humans

Human exposure to contaminants present in soils can occur via several pathways. Direct exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children). Other indirect pathways include human ingestion of plants grown in contaminated soil or contaminated ground or surface water. Contaminants associated with wind blown dust can affect humans on surrounding sites.

Water

The principal pathway by which the contaminants in the made ground may reach the water environment is through a slow seepage or leaching to either groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body.

Vegetation and the Ecosystem

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants may accumulate within the plant or be excreted naturally. Plants form a secondary pathway for contaminants if consumed by humans or animals.

Construction Materials

Materials at risk from possible soil contaminants include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and high levels of sulphates can accelerate the corrosion of building materials. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

Contamination Guidelines

There are various guidelines which relate to contamination of water, soils and gas in the UK.

The CLEA values provide the most recent and appropriate guidance on soil contamination that applies to the UK. These give soil guideline values (SGV) at which a risk to human health may exist and are primarily intended as a guide to site redevelopment. Values are given for different land uses; these include residential gardens and commercial areas where the risks are less.

CLEA SOIL GUIDELINE VALUES (mg/kg)											
DETERMINANT	SOURCE	RESIDENTIAL WITH PLANT UPTAKE			RESIDENTIAL WITHOUT PLANT UPTAKE	ALLOTMENTS			COMMERCIAL/ INDUSTRIAL
ARSENIC	SGV1	20			20	20			500
CADMIUM	SGV3	pH6	1		30	pH6	1		1400
		pH7	2			pH7	2		
		pH8	8			pH8	8		
CHROMIUM	SGV4	130			200	130			5000
LEAD	SGV10	450			450	450			750
MERCURY	SGV5	8			15	8			480
NICKEL	SGV7	50			75	50			5000
SELENIUM	SGV9	35			260	35			8000

These figures need to be compared with the modified average given in the Environment Agency document CLR7 "*Assessment of risks to human health from land contamination. An overview of the development of soil guideline values and related research*".

There are various guidelines employed for assessing water quality. There are some UK guidelines which are derived from EC Regulations. In addition, Dutch ground water quality thresholds are commonly referred to due to their ease of use and the stringent nature of the need for ground water quality control in a country which is low lying. Other information and guidelines used are taken from waste management and are termed leachate quality thresholds. However, some professional judgement and modelling may be required where the contamination is in close proximity to a sensitive receptor such as a lake, river or aquifer.

Requirements of Parties within the Development Process

Interested parties involved in the development process may use the data in different ways and there may be varying views and interpretation of the factual data. Local Authority staff may have a view on contamination and human health and the wider environment. The Environment Agency are concerned principally with the protection of surface and groundwater. Building Insurers, funders and purchasers may be primarily concerned with issues of potential commercial blight. Purchasers are also not always fully informed, and perceptions on issues associated with risk can affect the decision to purchase. Developers and construction organisations will focus on financial aspects of dealing with the contamination in the context of the development and construction programme.

Risks & Liabilities from Contamination

In simple terms, risks associated with contamination may be considered in terms of 1) statutory risks and 2) development related risks. If contamination is severe or forms a potential hazard based on its potential to affect groundwater, surface water or human health, a statutory risk may be present, and as such, if the risk is not reduced, criminal proceedings may be instigated by a government body or local authority.

If the contamination is less severe or not considered to be mobile, it may be considered a commercial liability which could, in theory remain untreated, but which may at a later date affect the value of the property, or, with changing legislation, become a statutory risk. Commercial liabilities could give rise to civil proceedings by third parties if the there are grounds for action.