

GROUND ENGINEERING



SITE INVESTIGATION REPORT

CRADGE BANK ROAD

SPALDING

LINCOLNSHIRE



Report-Reference No. C11252

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BRIAN HARDING CONSTRUCTION LIMITED

REPORT ON A SITE INVESTIGATION

AT

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December 2007

INTRODUCTION

Brian Harding Construction Limited, the client, intends to redevelop the site of a former works on the eastern side of Cradge Bank Road, Spalding, Lincolnshire. The proposed new development will include two detached dwellings, two semi-detached dwellings and five terrace houses with associated car parking and landscaped areas.

Ground Engineering was instructed by the client to carry out a site investigation comprising machine excavated trial pits and a desk study into the former uses of the site. The former was to determine if contamination was present within the underlying soils. No foundation recommendations were required within this report.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site is situated immediately south-east of Cradge Bank Road, 200m to the south-west of Little London Bridge and approximately 1.6km south-west of Spalding, Lincolnshire, in a mixed industrial and residential area. The site is centred at National Grid Reference TF 241 211 and the location is shown on the plan to the rear of this report.

The irregular shaped site is approximately 45m by 30m and fronts Cradge Bank Road along the north-western boundary. At the time of investigation the site comprised a bare soil surface, with occasional areas of limestone hardcore used as tracks for vehicles. The foundations of plot No. 7 had been cast in the south-western corner of the site and building materials were stored alongside the southern and north-eastern boundaries. A portable cabin was situated in the northern area of the site adjacent to Cradge Bank Road. The northern and southern boundaries were defined by 1.80m high close boarded fencing and the eastern boundary was undefined. Immediately east of the site residential houses were being constructed, which front River Bank. Located west and south-west was Jacksons Building Centre and north of the site was a gravel car park and a temporary caravan.

The site is at an approximate elevation of 5mOD, on ground that is generally level. The River Welland is located 40m south-east of the site, flowing northwards.

The 1992 geological map for the area at 1:50,000 scale, Sheet 144 'Spalding', shows the site to be covered by a superficial deposit of the Terrington Beds, comprising sandy silt, sand and clay. The superficial deposit is indicated to be underlain by the solid geology of the Oxford Clay Formation at depth. Previous investigations in this area by Ground Engineering determined that the Oxford Clay was overlain by gravels of Glacial origin and also Boulder Clay.

HISTORY OF THE SITE

Historical maps dating between 1889 and the undated Landmark map have been reviewed as part of this desk study. Selected map extracts are reproduced in Appendix 1 with relevant descriptions given below.

<i>Map Extract Studied</i>	<i>Description</i>
1889 Lincolnshire CXLII.1, CXLII.2, CXLII.5 & CXLII.6 Scale 1:2500 Figure A	The site is located immediately south-east of an unnamed road and approximately 35m west and north-west of the River Welland. The site is shown undeveloped within fields, with the northern part of the site within Parcel No. 1455. The south-western area appears to contain deciduous trees. Immediately beyond the southern boundary of the site a small outbuilding is shown. Houses are shown around the site, predominately north and south of London Road to the north. South and east of the site, embankments associated with the River Welland are depicted and a track is shown along the top of the embankment. East of the site 'Locks Mill (corn)' is located and 100m south-east 'Locks Bridge' crosses a tributary of the River Welland.
1906 Lincolnshire CXLII NW Scale 1:10,560 Figure B	The site appears unchanged since the previous edition. This map indicates the site is within Little London and approximately 100m north a Smithy is shown. West of the site two windmills, a school and a chapel are depicted and to the south-west there are two nurseries. Railway lines are shown approximately 500m north-east and north-west. Approximately 210m north-east of the site a bridge crosses the River Welland
1932 Lincolnshire CXLII NW Scale 1:10,560 Figure C	The site appears unchanged, although the northern area of the site appears to have been divided by a new boundary orientated north to south. Only one of the nurseries is depicted, the remaining nursery has been extended and now comprises three buildings. 'Locks Farm' has been extended and now contains several larger buildings. The bridge north-east of the site is now named 'Little London Bridge'.
1938 Lincolnshire CXLII NW Scale 1:10,560 Figure D	The site remains unchanged since the 1932 edition. North of the site, beyond the unnamed road a rectangular building has been constructed and south-west the nursery buildings have also been extended.
1950 Lincolnshire CXLII NW Scale 1:10,560 Figure E	The site is now shown with a square building in the northern area of the site. The former rectangular building north of the site is now shown as three smaller square buildings. A drain is shown north of the site.
1959 Sheet TF22SW Figure F	The site and surrounding area appear unchanged since the 1950 edition.

1968 & 1973 Sheets TF2321, TF2421, TF2320 & TF2424 Scale 1:2500 Figure G	A second building has now been constructed in the centre of the site, south of the original square building. The buildings are depicted as 'Works'. A small building is also shown in the south-eastern corner of the site. The road which defines the north-western boundary is now named Cradge Bank Road. The surrounding area has undergone industrial development. Adjacent to the western boundary a rectangular building is shown although it is not possible to determine its use. An oil store is shown 25m south of the site, adjacent to No. 14 River Bank. Approximately 30m south-west of the site a tank is depicted and further south-west a warehouse and works buildings are situated alongside the Welland Bank. Approximately 25m north-west a store is located within a Transport Depot. Welland Yacht Club is located alongside the River Welland 75m south-west of the site.
1981 Sheet TF2421 Scale 1:2500 Figure H	The site and surrounding area appears generally unchanged since the previous edition.
1993, 1988 & 1986 Sheet TF2321, TF2421, TF2320 & TF2420 Scale 1:2500 Figure I	Further development has been undertaken on site with a 5m by 6m building in the north-eastern corner, adjacent to the existing buildings. The larger of the two existing building has also been extended on the western elevation. The surrounding area appears generally unchanged, although a second tank is shown to the south-west of the site.
Aerial Photograph & Landmark Plan on page 4 of Landmark Report in Appendix 2.	The aerial photograph and location plan shows the site unchanged since the previous editions.

In summary the site was shown undeveloped as fields on the first available map dated 1889. A building was shown on the northern part of the site on the 1950 map although it is not possible to determine its use. By 1968 another building is shown immediately south of the existing building and both buildings are depicted as 'works'. Further development had occurred on the site by 1988, with an extension on the western elevation of the existing building and a small building in the north-eastern corner. The site appears unchanged on the Landmark Plan, although at the time of the site work the buildings on the site had been demolished and the site cleared.

COMMENTS ON ENVIRONMENTAL DATA

Appendix 2 contains information derived from Environmental Databases for a radius of up to 250m from the site. The information covers Sitecheck data sets held by the Landmark Information Group and contributors include the Environment Agency, British Geological Survey, Ordnance Survey and the Coal Authority.

The results obtained are presented in summary form together with a detailed search on selected areas of inquiry, within 250m of the site, based on the summary details. The following is a brief summary of the main points:

Current Land Use

Landfill and Waste

Waste/Landfill Sites: There are no (0) recorded current or former landfills and no (0) Registered Waste Treatment or Disposal Sites to treat, transfer or dispose of controlled waste, licensed by the Environment Agency under Part II of the Environmental Protection Act 1990 on the site, or within 250m of the site.

Statutory Authorisations

Local Authority Pollution Prevention and Controls: There are no (0) recorded sites, authorised by the Environment Agency under Part I of the Environmental Protection Act 1990, to be subject to air pollution controls located on the site. However there are three (3) within 250m of the site, two located to the north-east relate to Little London Service Station and Malthurst Petroleum Ltd, Fuel and Power Industry Sector. One is located south-west alongside Cradge Bank Road and relates to Lafarge Redland Readymix Ltd, Mineral Industry Sector.

Contaminated Land Register Entries & Notices: There are no (0) recorded entries or notices in the Contaminated Land Register on, or within 250m of the site.

Registered Radioactive Substances: There are no (0) recorded sites registered by the Environment Agency under the Radioactive Substances Act 1993, to keep or use radioactive materials on, or within 250m of the site.

Discharge Consents

Discharges Consents: There are no (0) recorded consents issued by the Environment Agency, to discharge to watercourses in accordance with the Water Resources Act 1991 on site, although there are four (4) discharge consents located within 250m of the site. Two are situated west of the site, alongside Cradge Bank Road and relate to Redland Readymix Ltd and Lafarge Redland Aggregates Ltd, Trade Discharge. The other discharge consents are located south associated with Welland Yacht Club, Unknown Discharge and east associated with G. R. Hastings, at Locksmill House, Sewage Discharge.

Industrial Processes

IPC Regulations: There are no (0) recorded sites, authorised by the Environment Agency under Part I of the Environmental Protection Act 1990, to carry out processes subject to Integrated Pollution Control (IPC) and there are no (0) Integrated Pollution Prevention and Control (IPPC) on, or within 250m of the site.

Storage of Hazardous Substances

Control of Major Accident Hazard Sites: There are no (0) recorded sites, regulated by the Health and Safety Executive under the Control of Major Accident Hazards (COMAH) regulations 1999 on, or within 250m of the site.

Explosive Sites: There are no (0) recorded explosive sites on, or within 250m of the site.

Notification of Installations Handling Hazardous Substances: There are no (0) recorded sites, regulated by the Health and Safety Executive for storing specific dangerous substances under the NIHHS regulations 1982 on, within 250m of the site.

Planning Hazardous Substance Consents: There are no (0) recorded sites subject to hazardous substances consents granted by the relevant local authority under the Planning (Hazardous Substances) Act 1990 on, or within 250m of the site.

Contraventions

Local Authority Pollution Prevention and Control Enforcements: There are no (0) recorded enforcements by the Environment Agency under Part I of the Environmental Protection Act 1990 on, or within 250m of the site.

Enforcement and Prohibition Notices: There are no (0) recorded enforcements and prohibition notices issued by the Environment Agency under Part I of the Environmental Protection Act 1990 on, or within 250m of the site.

Planning Hazardous Substance Enforcements: There are no (0) recorded planning hazardous substance enforcements issued by the Environment Agency under Part I of the Environmental Protection Act 1990 on, or within 250m of the site.

Prosecutions: There are no (0) recorded prosecutions by the Environment Agency under Part I of the Environmental Protection Act 1990 relating to either authorised processes or controlled waters on, or within 250m of the site.

Pollution Incidents to Controlled Water: There are no (0) recorded incidents on, or within 250m of the site.

Potentially Contaminative Uses

Contemporary: There are no (0) recorded contemporary trade entry listed for the site address, however there are eight (8) listed within 250m of the site which comprise Garage Services, Pet Foods and Animal Feeds, Concrete and Mortar Ready Mixed, Valve Manufacturers and Suppliers, Petrol Filling Stations and Asphalt and Coated Macadam Laying Contractors.

Fuel Station Entries: There are no (0) recorded fuel station sites on the site, however there is a fuel station within 250m of the site to the north-east along London Road.

Miscellaneous

Mineral Sites: There are no (0) recorded mineral sites on the British Geological Survey database on, or within 250m of the site.

Historical Land Use

A summary of the main points for the historical land use is presented below.

Potentially Contaminative Uses

Historical Tanks and Energy Facilities: There are no (0) recorded historical tanks and energy facility listed for the site address. However, there are five (5) listed within 250m of the site which comprise oil industry facilities to the south, tanks to the south-west, electrical sub station facilities to the north-east and south-west and potential tanks to the north-east.

Past Land Use: There are no (0) recorded historical potentially contaminative uses listed on the site. However, there are three (3) within 250m of the site, these are related to road haulage to the north-west, factory or works to the south-west and sewage to the north-west.

Potentially Infilled Land

Former Marshes: There are no (0) recorded former marshes on, or within 250m of the site.

Potentially Infilled Land: There are no (0) areas of potentially infilled land (non-water) on, or within 250m of the site. There are no (0) areas of potentially infilled land (water) on site, however there are two within 250m of the site located north of the site, on the northern side of London Road, associated with infilled drains. The drain north of the site has not been recognised.

Site Sensitivity

A summary of the main points for the sensitivity of the site is presented below.

Pathways

Groundwater Vulnerability: The site is designated as being underlain by a non-aquifer, negligibly permeable.

Drift Deposits: The site is surprisingly not recorded as not being covered by any drift deposits.

Flood Risk: The site is recorded as being at risk from flooding and extreme flooding from rivers or seas without defences. The site does not benefit from flood defences, although a flood water storage area is located south-east of the site.

Environmentally Sensitive Receptors

Surface Water Abstractions: There no (0) surface water abstractions on the site, or within 250m of the site.

Surface Water Features: There are no (0) surface water features on the site. The nearest water feature is the River Welland located 40m east.

National Nature Reserves & Sites of Special Scientific Interest: There are no (0) National Nature Reserves and Sites of Special Scientific Interest within 250m of the site

Source Protection Zones: There are no (0) Source Protection Zones on or within 250m of the site.

Other Factors

Brine Compensation Areas: The site is not within a Brine Compensation Area.

Coal Mining Affected Areas: The site is in an area which may not be affected by mining.

Radon Affected Areas: The site lies within an area where less than 1% of homes are above the BRE action level for radon.

Radon Protection Measures: The site lies within an area where no radon protection measures are necessary in accordance with building regulations BR211.

Ground Stability Hazards: According to the British Geological Survey the on-site risk due to Collapsible Ground, Ground Dissolution and Shallow Mining Hazards are all recorded as 'No Hazard' on site. The ground stability risk associated with Landslide is assessed as 'Very Low' and Shrinking or Swelling Clay is assessed as 'Low'. The risk associated with Running Sand Ground and Compressible Ground is recorded as 'Moderate'.

Summary of Database Searches

There are no recorded or current landfills within 250m of the site and the site is not recorded on the contaminated land register. There are no recorded discharges to water consents on the site, although there are four within 250m of the site. No areas of potentially infilled (water and non-water) land or former marshes are shown on site, although the drain north of the site has not been recognised. There are no potentially contaminative uses on site, although eight contemporary trade directory entries were listed within 250m of the site. There are no historical potentially contaminative industrial uses on the site despite the historical maps indicating 'works buildings'. Oil Industry Facilities are identified 25m south of the site. The nearest surface water feature is the River Welland, located 40m east.

The site is underlain by a non-aquifer, is at risk from flooding and extreme flooding, although a flood water storage area is located south-east of the site. The on-site risk due to running sand ground and compressible ground stability hazard is assessed as 'Moderate'.

SITE WORK

The site work was undertaken on 22nd October 2007 and comprised seven machine excavated trial pits (TP1 to TP7). The investigative locations are shown on the Exploratory Hole Location Plan, presented at the rear of the report.

Prior to excavation, a service scan was made using a CAT (Cable Avoidance Tool) to check for the absence of detectable buried services that may otherwise have been damaged by the investigation.

Trial Pits

Trial pits TP1 to TP7 were excavated using a tracked 3 tonne mini-excavator to depths of between 1.10m and 2.00m below ground level (bgl). The exposed strata were sampled and recorded by a Geoenvironmental Engineer. Standpipes were installed in the corner of trial pits TP2 and TP5, comprising plain standpipe from surface to 1m depth and slotted to the base of the trial pit at 2m depth, with a bung and gas tap installed in the top of the pipe. The trial pits were backfilled with arisings upon completion.

Representative small disturbed samples of soil were taken at regular intervals throughout the depth of each trial pit. Samples of shallow soil were sealed within suitable polycarbonate pots and amber glass jars pending contamination testing.

The exploratory hole records have been produced in accordance with British Standard BS 5930:1999 'Code of Practice for Site Investigations', and are and are presented at the rear of the report. The records provide the descriptions and depths of the various strata encountered, details of all samples taken, standpipe installation, and the groundwater conditions observed during excavation and on completion.

Site Monitoring

One return visit to site was conducted on 2nd November 2007 to monitor soil gas concentrations and to measure the depth to groundwater in the installations. The results are presented following the trial pit records.

LABORATORY TESTING

The recovered samples were inspected and described in accordance with BS5930:1999 and assessments of the soil characteristics have been taken into account during preparation of the exploratory hole records.

Chemical analysis on five soil samples and one water sample recovered from the exploratory holes was undertaken by the Chemtest division of Xplor Limited, primarily for characterisation purposes.

The following suite of tests encompasses a wide range of potential contaminants outlined by CLR 8 which is included within the CLEA series of contaminated land reports, by the Department for Environment, Food and Rural Affairs, DEFRA, and the Environment Agency, EA. The results of chemical results for the samples tested are presented at the rear of the report.

Inorganic Testing

Inorganic tests were conducted on selected samples to determine the following suite of potential contaminants. Total arsenic, total cadmium, total chromium, total lead, total mercury, total selenium, water soluble boron, total copper, total nickel, total zinc, total cyanides, free cyanides, total sulphate, sulphides and pH-value.

Organic Testing

Organic tests were conducted on selected samples to determine the concentration of phenols and polyaromatic hydrocarbons (PAH). The soil organic matter (SOM) of the samples was also determined.

GROUND CONDITIONS

The ground conditions encountered comprised made ground, overlying superficial Terrington Beds which was encountered to at least the base of all the trial pits.

Made Ground

The made ground encountered varied in depth from 0.45m to 0.65m. Limestone gravel (hardcore) was encountered from the surface to 0.15m depth within TP1 and from 0.15m to 0.25m below ground level within TP5. Yellow brown and orange brown gravelly sand was encountered from surface in TP2, TP3 and TP7 to a depth of between 0.20m and 0.40m below ground level. Beneath the surface made ground and from the surface in TP4, TP5 and TP6, the made ground encountered comprised firm, brown and dark brown slightly gravelly, slightly sandy silt.

The gravel fraction comprised brick, concrete, tile, limestone, quartzite, tile, ash and wood. Occasional brick and concrete cobbles were encountered from surface to 0.15m below ground level within TP5 and rare brick cobbles encountered from 0.20m to 0.50m below ground level within TP7.

Terrington Beds

Beneath the made ground in TP1 and TP5 a firm, dark brown slightly sandy silt was encountered to 0.75m and 1.10m below ground level respectively. Beneath the initial slightly sandy silt within TP5 a band of firm, very dark brown, slightly clayey amorphous peat was encountered to a depth of 1.20m depth. Beneath the made ground in TP2 a soft, grey and blue grey slightly sandy, organic silt was encountered to a depth of 1.30m below ground level.

At a depth of between 0.50m and 1.30m below ground level firm grey and orange brown mottled, slightly sandy silt with occasional clay partings and black carbonaceous mottling was encountered to the base of all the trial pits, except TP6. Within TP6 a firm orange brown

and brown mottled slightly sandy clay was met at 1.00m below ground level to the completion depth of 1.30m below ground level.

Groundwater

Groundwater was encountered within all the trial pits at a depth of between 1.10m and 1.50m below ground level. Within the base of TP3, TP4, TP6, and TP7 water seepages were observed. Upon completion of TP1 and TP5 the water had rose from 1.20m to 1.10m below ground level. Groundwater was met in TP2 at 1.50m and risen to 1.40m depth upon completion. Within the gas and water monitoring installations on the 2nd November 2007, groundwater was standing at 0.83m below ground level in TP2 and 0.90m below ground level in TP5.

Evidence of Contamination

Based on inspection the made ground contained brick, ash, tile and concrete fragments. Olfactory evidence of hydrocarbon contamination was not detected within the soils beneath this site.

COMMENTS ON THE CHEMICAL TEST RESULTS

The results of the laboratory chemical testing from the initial phase of investigation have been compared to CLEA Soil Guideline Values (SGV), Generic Assessment Criteria (GAC) and Atkins Soil Screening Values (ASSV), which have been used as screening tools for use in the assessment of land affected by contamination. The hierarchy used by Ground Engineering for selecting Tier 1 screening values is SGV; GAC and ATRISKSOIL values.

CLEA Series Soil Guideline Values (SGV)

Toxicological data and Soil Guideline Values for arsenic, cadmium, chromium, lead, mercury, selenium, nickel, phenol, ethylbenzene and toluene have been provided in the CLEA series of contaminated land reports, by the Department for Environment, Food and Rural Affairs, DEFRA, and the Environment Agency, EA, March 2002 to November 2005. The respective Soil Guideline Values have been published in reports SGV1, SGV3 to SGV5, SGV7 to SGV10, SGV15 and SGV16 and have been derived according to standard land-uses and individual SGVs determined using CLR 7-10 *The Contaminated Land Exposure Assessment (CLEA) Model: Technical Basis and Algorithms*.

Generic Assessment Criteria (GAC)

To improve the shortfall in generic guideline values the Chartered Institute of Environmental Health (CIEH) and Land Quality Management of Nottingham Trent University have recently published (November 2006) GAC (which have been derived using the CLEA UK beta software) but using the same assumptions and parameters as used by DEFRA and the EA to derive the SGV, and incorporating the three EA Briefing Notes dealing with revisions to CLR10.

ATRISKSOIL Series Soil Screening Values (ASSV)

ATRISKSOIL is a database compiled by Atkins Limited, which provides Soil Screening Values (UK applicable), under licence to Ground Engineering, for common contaminants not currently covered by Soil Guideline Values. The Atkins Soil Screening Values for clarity have been referenced as ASSVs within the text of this report. The conceptual model, adopted by Atkins Limited, for the specified land uses is understood to be equally or more conservative than those incorporated in the CLEA model. The risk assessment tool is BP RISC 4.0 and the resulting ASSVs are recommended to be used as relatively conservative screening values. Respective toxicology reports and technical details on the derivation of the ASSVs can be provided on request.

Assessment Summary

The following standard land uses form the basis of the assessment:

- Residential usage with plant uptake, representative of most sensitive land usage such as private rear gardens.
- Residential usage without plant uptake representative of communal garden or landscaped areas.
- Commercial and industrial usage representative of buildings and areas covered by hardstanding.

The intended purpose of the SGV, GAC and ASSV is as “intervention values” in the regulatory framework for assessment of human health risks in relation to land use. These values are not binding standards, but are intended to inform judgements about the need for action to ensure that a new use of land does not pose any unacceptable risks to the health of the intended users.

In summary Tables 1, 2 and 3 compare the test results with the SGVs, GAC and ASSVs in relation to the specified usage. The fraction of test results, which exceed these values, are also provided.

Table 1: Residential With Plant Uptake
Comparison of Chemical Test Results with SGVs, GAC and ASSV

Determinand	Minimum Value Detected mg/kg	Maximum Value Detected mg/kg	Assessment Method	Standard Residential usage with plant uptake mg/kg			Fraction of samples exceeding SGV, GAC and ASSV		
Arsenic	7.8	29	SGV	20			1/5		
Cadmium	<0.1	0.29	SGV	1 pH6	2 pH7	8 pH8	0/5 pH6	0/5 pH7	0/5 pH8
Chromium (Total)	12	31	SGV	130			0/5		
Lead	28	110	SGV	450			0/5		
Mercury	0.18	0.48	SGV	8			0/5		
Selenium	0.12	0.32	SGV	35			0/5		
Nickel	13	19	SGV	50			0/5		
Phenols	<0.3	<0.3	SGV	78 1% SOM	150 2.5% SOM	280 5% SOM	0/5 1% SOM	0/5 2.5% SOM	0/5 5% SOM
Benzo[a]pyrene	<0.1	2.7	GAC	1.1			1/5		
Boron	1.1	2.2	*	-			0/5		
Copper	17	44	GAC	111			0/5		
Zinc	61	180	GAC	330			0/5		
Free Cyanide	<0.5	<0.5	ASSV	34			0/5		
Sulphide	<0.5	4.3	*	-			-/5		

SOM = Soil Organic Matter * = Soil Screening Value not derived

Table 2: Residential Without Plant Uptake
Comparison of Chemical Test Results with SGVs, GAC and ASSV

Determinand	Minimum Value Detected mg/kg	Maximum Value Detected mg/kg	Assessment Method	Standard Residential usage without plant uptake mg/kg			Fraction of samples exceeding SGV, GAC and ASSV		
Arsenic	7.8	29	SGV	20			1/5		
Cadmium	<0.1	0.29	SGV	30			0/5		
Chromium (Total)	12	31	SGV	200			0/5		
Lead	28	110	SGV	450			0/5		
Mercury	0.18	0.48	SGV	15			0/5		
Selenium	0.12	0.32	SGV	260			0/5		
Nickel	13	19	SGV	75			0/5		
Phenols	<0.3	<0.3	SGV	21,900 1% SOM	34,400 2.5% SOM	37,300 5% SOM	0/5 1% SOM	0/5 2.5% SOM	0/5 5% SOM
Benzo[a]pyrene	<0.1	2.7	GAC	1.3			1/5		
Boron	1.1	2.2	*	-			0/5		
Copper	17	44	GAC	2,080			0/5		
Zinc	61	180	GAC	8,250			0/5		
Free Cyanide	<0.5	<0.5	ASSV	34			0/5		
Sulphide	<0.5	4.3	*	-			-/5		

SOM = Soil Organic Matter * = Soil Screening Value not derived

**Table 3: Standard Commercial / Light Industrial
Comparison of Chemical Test Results with SGVs, GACs and ASSV**

Determinand	Min Value Detected mg/kg	Max Value Detected mg/kg	Assessment Method	Standard Commercial / Industrial Land-use mg/kg			Fraction of samples exceeding SGV, GAC, ASSV		
Arsenic	7.8	29	SGV	500			0/5		
Cadmium	<0.1	0.29	SGV	1400			0/5		
Chromium (Total)	12	31	SGV	5000			0/5		
Lead	28	110	SGV	750			0/5		
Mercury	0.18	0.48	SGV	480			0/5		
Selenium	0.12	0.32	SGV	8000			0/5		
Nickel	13	19	SGV	5000			0/5		
Phenols	<0.3	<0.3	SGV	21,900 1% SOM	43,000 2.5% SOM	78,100 5% SOM	0/5 1% SOM	0/5 2.5% SOM	0/5 5% SOM
Benzo[a]pyrene	<0.1	2.7	GAC	29			0/5		
Boron	1.1	2.2	*	-			-/5		
Copper	17	44	GAC	45700			0/5		
Zinc	61	180	GAC	180,000			0/5		
Free Cyanide	<0.5	<0.5	ASSV	34			0/5		
Sulphide	<0.5	4.3	*	-			-/5		

SOM = Soil Organic Matter * = Soil Screening Value not derived

Hydrocarbon Fuel Pollution in Soil

Olfactory or visual evidence of hydrocarbon pollution was not detected within the soils beneath this site.

Discussion of Results of Soil Analysis

Statistical analysis of the test results for the made ground has been carried out in accordance with guidelines provided in R & D Publication CLR 7 Department for Environment, Food and Rural Affairs, DEFRA, and the Environment Agency, EA, March 2002. The findings are summarised over page in Table 4.

Table 4: Summary of Statistical Analysis of Chemical Test Results for Near Surface Strata

	Near Surface Strata								
	Sample No.	Min Value mg/kg	Max Value mg/kg	Mean mg/kg	Geo-metric Mean mg/kg	Measured 95 th Percentile mg/kg	SGV, GAC, ASSV for Residential With Plant Uptake	SGV, GAC, ASSV for Residential Without Plant Uptake	SGV, GAC, ASSV for Commercial / Industrial
Arsenic	5	7.8	29	15.56		23.40	20	20	500
Cadmium	5	<0.1	0.29	0.14		0.22	2	30	1400
Chromium	5	12	31	18.2		25.25	130	200	5000
Lead	5	28	110	65.6	58.93	97.85	450	450	750
Mercury	5	0.18	0.48	0.29		0.41	8	15	480
Selenium	5	0.12	0.32	0.17		0.25	35	260	8000
Nickel	5	13	19	16.2		18.48	50	75	5000
Phenols	5	<0.3	<0.3	<0.30		<0.30	78 (1% SOM)	21900 (1% SOM)	21900 (1% SOM)
Benzo(a) pyrene	5	<0.1	2.7	1.02		2.03	1.1	1.3	29
Boron	5	1.1	2.2	1.6		2.08	*	*	*
Copper	5	17	44	26.4		38.9	111	2080	45700
Zinc	5	61	180	125		180.37	330	8250	188000
Free Cyanide	5	<0.5	<0.5	<0.50		<0.50	34	34	34
Sulphide	5	<0.5	4.3	1.28		2.89	*	*	*

SOM = Soil Organic Matter * = Soil Screening Value not derived

Chemical analysis revealed concentrations of all the determinands, with the exception of benzo[a]pyrene and arsenic in TP6 at 0.50m depth, in the five near surface soil samples to be below the respective SGVs, GAC and ASSV for residential usage. The measured 95th percentile for benzo[a]pyrene and arsenic exceeded the GAC and SGV for residential with and without plant uptake.

None of the determinands exceeded the screening values for commercial/industrial usage.

Comparison of Water Analysis with Inorganic Drinking Water Standards

A sample of groundwater was recovered from TP2 at a depth of 1.40m and was analysed in the laboratory for a suite of common inorganic and organic potential contaminants primarily for characterisation purposes.

The primary assessment tool employed for the generic screening of samples for the protection of 'Controlled Waters' consists of the Statutory Instrument 2000 No.3184 'The Water Supply (Water Quality) Regulations 2000'. The fraction of test results that exceed these levels are summarised in Table 5.

Table 5. Comparison of Chemical Test Result with Water Supply Regulations

Determinand	Concentration	The Water Supply (Water Quality) Regulations 1989-2000 Maximum Concentration/Value for Consumers Taps	Fraction of samples Exceeding Water Supply Regulation
Arsenic (total) µg/l	4.50	10 µg/l	0/1
Boron (Water Soluble) µg/l	1100	1000 µg/l	1/1
Cadmium (total) µg/l	<0.5	5.0 µg/l	0/1
Chromium (total) µg/l	9.0	50 µg/l	0/1
Copper (total) µg/l	5.9	2000µg/l	0/1
Cyanide (total) mg/l	<0.05	0.05 mg/l	0/1
Lead (total) µg/l	<1	25 µg/l	0/1
Mercury (total) µg/l	<0.5	1.0 µg/l	0/1
Nickel (total) µg/l	14	20 µg/l	0/1
pH value	7.2	6.5 minimum 10.0 maximum	0/1
Phenols mg/l	<0.03	0.0005 mg/l	-/1
Selenium (total) µg/l	4.1	10 µg/l	0/1
Sulphate (soluble) mg/l	280	250mg/l	1/1
Sulphide mg/l	<0.05	No limit	0/1
Zinc (total) µg/l	30	5000 µg/l	0/1
PAHs µg/l	<2	0.10 µg/l	-/1

With regard to the groundwater quality, chemical analysis revealed concentrations of all the determinands, with the exception of boron and sulphate, in the water sample to be within the drinking water standard thresholds.

Soil Gas

The results of soil gas monitoring in the two trial pit installations, during a return visit on 2nd November 2007, indicated within TP2 less than 0.1% by volume methane and 0.3% by volume carbon dioxide and within TP5 less than 0.1% by volume methane and 0.9% by volume carbon dioxide. In-situ measurements revealed negligible gas emission rates of less than 0.1l/h within both TP2 and TP5. This gives a gas screening value, GSV, of 0.0001l/h for methane and a GSV of 0.0009l/h for carbon dioxide in TP5. The site is therefore categorised as 'Green' in the NHBC traffic light system as defined in the Construction Industry Research and Information Association, CIRIA Report C659, 'Assessing risks posed by hazardous ground gasses to buildings'.

RISK ASSESSMENT

In order to assess the risks associated with the presence of ground contamination the linkages between the sources and potential receptors to contamination need to be established and evaluated. This is in accordance with the Environmental Protection Act 1990, which provides a statutory definition of Contaminated Land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present on or under the land such 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.

There are three principal factors, which are assessed whilst undertaking a qualitative risk assessment for any site. These are the presence of a contamination source, the existence of migration pathways and the presence of sensitive target(s).

It should be noted that it is necessary for each element of source, pathway and target to be present in order for exposure of a human or environmental receptor to occur.

UK Government guidance on the assessment of contaminated land requires risk to human health and the environment to be reviewed using source – pathway – target relationships. If each of these elements is present, the linkage provides a potential risk to the identified targets.

Contaminants or potential pollutants identified as *sources* in relation to possible previous uses are listed over page in the Table 6.

Table 6. Summary of Possible Contaminant Sources on the Site

<i>Contaminant Source</i>	<i>Comments</i>
Contaminated soil and groundwater	Potential contamination present within near surface soils or water on the site
Soil gas	Potential soil gas generated from topsoil, made ground or natural strata.
Drainage	Effluent from former or leaking drains would provide a contaminant source.

A *Pathway* is defined as one or more routes through which a receptor is being, or could be, exposed to, or affected by, a given contaminant.

Potential *Target or Receptors* fall within the categories of Human Health, Water Environment, Flora and Fauna, and Building Materials. There are several possible pathways for the potential contaminants on the site to impact human and/or environmental receptors and these are summarised in Tables 7 and 8.

Table 7. Summary of Possible Exposure Pathways for Human Receptors

<i>Human Receptor-Mechanism</i>	<i>Typical Exposure Pathway</i>
Human Inhalation	Breathing dust and fumes Breathing gas emissions
Human Ingestion	Eating -contaminated soil, for example by small children -plants grown in contaminated soil Ingesting dust or soil on vegetables and fruit Drinking contaminated water
Human Contact	Direct skin contact with contamination Direct skin contact with contaminated liquids

Table 8. Summary of Possible Exposure Pathways for Water Receptors

<i>Receptor-Water Environment</i>	<i>Typical Exposure Pathway</i>
Groundwater The site is underlain by a non-aquifer. No water abstractions are present within 250m of the site.	Surface infiltration of atmospheric waters into the soils beneath could wash or dissolve potential contaminants into the underlying groundwater. Contamination leads to restriction/prevention of use as a resource, for example, drinking water, and can have secondary impacts on other resources, which depend on it.
Surface water The River Welland is 40m south-east, flowing northwards.	Surface infiltration of atmospheric waters into the soils beneath could wash or dissolve potential contaminants into surface water, which can then migrate laterally. Contamination leads to a restriction/prevention of use, as drinking water resource and for amenity use Effects on aquatic life

Conceptual Model

Assessment of the potential linkage between ground contamination sources, human and environmental receptors have been assessed based on the desk study research documented in the preceding sections of this report.

A generalised conceptual model relative to the construction phase and completed development is presented below in Table 8.

Table 8: Phase 1 Conceptual Model Relative to Existing Site and Future Redevelopment

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources		
		Drainage	Soil/Water	Soil Gas
Human Health – ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low	Low	Low
Human Health – users of completed Residential development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	N/A	Low	Low
Water Environment	Migration through ground into surface or groundwater	N/A	Low	Low
Flora and Fauna	Vegetation on site growing on contaminated soil	N/A	Low	Low
Building Materials	Contact with contaminated soil	N/A	Low	Negligible

Key to Table 8 Estimated Potential for Linkage with Contaminant Source	Definition
N/A	Not Applicable because redevelopment would automatically remove potential contaminant item.
Negligible	Negligible Risk: The site should be considered suitable for defined linkage or environmental setting. Contaminants, which might have unacceptable impact on key receptors, are unlikely to be present.
Low	Low Risk: The site should be considered suitable for defined contaminant linkage or environmental setting. Contaminants may be present but are unlikely to have unacceptable impact on key receptors. This would include a given pathway being blocked by a physical barrier such as concrete hardstanding.
Medium	Medium Risk: The site may not be suitable for defined contaminant linkage or environmental setting. Contaminants are probably present and might have unacceptable impact on key receptors and therefore remedial measures may be necessary.
High	High Risk: The site is probably or certainly not suitable for defined contaminant linkage or environmental setting. Contaminants probably or certainly present and likely to have an unacceptable impact on key receptors and therefore remedial measures would be necessary.

COMMENTS ON GROUND CONTAMINATION IN RELATION TO PROPOSED REDEVELOPMENT

Anticipated exposure scenarios relating to the site and future redevelopment works including remedial options as applicable, in the context of the conceptual model, are discussed as follows.

The proposed development is understood to comprise the construction of two detached dwellings, two semi-detached dwellings and five terrace houses with associated car parking, gardens and landscaped areas.

This investigation may not have revealed the full extent of contamination on the site and appropriate professional advice should be sought if subsequent site works reveal materials that may appear to be contaminated.

Existing Drainage

Redundant foul drain runs should be removed from beneath the site and precautions should ensure that any remaining effluent is directly disposed off-site. The integrity of existing drainage should be checked, and damaged sections replaced prior to development. The latter measures should reduce the future risk to human health and water environment.

Contaminated Soil

On the basis of the work carried out, the site is underlain by 0.45m to 0.65m thickness of made ground covering naturally deposited superficial Terrington Beds to at least 2.00m depth.

No visual or olfactory evidence of hydrocarbon fuel impacted soils were identified within the exploratory holes.

Chemical analysis revealed concentrations of all the determinands, with the exception of benzo[a]pyrene and arsenic in TP6, in the five near surface soil samples to be below the respective SGVs, GAC and ASSV for residential usage. The measured 95th percentile for

benzo[a]pyrene and arsenic in TP6 exceeded the GAC and SGV for residential with and without plant uptake.

None of the determinands exceeded the screening values for commercial/industrial usage representative of buildings and areas of hardstanding.

Soil Gas

According to the environmental database there are no landfills within influencing distance of the site and no significant quantities of putresible or peaty matter were encountered by the exploratory holes in the made ground or natural ground. Although within TP5 a thin band of firm, very dark brown, slightly clayey amorphous peat was encountered between 1.10m and 1.20m below ground level.

The results of soil gas monitoring of the trial pit installations (TP2 and TP5), gave a gas screening value, GSV, of 0.00011/h for methane and a GSV of 0.00091/h for carbon dioxide. The site is therefore categorised as 'Green' in the NHBC traffic light system as defined in the Construction Industry Research and Information Association, CIRIA Report C659, 'Assessing risks posed by hazardous ground gasses to buildings'.

The Green traffic light classification does not require any special precautions.

The site lies within an area where less than 1% of homes are above the BRE action level for radon indicating that no radon protection measures would be required.

Human Health - Construction Workers

According to database information there are no active landfills within influencing distance of the site and no significant quantities of putresible or peaty matter were encountered by the exploratory holes in the natural ground. Although within TP5 a thin band of firm, very dark brown, slightly clayey amorphous peat was encountered between 1.10m and 1.20m below ground level.

No special precautions would be required during the development of the site by workers who may come into contact with the soil during groundworks, providing standard precautions are adopted which should generally include the procedures given by the Health and Safety Executive (HS[G]66, The Blue Book).

For the protection of these workers during groundworks the following is recommended:

a) Limit repeated or prolonged skin contact with soils by wearing gloves with sleeves rolled down.

b) Washing facilities should be made available to ground workers, so as to minimise the potential for inadvertent ingestion of soil.

c) If any soils are revealed which are different to those encountered by this ground investigation, the advice of a specialist should be sought in view of classifying the material and ascertaining its risk to groundworkers.

d) Precautions should be observed by workers because carbon dioxide, a heavier than air asphyxiant gas could potentially accumulate in excavations.

Human Health - Users of Housing Development

The results indicate that a case can be generated for the analysed data sets to statistically exceed the SGV's for arsenic and the GAC for benzo[a]pyrene for residential usage. However the concentrations of arsenic and benzo[a]pyrene were only marginally elevated within TP6, consequently the made ground within this area would be considered unsuitable for surface exposure within garden or landscaped areas. The made ground encountered within the other trial pits would be considered suitable for surface exposure within garden or landscaped areas. It is understood that the proposed development will cover the area of TP6 with hardstanding, therefore no remediation is considered necessary. The risk of site users ingesting the encountered ground contamination when present beneath buildings and or hardstanding would be considered to be low. This is because it would be unlikely that the general site users would normally be able

to penetrate building floors or surface hardstanding layers necessary in order to uncover any contaminated soils beneath the site.

No special gas precautions would be considered necessary for the proposed development.

Water Environment

The site is underlain by a non-aquifer and there appear to be no protected water sources or source protection zones recorded within a radius of 250m. The observed concentrations of boron and sulphate would not be considered to present a significant risk to surface water or groundwater.

Flora and Fauna

The environmental database does not indicate there to be any environmentally sensitive receptors within 250m of the site.

Building Materials

Tests on the five soil samples and one water sample to determine the risk of sulphate attack on buried concrete indicate levels that fall into Classes DS-1 categorisation as defined by Table C2 of BRE Special Digest 1, 2005. The pH results indicate slightly alkaline ground conditions with pH values typically ranging between 7.2 and 7.9.

No special precautions are considered necessary to protect underground services on this site.

Off-site Disposal of Soil Arisings

Excavated material and excess spoil should always be classified prior to removal from site as required by 'Duty of Care' (Environmental Protection Act, 1990) legislation. This means that material has to be given a proper description and waste classification prior to removal. The site plan, exploratory hole records and certificates of chemical analysis should be sent to the

Environmental Agency or a suitably licensed waste disposal contractor for classification of the material prior to disposal off-site during the development works.

GROUND ENGINEERING



P. LEWIN

B.Sc.(Hons.),

Graduate Geo-Environmental Engineer

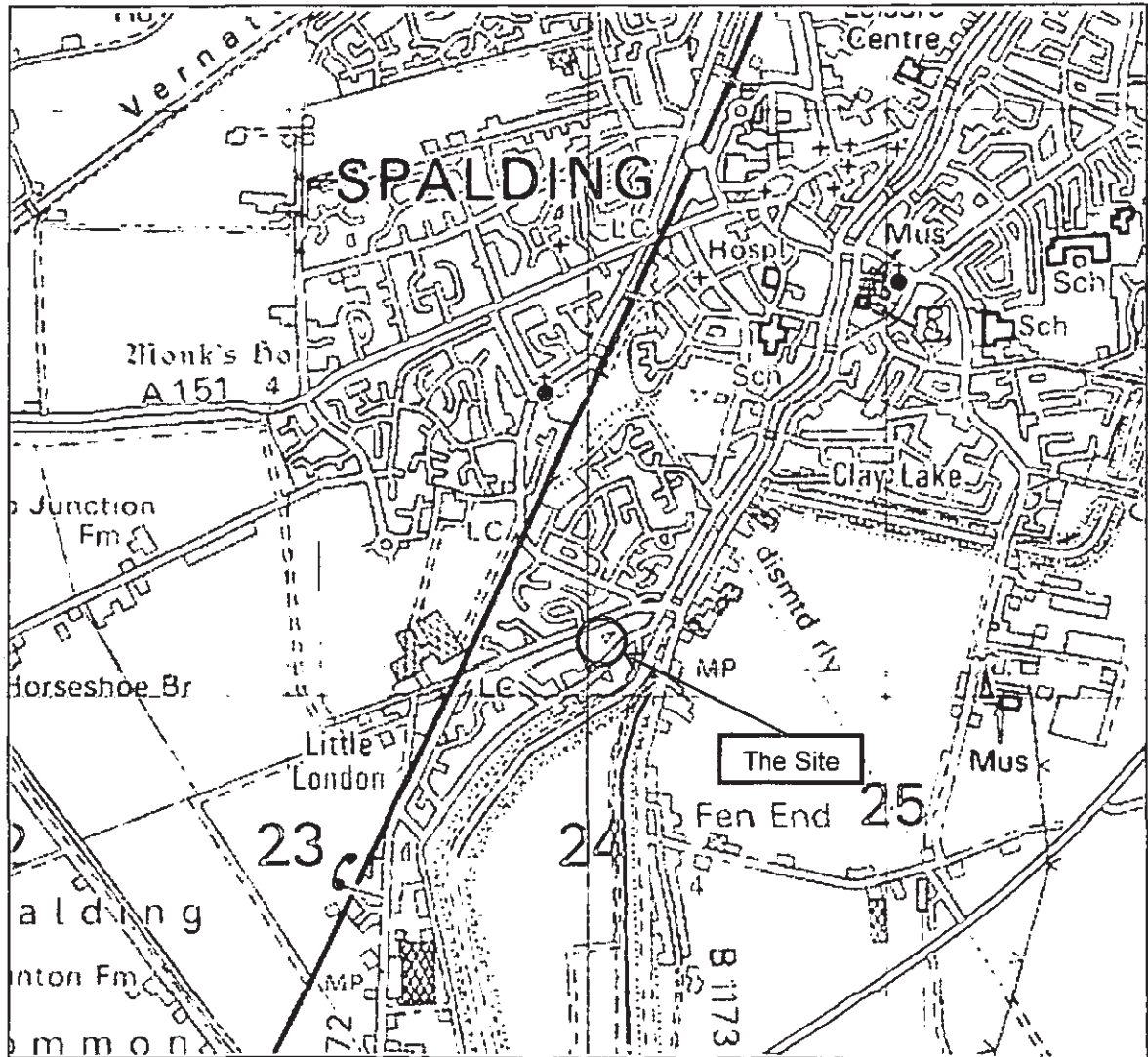


S. WEATHERLEY

B.Eng.(Hons.), C.Geol., F.G.S.

Senior Geo-Environmental Engineer

Site Location Plan



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Project : Cradge Bank Road, Spalding

Client : Brian Harding Construction Limited

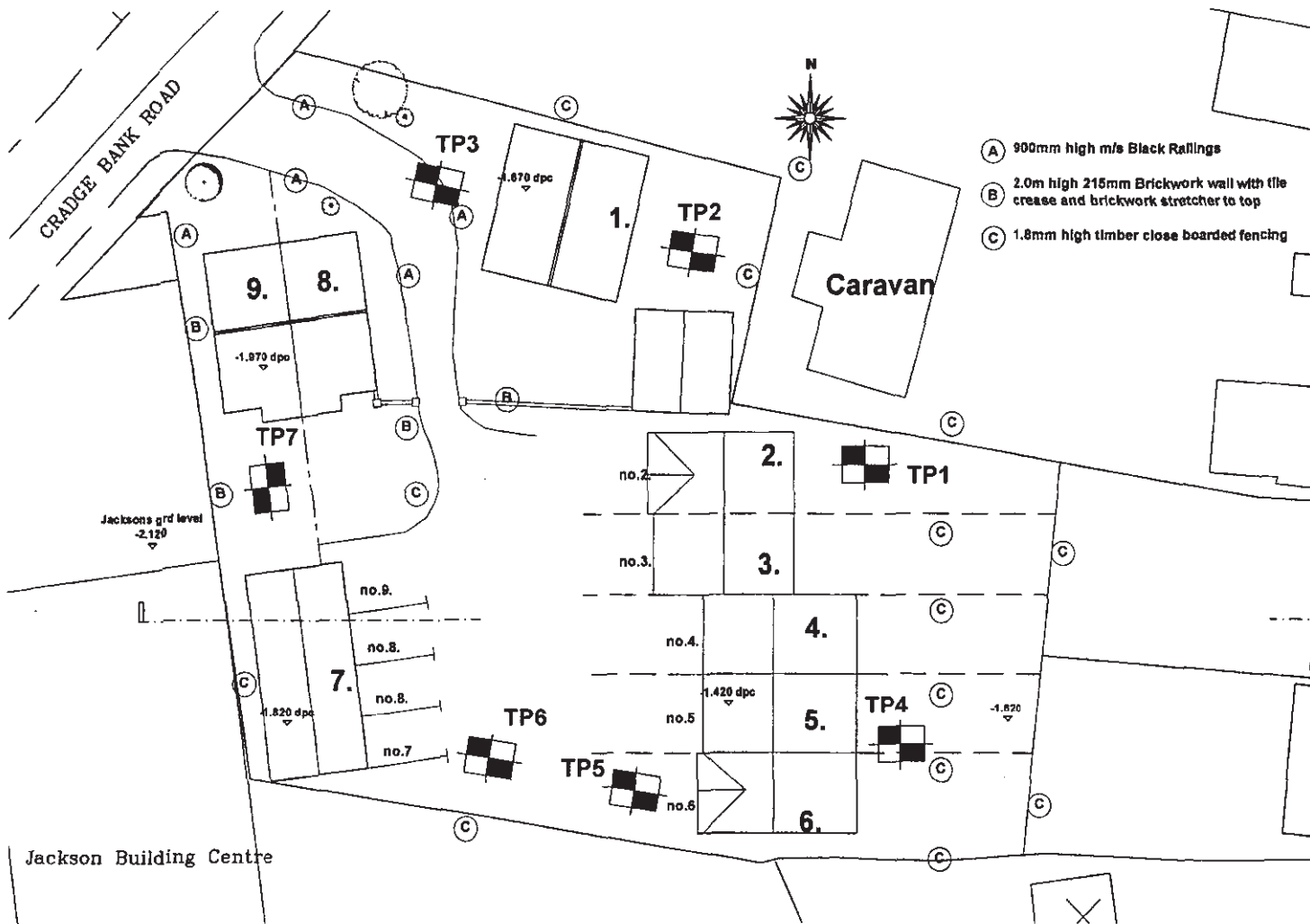
**GROUND
ENGINEERING**

Peterborough Tel : 01733 566566

Project No.

C11252

Exploratory Hole Location Plan



Project : Cradce Bank Road, Spalding

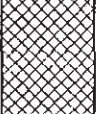
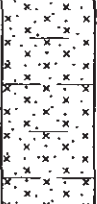
Client : Brian Harding Construction Limited

GROUND
ENGINE

Peterborough

GROUND ENGINEERING Geo-Environmental Specialists 01733 566566			Site: CRADGE BANK ROAD, SPALDING		TRIAL PIT TP1				
			Date: 22/10/07	Pit Size: 2.00m L x 0.45m W x 1.30m D.		Ground Level:			
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m		
Depth m	Type	Result							
0.10 0.10	D1 J1			MADE GROUND - Yellow brown, sandy GRAVEL. Gravel consists of sub-angular to sub-rounded limestone.(Hardcore)		0.15			
0.40 0.40	D2 J2			MADE GROUND - Firm, dark brown slightly silty, slightly gravelly SILT. Gravel consists of angular brick and tile.		0.45			
0.70	D3			Firm, dark brown slightly sandy SILT. (TERRINGTON BEDS)		0.75			
1.00 1.10 1.30	D4 W1 D5		 1.20m	Firm, grey, orange brown and brown, mottled slightly sandy SILT with occasional black carbonaceous mottling and occasional clay partings. (TERRINGTON BEDS)		1.30			
				Trial pit completed at 1.30m depth.					
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample  Water Strike  Water Rise  Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. No live roots observed. 2. Water seepage at 1.20m depth. 3. Water stood at 1.10m on completion. 4. Pit sides unstable below 1.10m depth.					Project No 11252 Scale Page 1:25 1/1	

GROUND ENGINEERING Geo-Environmental Specialists 01733 566566			Site: CRADGE BANK ROAD, SPALDING		TRIAL PIT TP2			
			Date: 22/10/07	Pit Size: 1.60m L x 0.40m W x 2.00m D.		Ground Level:		
Samples and In-situ Tests			(Date)	Description of Strata		Legend	Depth m	O.D. Level m
Depth m	Type	Result	Water					
0.30 0.30	D1 J1			MADE GROUND - Yellow brown and brown, slightly silty gravelly SAND. Gravel consists of angular to sub-rounded brick, wood, tile, concrete and quartzite.			0.35	
0.60 0.60	D2 J2						MADE GROUND - Firm, dark brown slightly sandy SILT with rare fine, angular brick fragments.	
0.90	D3		▽s	Soft, grey and blue grey with iron-stained slightly sandy organic SILT. (TERRINGTON BEDS)				
1.20	D4						Firm, orange brown and grey brown mottled slightly sandy SILT with occasional clay partings. (TERRINGTON BEDS)	
1.40 1.50	W1 D5		▽c 1 ▽					
2.00	D6						2.00	
				Trial pit completed at 2.00m depth.				
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample ▽ - Water Strike ▽ - Water Rise ▽c - Level on completion MP - Mackintosh Probe R() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. No live roots observed 2. Water seepage at 1.50m depth 3. Water stood at 1.40m on completion 4. Pit sides unstable below 1.50m depth 5. Standpipe installed to 2.00m depth 6. Water stood at 0.83m on 2/11/07					
							Project No 11252	
							Scale 1:25	Page 1/1

GROUND ENGINEERING Geo-Environmental Specialists 01733 566566			Site: CRADGE BANK ROAD, SPALDING		TRIAL PIT TP3				
			Date: 22/10/07	Pit Size: 1.70m L x 0.45m W x 1.40m D.		Ground Level:			
Samples and in-situ Tests			(Date)	Description of Strata		Legend	Depth m	O.D. Level m	
Depth m	Type	Result	Water						
0.30 0.30	D1 J1			MADE GROUND - Orange-brown and yellow-brown gravelly SAND. Gravel consists of angular to sub-rounded limestone, brick, concrete and quartzite. MADE GROUND - Firm dark brown, slightly sandy SILT with rare brick and limestone fragments. Firm, grey brown, grey and orange brown mottled, slightly sandy SILT with occasional black carbonaceous mottling and occasional clay partings. (TERRINGTON BEDS)			0.40		
0.60 0.60	D2 J2						0.65		
0.90	D3								
1.40	D4		1 Σ	Trial pit completed at 1.40m depth.			1.40		
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample Σ - Water Strike Σ - Water Rise Σc - Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. No live roots observed 2. Pit sides stable 3. Water seepage at 1.40m depth					Project No 11252	
							Scale 1:25	Page 1/1	

GROUND ENGINEERING Geo-Environmental Specialists 01733 566566			Site: CRADGE BANK ROAD, SPALDING		TRIAL PIT TP4	
Date: 22/10/07			Pit Size: 1.60m L x 0.45m W x 1.10m D.		Ground Level:	
Samples and in-situ Tests			(Date)	Description of Strata	Legend	Depth m
Depth m	Type	Result	Water			
0.25 0.25	D1 J1			MADE GROUND - Firm, brown and orange brown, slightly sandy, slightly gravelly SILT. Gravel of angular to sub-rounded brick and concrete.		0.30
0.50 0.50	D2 J2			MADE GROUND - Firm, dark brown, slightly sandy, slightly gravelly SILT. Gravel consists of angular to sub-angular brick and concrete.		0.55
0.80	D3			Firm, dark orange brown, grey and brown mottled, slightly sandy SILT, with occasional black carbonaceous mottling and iron-staining below 1.00m depth. (TERRINGTON BEDS)		
1.10	D4		1 V			1.10
				Trial pit completed at 1.10m depth.		

KEY	REMARKS
D - Disturbed Sample	1. Live roots observed to 0.40m depth 2. Water seepage at 1.10m depth 3. Pit sides stable
B - Bulk Sample	
U - Undisturbed Sample	
R - Root Sample	
W - Water Sample	
J - Jar Sample	
∇ - Water Strike	
∇ - Water Rise	
∇c - Level on completion	
MP - Mackintosh Probe	
P () - Hand Penetrometer	
Cohesion () kPa	
V - Vane Shear Test	
Cohesion () kPa	
Project No 11252 Scale 1:25 Page 1/1	

GROUND ENGINEERING Geo-Environmental Specialists 01733 566566			Site: CRADGE BANK ROAD, SPALDING		TRIAL PIT TP5		
Samples and In-situ Tests			Date: 22/10/07	Pit Size: 1.90m L x 0.40m W x 2.00m D.		Ground Level:	
Depth m	Type	Result	(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
0.10	D1			MADE GROUND - Firm, brown, orange-brown and dark grey mottled, slightly sandy, gravelly SILT with occasional brick and concrete cobbles.		0.15	
0.10	J1					0.25	
0.20	D2			MADE GROUND - Light yellow-brown sandy GRAVEL. Gravel consists of sub-angular to sub-rounded limestone.			
0.50	D3			MADE GROUND - Firm, brown, orange-brown and grey mottled slightly gravelly, slightly sandy SILT. Gravel consists of angular to sub-angular flint, brick, concrete, limestone and brick.		0.60	
0.50	J2						
0.80	D4		▼s	Firm, dark brown, brown and rare grey and orange-brown mottled, slightly sandy SILT with occasional black carbonaceous mottling. (TERRINGTON BEDS)			
1.10	D5		▼c			1.10	
1.10	W1		1 ▼	Firm, very dark brown, slightly clayey, amorphous PEAT. (TERRINGTON BEDS)		1.20	
				Firm grey and orange-brown mottled, slightly sandy SILT with occasional black carbonaceous mottling. (TERRINGTON BEDS)			
1.50	D6						
2.00	D7					2.00	
				Trial pit completed at 2.00m depth.			

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample ▼ - Water Strike ▼ - Water Rise ▼c - Level on completion MP - Mackintosh Probe R() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. Live roots observed to 0.50m depth. 2. Water met at 1.20m depth. 3. Water stood at 1.10m depth on completion. 4. Pit sides unstable below 1.20m depth. 5. Standpipe installed to 2.00m depth.
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Project No 11252	
Scale 1:25	Page 1/1

GROUND ENGINEERING			Site: CRADGE BANK ROAD, SPALDING		TRIAL PIT TP6	
Geo-Environmental Specialists 01733 566566			Date: 22/10/07	Pit Size: 1.20m L x 0.40m W x 1.30m D.		Ground Level:
Samples and in-situ Tests			(Date)	Description of Strata	Legend	Depth m
Depth m	Type	Result	Water			
0.30	D1			MADE GROUND - Firm, brown, rare orange-brown and grey mottled, slightly gravelly, slightly sandy SILT. Gravel consists of fine and medium, angular to sub-rounded flint, rare brick and wood.		0.40
0.50	D2			MADE GROUND - Firm, dark brown, slightly gravelly, slightly sandy, slightly organic SILT. Gravel consists of angular to sub-angular tile and concrete.		0.50
0.80	D3			Firm, orange-brown and grey mottled, slightly sandy SILT, with occasional clay partings and black carbonaceous mottling. (TERRINGTON BEDS)		1.00
1.30	D4		1 Σ	Firm, grey, occasional orange-brown and brown mottled, slightly sandy CLAY with occasional black carbonaceous mottling. (TERRINGTON BEDS)		1.30
Trial pit completed at 1.30m depth.						

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample Σ - Water Strike Σ - Water Rise Σc - Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. Live roots observed to 0.70m depth 2. Water seepage at 1.30m depth 3. Pit sides stable	Project No 11252 Scale 1:25 Page 1/1
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GROUND ENGINEERING Geo-Environmental Specialists 01733 566566			Site: CRADGE BANK ROAD, SPALDING			TRIAL PIT TP7		
			Date: 22/10/07		Pit Size: 1.80m L x 0.45m W x 1.30m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata		Legend	Depth m	O.D. Level m
Depth m	Type	Result						
0.10 0.10	D1 J1			MADE GROUND - Yellow brown and brown slightly silty gravelly SAND. Gravel consists of angular to sub-rounded brick, limestone, concrete.		0.20		
0.40 0.40	D2 J2			MADE GROUND - Firm, brown, dark brown slightly gravelly, slightly sandy SILT with rare brick cobbles. Gravel consists of angular to sub-angular ash, brick, concrete and wood.		0.50		
0.70	D3			Firm, orange-brown and grey mottled slightly sandy SILT, with occasional black carbonaceous mottling and occasional clay partings. (TERRINGTON BEDS)				
1.00	D4							
1.30	D5		1 ∇			1.30		
				Trial pit completed at 1.30m depth.				

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample ∇ - Water Strike ∇ - Water Rise ∇c - Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. No live roots observed 2. Water seepage at 1.30m depth 3. Pit sides stable
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Project No 11252	
Scale 1:25	Page 1/1

Gas Monitoring Record

Site: Cradge Bank Road, Spalding, Lincolnshire

Report Ref: C11252

Date	Borehole No.	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Flow (l/hr)	Pressure Ambient (mb)	Depth to Groundwater (mbgl)	Comments
02/11/2007	TP 2	<0.1	0.3	20.7	<0.1	1033	0.83	Base 2.26m
02/11/2007	TP 5	<0.1	0.9	19.8	<0.1	1033	0.90	Base 1.46m

GROUND ENGINEERING, NEWARK ROAD, PETERBOROUGH, PE1 5UA

Chemtest

Willie Snaith Road Newmarket CB8 7SQ
Tel: 01638 606070 Fax: 01638 606071
Email: admin @ chemtest.co.uk

Ground Engineering
Newark Road
Peterborough

PE1 5UA
FAO Simon Weatherley

31 October 2007

Dear Simon Weatherley

Test Report Number 45578
Your Project Reference Cradge Bank Road, Spalding

Please find enclosed the results of analysis for the samples received 24 October 2007.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact Louise Watts in Customer Services.

Yours sincerely



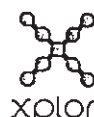
Darrell Hall - Laboratory Manager
Authorised Signatory



2183

Notes to accompany report:

- The sign < means 'less than'
- Tests marked 'U' hold UKAS accreditation
- Tests marked 'M' hold MCertS (and UKAS) accreditation
- Tests marked 'N' do not currently hold UKAS accreditation
- Tests marked 'S' were subcontracted to an approved laboratory
- n/e means 'not evaluated'
- i/s means 'insufficient sample'
- Comments or interpretations are beyond the scope of UKAS accreditation
- The results relate only to the items tested



Results of analysis of 6 samples
received 24 October 2007

PE1 5UA

FAO Simon Weatherley

Cradge Bank Road, Spalding

Login Batch No

Chemtest/ELMS ID

Sample ID

Sample No

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

					45578				
					AC43831	AC43833	AC43834	AC43835	AC43836
					TP1	TP4	TP5	TP6	TP7
					D2	D1	D3	D2	D1
					0.40m	0.25m	0.50m	0.50m	0.40m
					SOIL	SOIL	SOIL	SOIL	SOIL
2300	Cyanide (total)	57125	mg kg ⁻¹	M	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2310	Cyanide (free)	57125	mg kg ⁻¹	M	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
2320	Sulfide	18496258	mg kg ⁻¹	N	4.3	0.5	0.6	0.5	< 0.5
2630	Organic matter		%	M	7.2	3.0	3.3	3.9	3.0
2120	Boron (hot water soluble)	7440428	mg kg ⁻¹	U	1.1	1.1	1.6	2.2	1.1
2210	Sulfate (2:1 water soluble)	14808798	g l ⁻¹	M	0.27	0.38	0.05	0.07	0.05
2450	Arsenic	7440382	mg kg ⁻¹	M	17	11	13	29	17
	Cadmium	7440439	mg kg ⁻¹	M	0.11	<0.1	<0.1	0.29	<0.1
	Chromium	7440473	mg kg ⁻¹	U	17	16	15	31	17
	Copper	7440508	mg kg ⁻¹	M	37	17	17	44	37
	Mercury	7439976	mg kg ⁻¹	M	0.48	0.24	0.35	0.19	0.48
	Nickel	7440020	mg kg ⁻¹	M	18	16	15	19	18
	Lead	7439921	mg kg ⁻¹	M	110	28	52	87	110
	Selenium	7782492	mg kg ⁻¹	U	0.32	0.16	0.13	0.12	0.32
	Zinc	7440666	mg kg ⁻¹	M	170	61	64	150	170
2700	Naphthalene	91203	mg kg ⁻¹	M	0.1	<0.1	<0.1	<0.1	<0.1
	Acenaphthylene	208968	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1	<0.1
	Acenaphthene	83329	mg kg ⁻¹	M	0.1	<0.1	<0.1	0.2	<0.1
	Fluorene	86737	mg kg ⁻¹	M	<0.1	<0.1	<0.1	0.1	<0.1
	Phenanthrene	85018	mg kg ⁻¹	M	0.3	<0.1	<0.1	1.2	<0.1
	Anthracene	120127	mg kg ⁻¹	M	<0.1	<0.1	<0.1	0.5	<0.1
	Fluoranthene	206440	mg kg ⁻¹	M	0.9	<0.1	<0.1	3.6	<0.1
	Pyrene	129000	mg kg ⁻¹	M	0.8	<0.1	<0.1	3	<0.1
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	0.5	<0.1	<0.1	1.8	<0.1
	Chrysene	218019	mg kg ⁻¹	M	0.5	<0.1	<0.1	1.8	<0.1
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	<0.1	<0.1	<0.1	2.1	<0.1
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	M	<0.1	<0.1	<0.1	1.1	<0.1
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	1.1	<0.1	<0.1	2.7	<0.1
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	M	<0.1	<0.1	<0.1	0.2	<0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	0.3	<0.1	<0.1	1.2	<0.1

All tests undertaken between 29-Oct-2007 and 31-Oct-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Ground Engineering
Newark Road
Peterborough

LABORATORY TEST REPORT

Results of analysis of 6 samples
received 24 October 2007

PE1 5UA

FAO Simon Weatherley

Cradge Bank Road, Spalding

					45578				
					AC43831	AC43833	AC43834	AC43835	AC43836
					TP1	TP4	TP5	TP6	TP7
					D2	D1	D3	D2	D1
					0.40m	0.25m	0.50m	0.50m	0.40m
					SOIL	SOIL	SOIL	SOIL	SOIL
2700	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	0.5	<0.1	<0.1	1.2	0.5
	Total (of 16) PAHs		mg kg ⁻¹	M	5.1	<2	<2	21	6
2920	Phenols (total)		mg kg ⁻¹	M	<0.3	<0.3	<0.3	<0.3	<0.3
2010	pH		-	M	7.3	7.5	7.9	7.8	7.5

All tests undertaken between 29-Oct-2007 and 31-Oct-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Results of analysis of 6 sample
received 24 October 2007

PE1 5UA

FAO Simon Weatherley

Cradge Bank Road, Spalding

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Depth

Matrix

45578

AC43332

TP2

W1

1.40m

WATER

SOP↓	Determinand↓	CAS No↓	Units↓	*	
1010	pH	PH	-	U	7.2
1300	Cyanide (total)	57125	mg l ⁻¹	N	< 0.05
1310	Cyanide (free)	57125	mg l ⁻¹	N	< 0.05
1330	Sulfide	18496258	mg l ⁻¹	N	< 0.05
1120	Sulfate	14808798	mg l ⁻¹	U	280
1450	Arsenic	7440382	µg l ⁻¹	U	4.5
	Boron	7440428	µg l ⁻¹	U	1100
	Cadmium	7440439	µg l ⁻¹	U	<0.5
	Chromium	7440473	µg l ⁻¹	U	9.0
	Copper	7440508	µg l ⁻¹	U	5.9
	Lead	7439921	µg l ⁻¹	U	<1
	Mercury	7439976	µg l ⁻¹	U	<0.5
	Nickel	7440020	µg l ⁻¹	U	14
	Selenium	7782492	µg l ⁻¹	U	4.1
	Zinc	7440666	µg l ⁻¹	U	30
1700	Naphthalene	91203	µg l ⁻¹	N	<0.1
	Acenaphthylene	208968	µg l ⁻¹	N	<0.1
	Acenaphthene	83329	µg l ⁻¹	N	<0.1
	Fluorene	86737	µg l ⁻¹	N	<0.1
	Phenanthrene	85018	µg l ⁻¹	N	<0.1
	Anthracene	120127	µg l ⁻¹	N	<0.1
	Fluoranthene	206440	µg l ⁻¹	N	<0.1
	Pyrene	129000	µg l ⁻¹	N	<0.1
	Benzo[a]anthracene	56553	µg l ⁻¹	N	<0.1
	Chrysene	218019	µg l ⁻¹	N	<0.1
	Benzo[b]fluoranthene	205992	µg l ⁻¹	N	<0.1
	Benzo[k]fluoranthene	207089	µg l ⁻¹	N	<0.1
	Benzo[a]pyrene	50328	µg l ⁻¹	N	<0.1
	Dibenzo[a,h]anthracene	53703	µg l ⁻¹	N	<0.1
	Indeno[1,2,3-cd]pyrene	193395	µg l ⁻¹	N	<0.1

All tests undertaken between 29-Oct-2007 and 31-Oct-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Ground Engineering
Newark Road
Peterborough

LABORATORY TEST REPORT

PE1 5UA

FAO Simon Weatherley

Results of analysis of 6 sample
received 24 October 2007

Cradge Bank Road, Spalding

					45578
					AC43882
					TP2
					W1
					1.40m
					WATER
1700	Benzo[g,h,i]perylene	191242	$\mu\text{g l}^{-1}$	N	<0.1
	Total (of 16) PAHs		$\mu\text{g l}^{-1}$	N	<2
1920	Phenols (total)		mg l^{-1}	N	<0.03

All tests undertaken between 29-Oct-2007 and 31-Oct-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

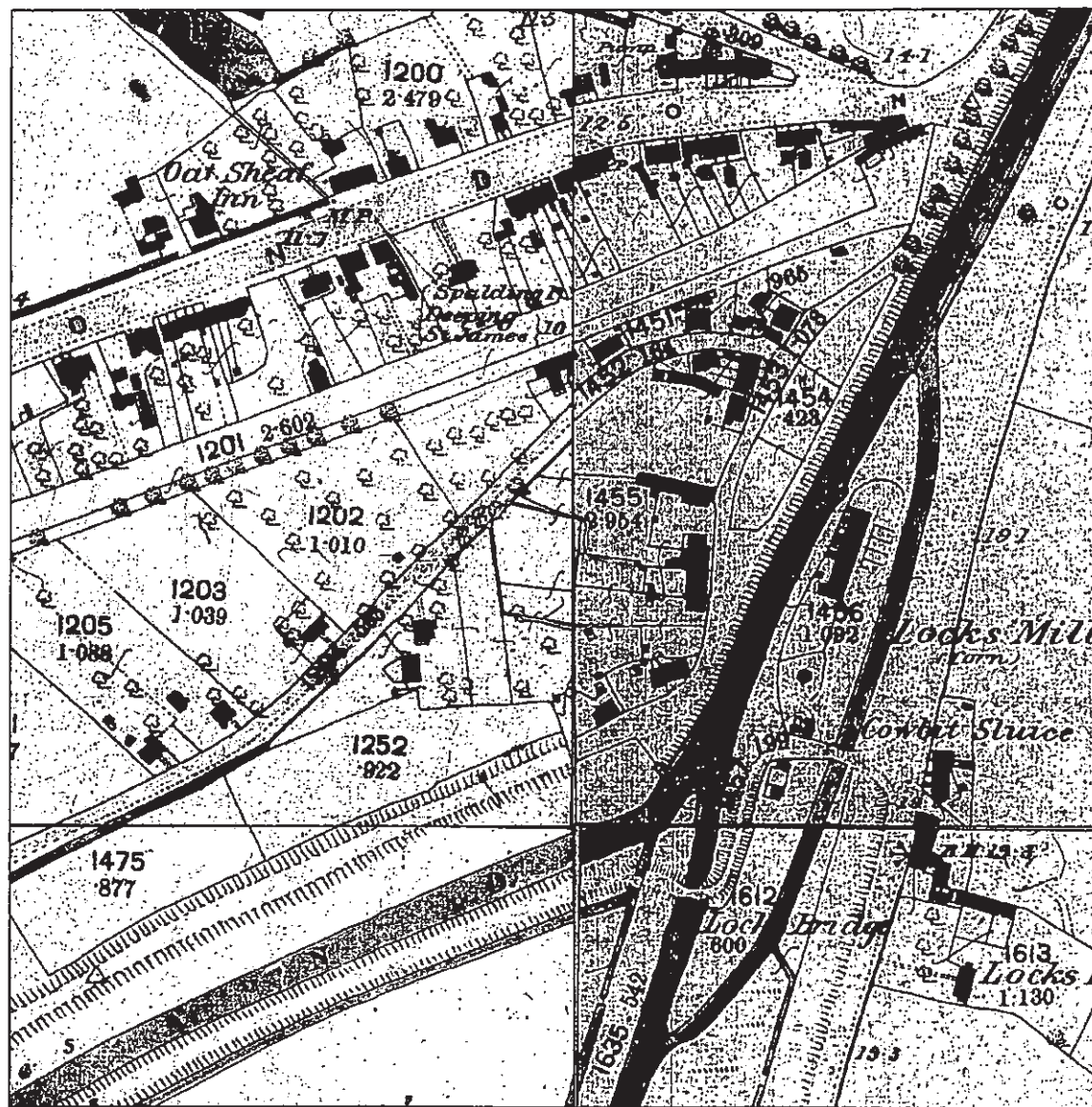
APPENDIX 1

HISTORICAL MAPS

Site History

Figure A

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Client : Brian Harding Construction Limited

**GROUND
ENGINEERING**

Peterborough Tel : 01733 566566

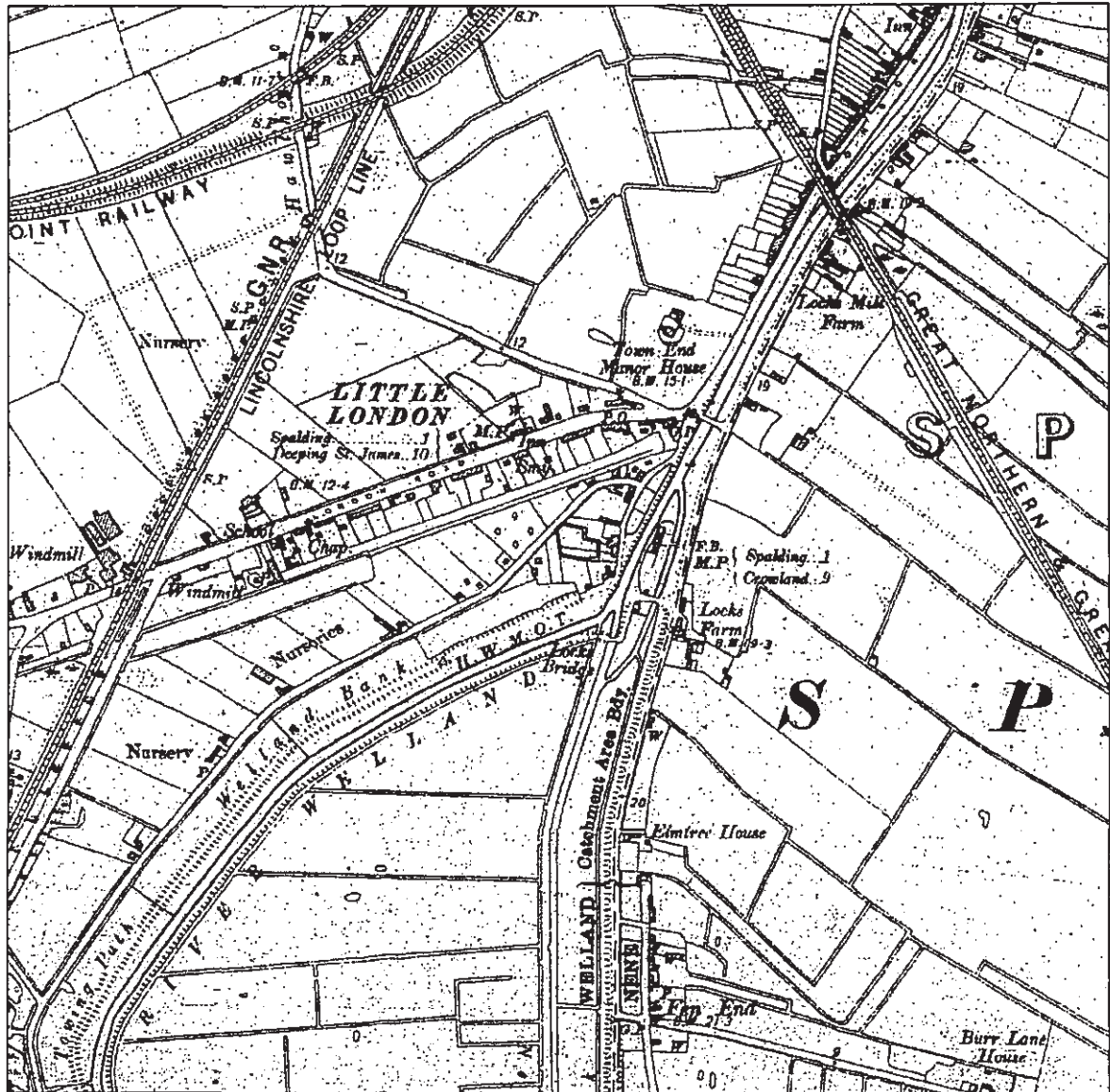
Project No.

C11252

Site History

Figure B

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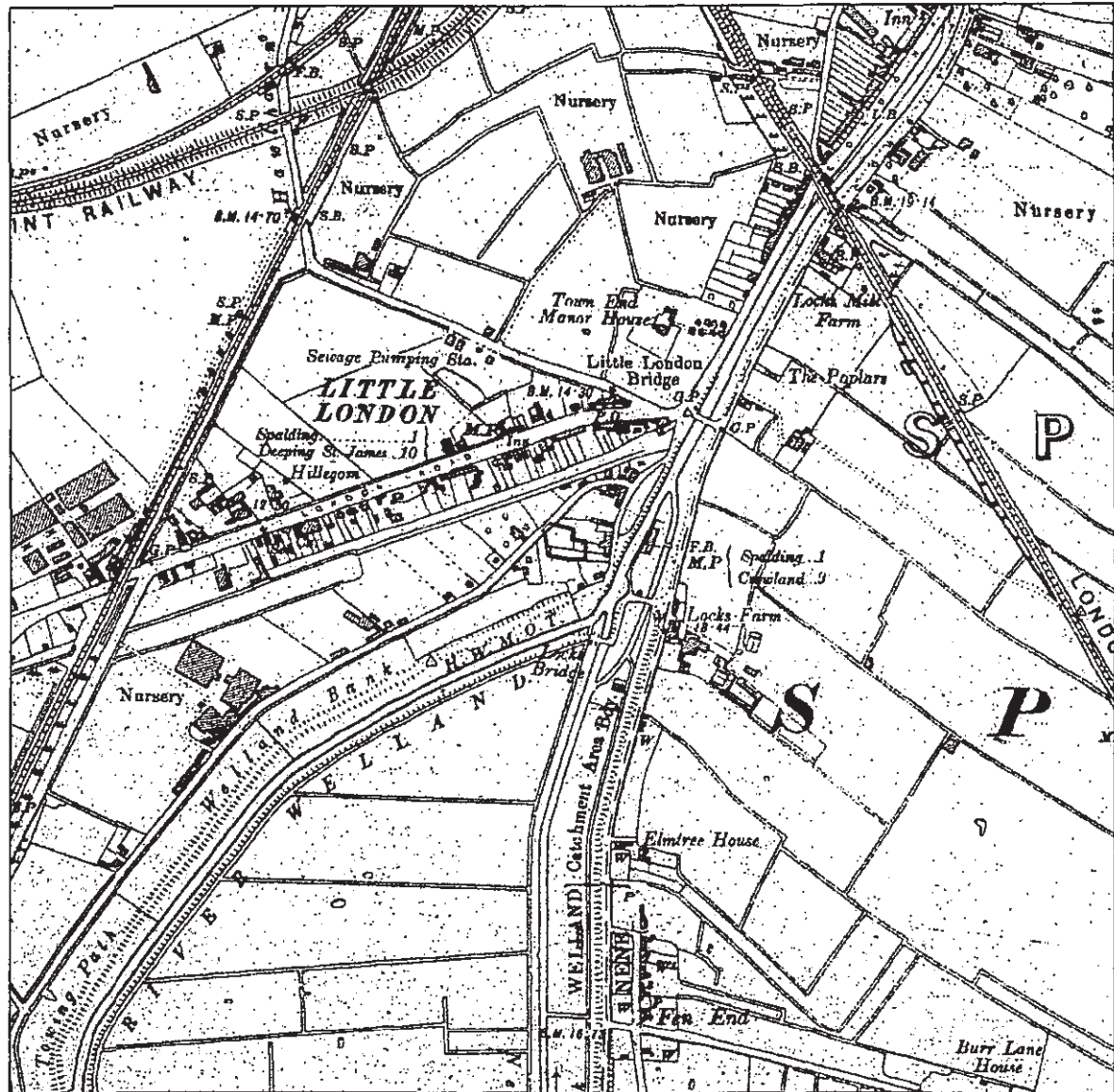
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Site History

Figure C

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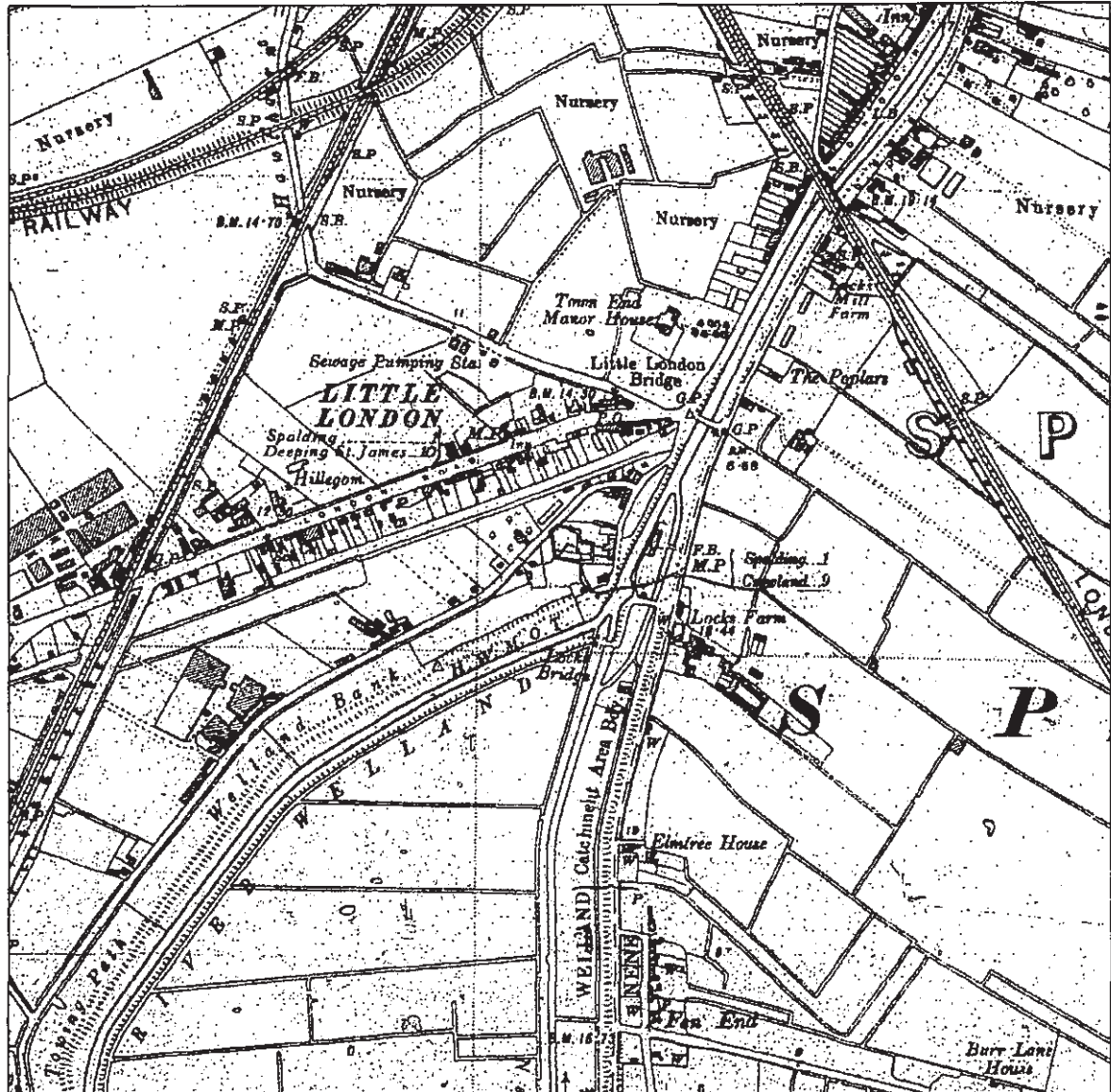
Project No.

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Site History

Figure D

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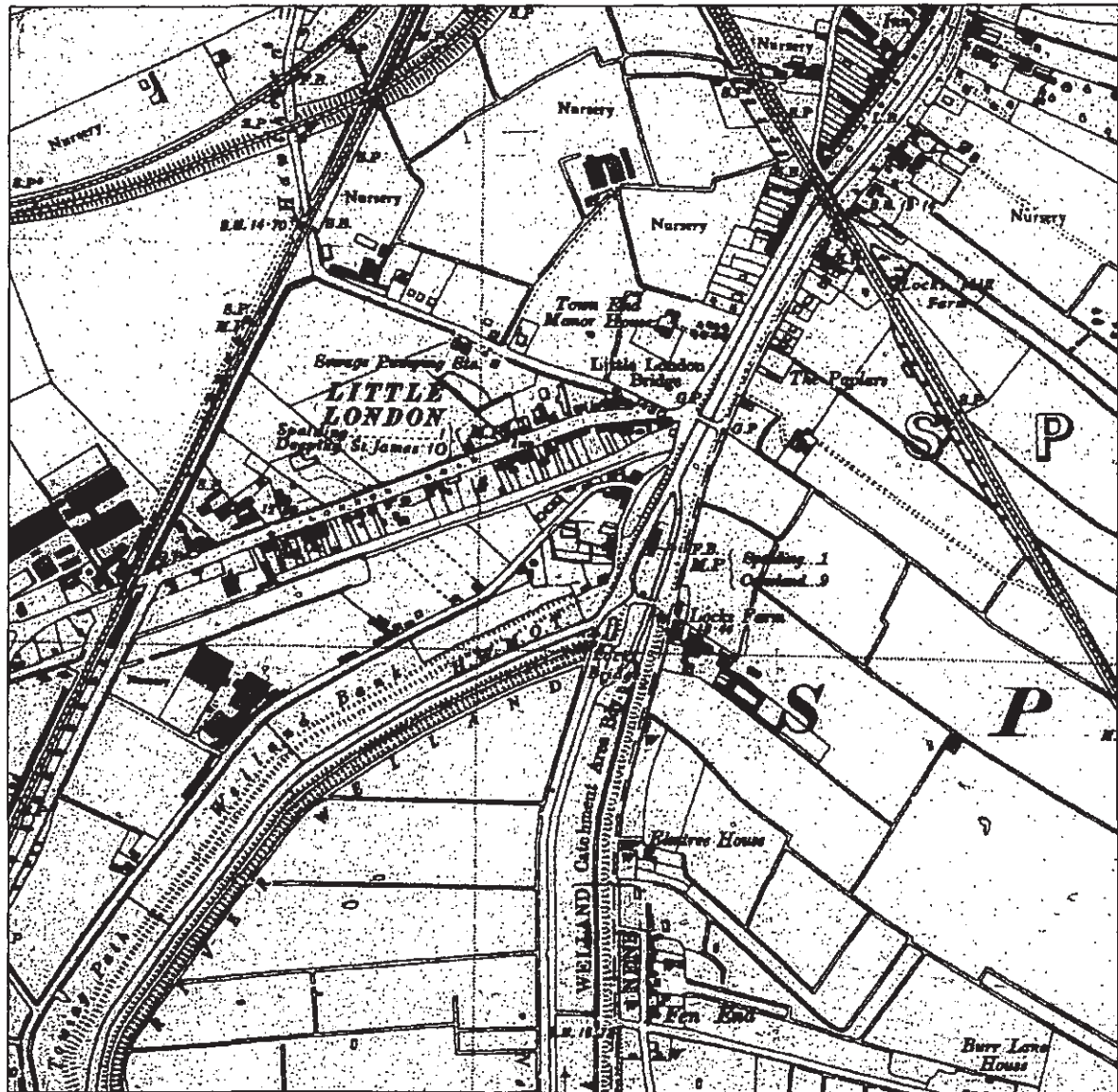
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Site History

Figure E

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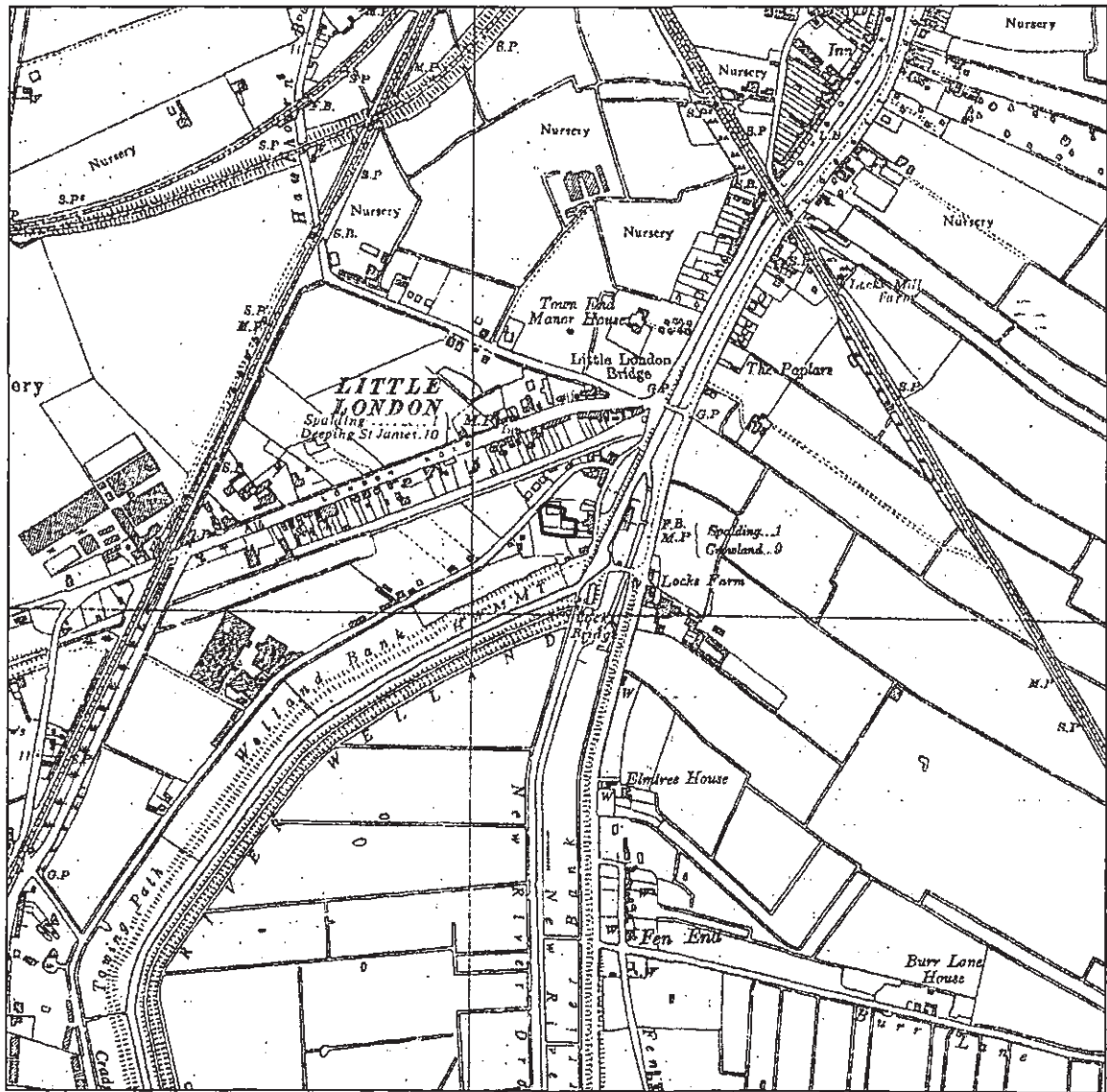
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Site History

Figure F

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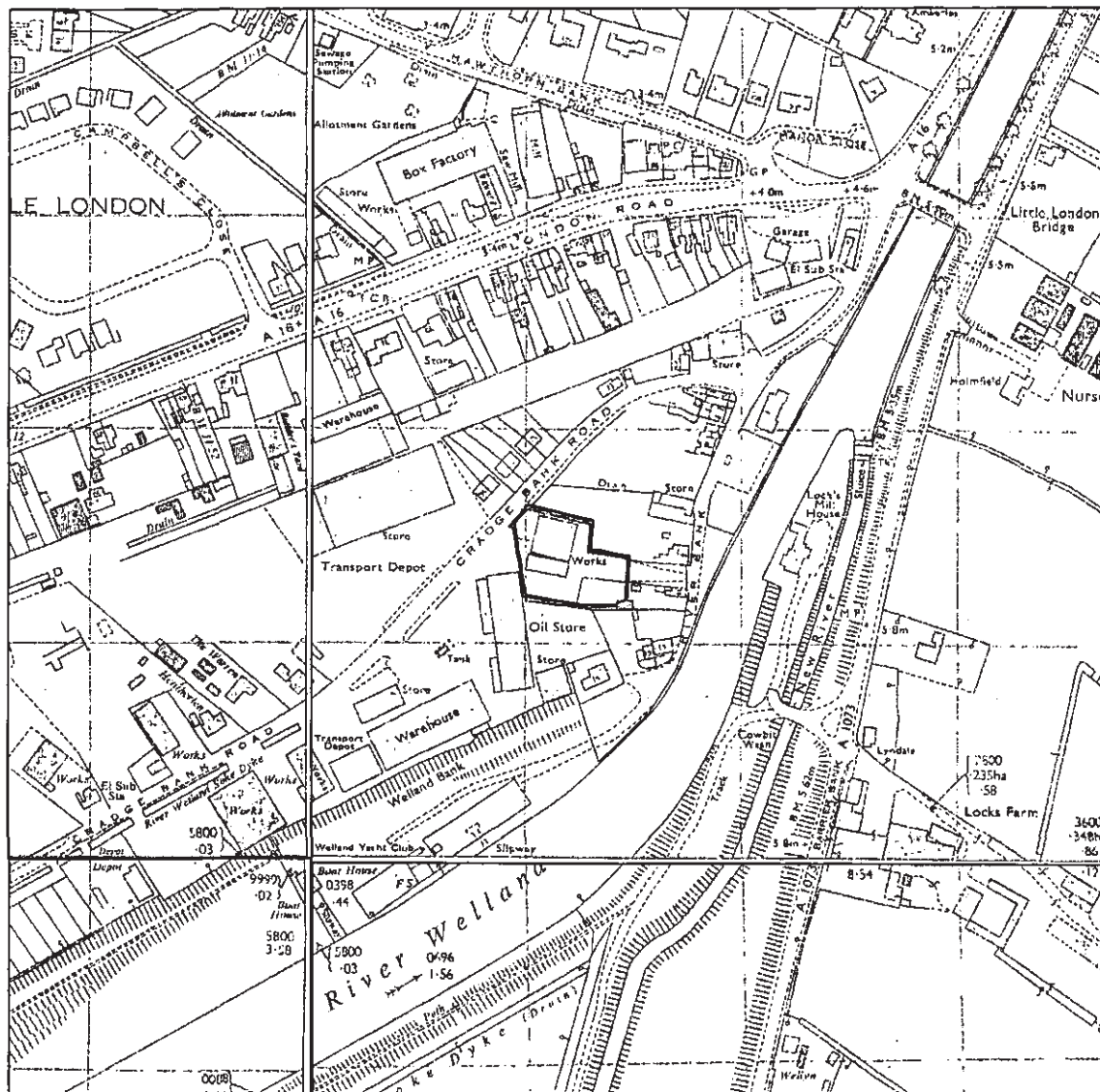
Project No.

C11252

Site History

Figure G

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Client : Brian Harding Construction Limited

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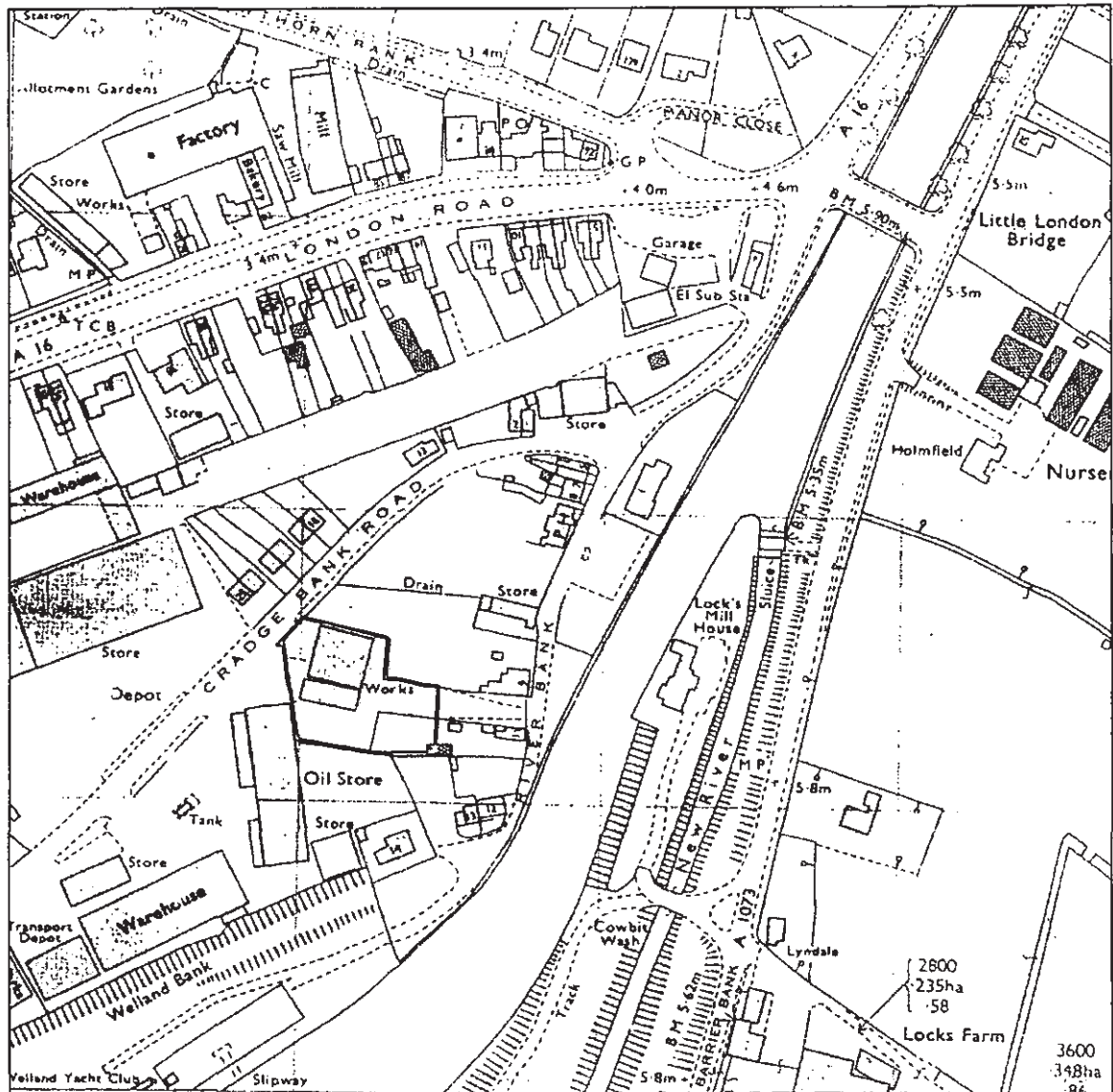
Project No.

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Site History

Figure H

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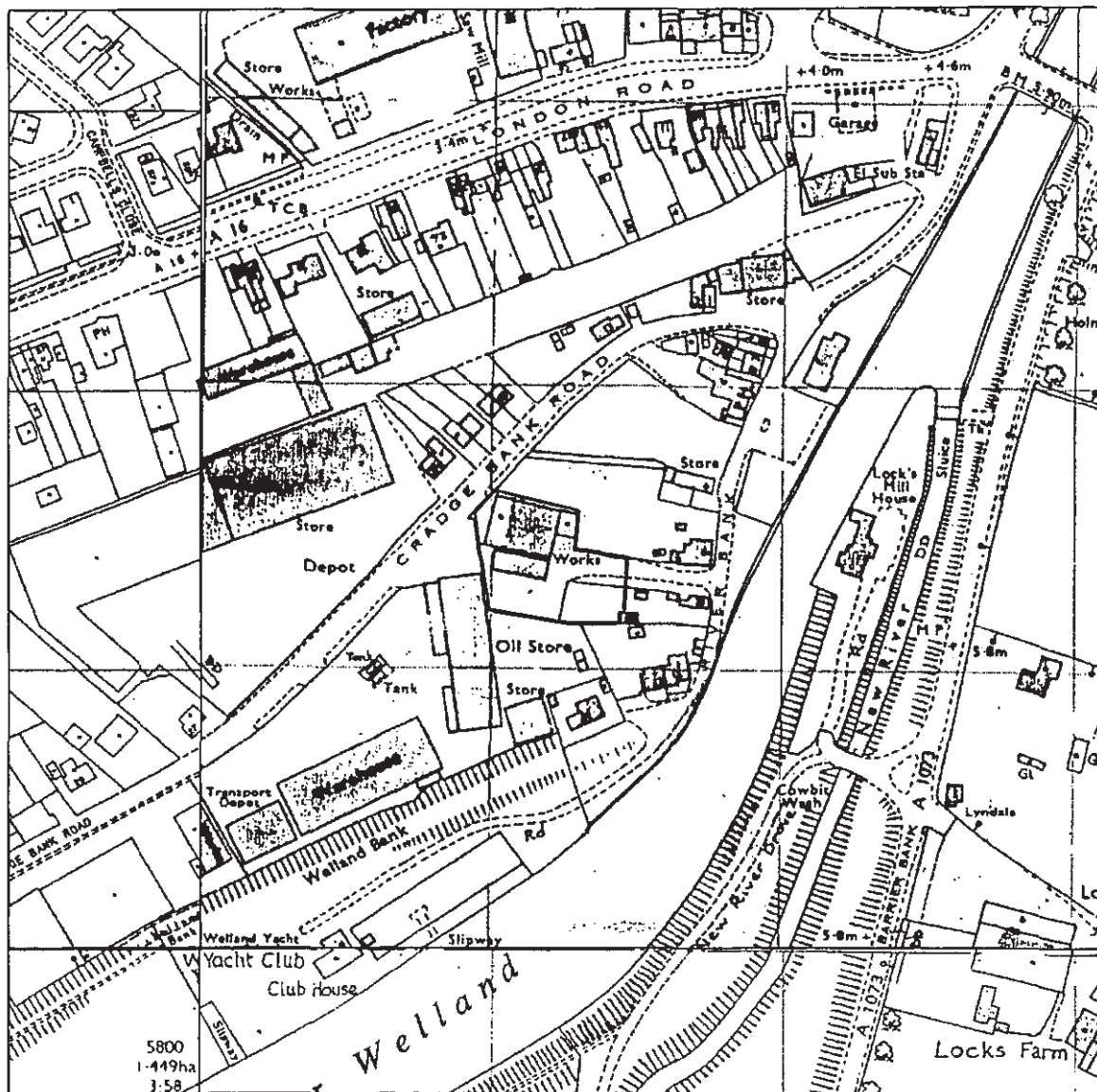
Project No.

C11252

Site History

Figure I

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Client : Brian Harding Construction Limited

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Peterborough Tel : 01733 566566

Project No.

C11252

APPENDIX 2

LANDMARK REPORT



Report on:
Cradge Bank
Spalding
PE11 3AB

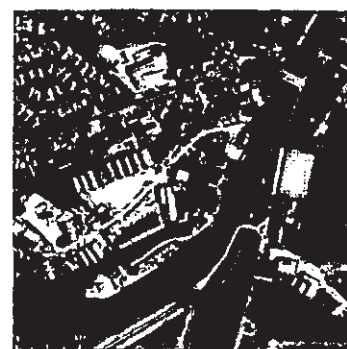
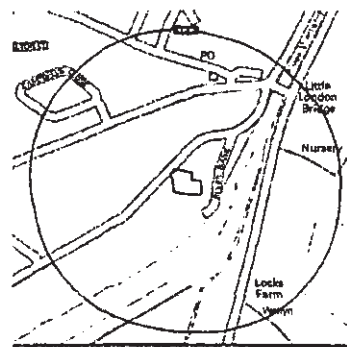
Prepared For:
Xplor Ltd (Ground Engineering)
Unit 7
Laureate Paddocks
Newmarket
Suffolk
CB8 0AP

Report Reference:
SCPRO-23228441-1-1

Report Date:
19th October 2007

Your Reference:
SW/C11252_SCD

Report Centre
National Grid Reference:
524120, 321140



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Email: customerservices@landmarkinfo.co.uk
Website: www.landmarkinfo.co.uk



Contents of the Report

This report is divided into eleven sections

Aerial Photo

The aerial photo gives an overall view of the area. The smaller large-scale Ordnance Survey map includes the site boundary and search zone buffer used throughout the report (250m).

Location Map

The accurate large-scale Ordnance Survey map confirms the boundary of the subject site. The descriptive text may identify other features which could be of relevance but not reported. The smaller aerial photo includes the site boundary.

Summary of Site

This section comprises source, pathway and receptor information found on site. Other factors which may affect the site are also included.

Summary

This section comprises of a summary table of the information found on site and in its vicinity.

Current Land Use

This section contains a map, which shows current land use features. The following pages detail these features and identify the Reference Number and direction.

Historical Land Use

This section contains a map, which shows historical land use features. The following pages detail these features and identify the Reference Number and direction. A table listing all the maps used to source this information is included.

Sensitivity

This section contains a map, which shows pathway and receptor features. The following pages detail these features and identify the Reference Number and direction. The section also contains a separate Flood Map.

Other Factors

This section contains information on other factors which may affect the site and its vicinity.

Useful Information

This section contains information which may be of use when interpreting the report.

Useful Contacts

All textual information is linked by the 'Contact Ref' to this quick reference list of contacts. These contacts may be able to supply additional information or answer any subsequent query relating to that record.

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The Sitecheck Data User guide is available free of charge from our website www.landmark-information.co.uk

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Geddings Road
Hoddesdon
Herts EN11 0NT

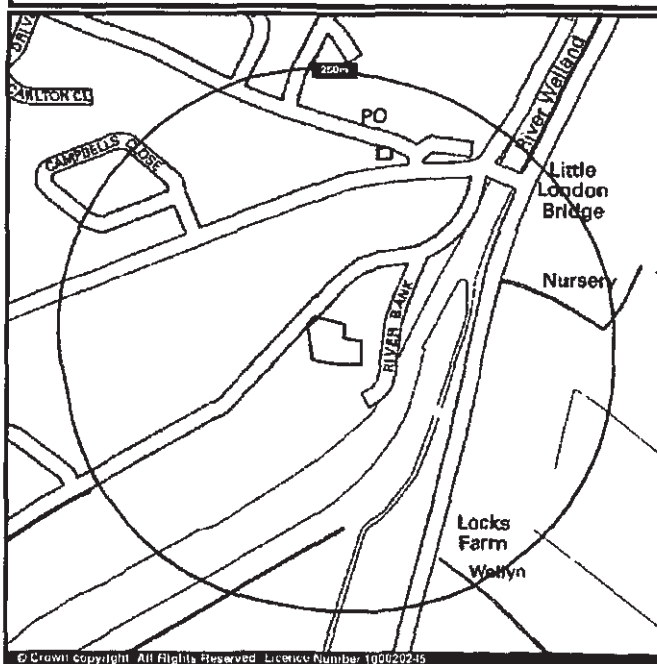
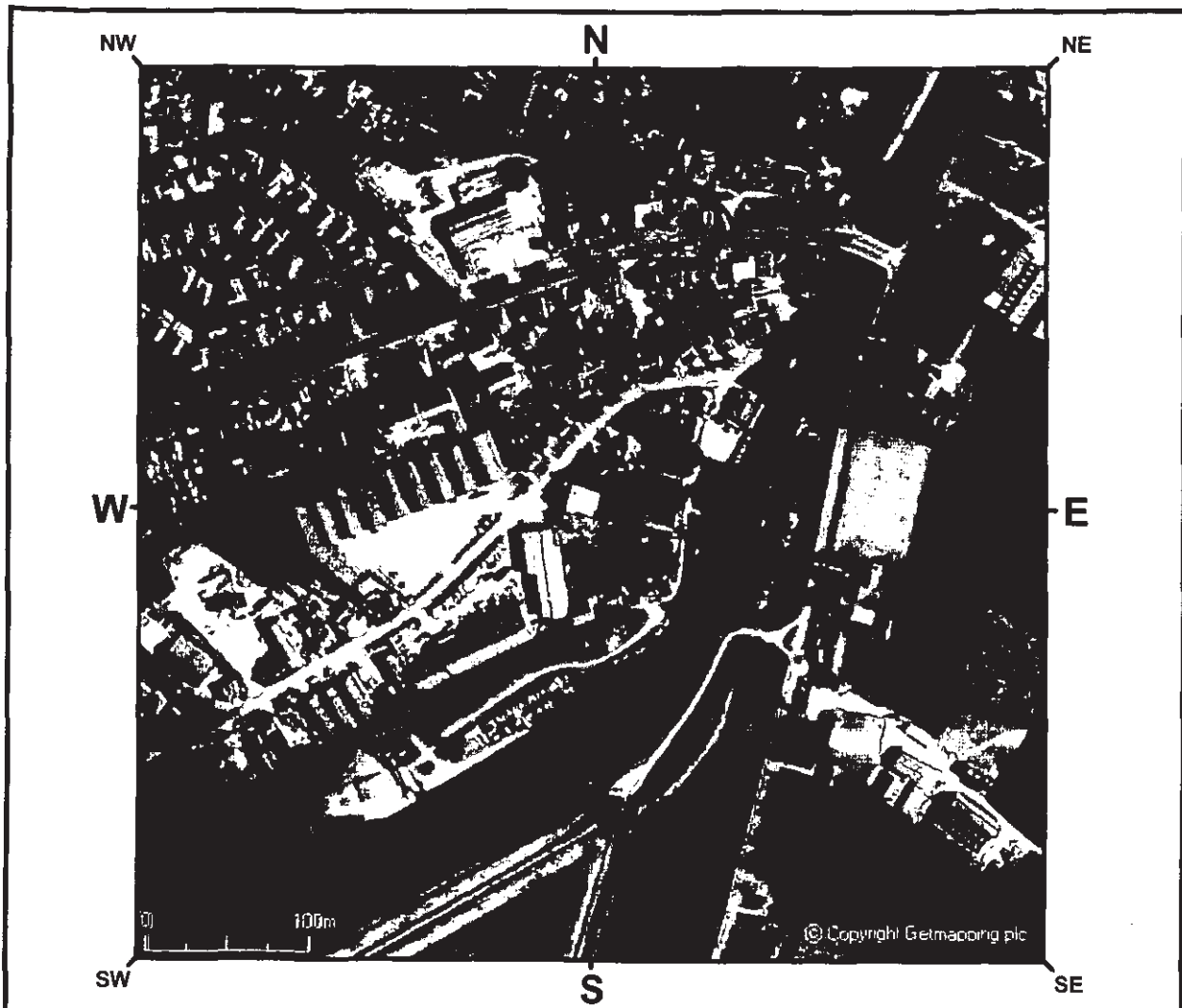
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APPEAR UNREADABLE ON
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Aerial Photo



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Site

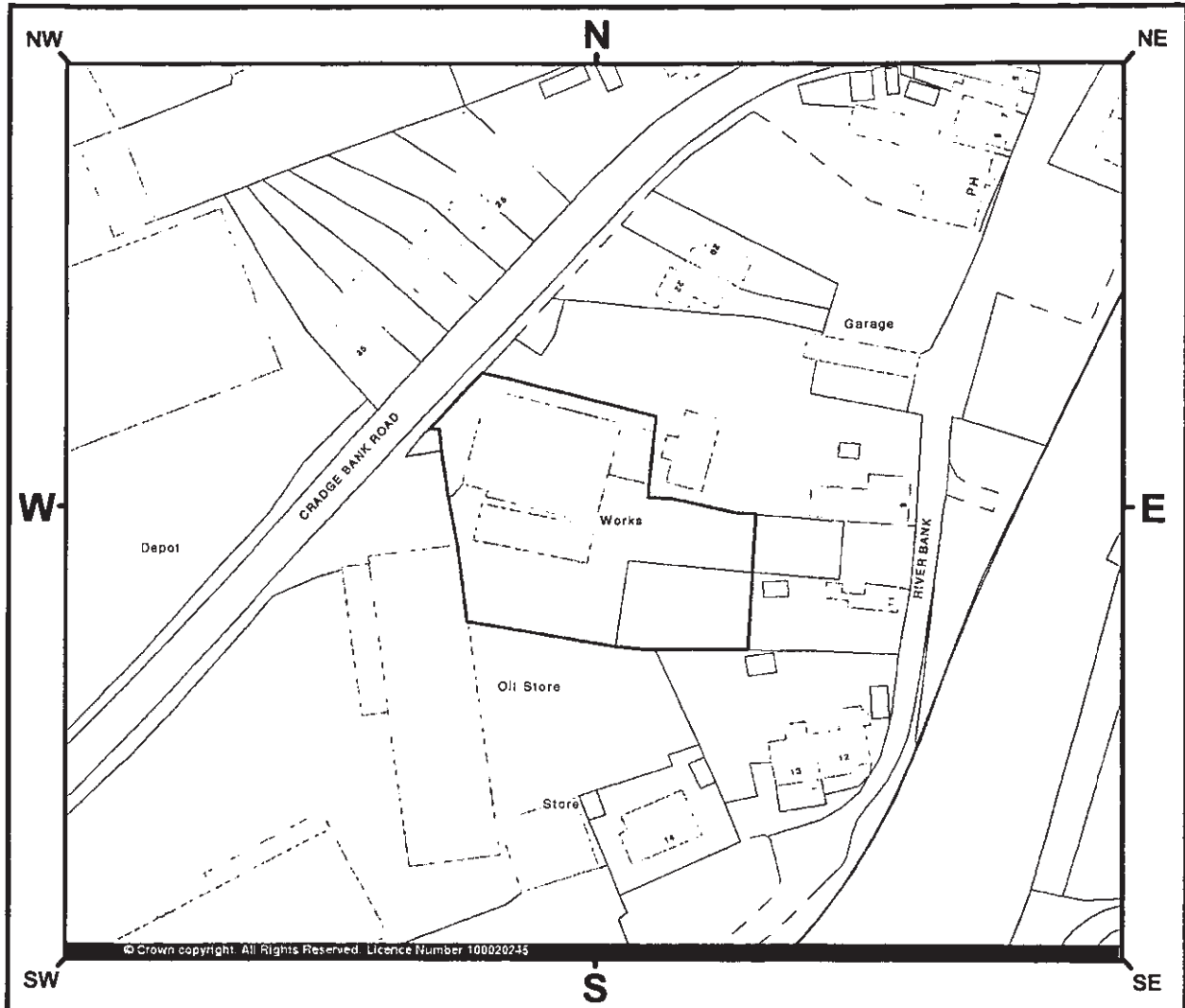
Cradge Bank
Spalding
PE11 3AB

Grid Reference

Easting 524120

Northing 321140

Location Map



Site

Cradge Bank
Spalding
PE11 3AB

Grid Reference

Easting 524120
Northing 321140

Summary of Site

**Cradge Bank
Spalding, PE11 3AB**

Sources

Current Land Use

Waste/Landfill Sites

Local Authority Landfill Coverage

Lincolnshire County Council, - Had landfill data but passed it to the relevant environment agency. Contact ref: 1

South Holland District Council, - Has no landfill data to supply. Contact ref: 2

Historical Land Use

No features were found on the site for this section.

Summary of Site

**Cradge Bank
Spalding, PE11 3AB**

Pathways and Receptors

Sensitivity

Ref. No.

Pathways

Groundwater Vulnerability

Geological Classification: Non Aquifer (Negligibly permeable) - Formations which are generally regarded as containing insignificant quantities of groundwater. However, groundwater flow through such rocks, although imperceptible, does take place and needs to be considered in assessing the risk associated with persistent pollutants, Soil Classification: Not classified, Map Scale: 1:100,000, Map Name: Sheet 24 North Northamptonshire. Contact ref: 3

Drift Deposits

No

Extreme Flooding from Rivers or Sea without Defences

Fluvial. Contact ref: 3

Flooding from Rivers or Sea without Defences

Fluvial. Contact ref: 3

Areas Benefiting from Flood Defences

No

Flood Defences

No

Summary of Site

Cradge Bank Spalding, PE11 3AB

Other Factors

Brine Compensation Areas

No

Coal Mining Affected Areas

In an area which may not be affected by coal mining

Radon Affected Areas

Less than 1% of homes are above the Action Level. Contact ref: 4

Radon Protection Measures

No radon protective measures are necessary in the construction of new dwellings or extensions. Contact ref: 5

Potential for Collapsible Ground Stability Hazards

No Hazard

Potential for Compressible Ground Stability Hazards

Moderate. Contact ref: 5

Potential for Ground Dissolution Stability Hazards

No Hazard

Potential for Landslide Ground Stability Hazards

Very Low. Contact ref: 5

Potential for Running Sand Ground Stability Hazards

Moderate. Contact ref: 5

Potential for Shrinking or Swelling Clay Ground Stability Hazards

Low. Contact ref: 5

Shallow Mining Hazards

No Hazard

Summary

Current Land Use

	On Site	0-250m
Sources	0	16
Waste/Landfill Sites		
BGS Recorded Landfill Sites	0	0
Licensed Waste Management Facilities (Landfill Boundaries)	0	0
Licensed Waste Management Facilities (Locations)	0	0
Local Authority Recorded Landfill Sites	0	0
Registered Landfill Sites	0	0
Registered Waste Transfer Sites	0	0
Registered Waste Treatment or Disposal Sites	0	0
Statutory Authorisations		
Local Authority Pollution Prevention and Controls	0	3
Contaminated Land Register Entries and Notices	0	0
Registered Radioactive Substances	0	0
Discharge Consents		
Discharge Consents	0	4
Water Industry Act Referrals	0	0
Industrial Processes		
Integrated Pollution Controls	0	0
Integrated Pollution Control Registered Waste Sites	0	0
Integrated Pollution Prevention And Control	0	0
Local Authority Integrated Pollution Prevention And Control	0	0
Storage of Hazardous Substances		
Control of Major Accident Hazards Sites (COMAH)	0	0
Explosive Sites	0	0
Notification of Installations Handling Hazardous Substances (NIHHS)	0	0
Planning Hazardous Substance Consents	0	0
Contraventions		
Local Authority Pollution Prevention and Control Enforcements	0	0
Enforcement and Prohibition Notices	0	0
Planning Hazardous Substance Enforcements	0	0
Prosecutions Relating to Authorised Processes	0	0
Prosecutions Relating to Controlled Waters	0	0
Substantiated Pollution Incident Register	0	0
Potentially Contaminative Uses		
Contemporary Trade Directory Entries	0	8
Fuel Station Entries	0	1
Miscellaneous		
BGS Recorded Mineral Sites	0	0

Historical Land Use

	On Site	0-250m
Sources	0	10
Potentially Contaminative Uses		
Historical Tanks And Energy Facilities	0	5
Potentially Contaminative Industrial Uses (Past Land Use)	0	3
Potentially Infilled Land		
Former Marshes	0	0
Potentially Infilled Land (Non-Water)	0	0
Potentially Infilled Land (Water)	0	2

Sensitivity

	On Site	0-250m
Pathways and Receptors	3	2
Pathways		
Groundwater Vulnerability	1	N/A
Drift Deposits	0	N/A
Historical Flood Liabilities	0	0
Extreme Flooding from Rivers or Sea without Defences	1	N/A
Flooding from Rivers or Sea without Defences	1	N/A
Areas Benefiting from Flood Defences	0	0
Flood Water Storage Areas	0	1
Flood Defences	0	0
River Flood Data (Scotland)	0	0
Environmentally Sensitive Receptors		
Areas of Outstanding Natural Beauty	0	0
Environmentally Sensitive Areas	0	0
Local Nature Reserves	0	0
Marine Nature Reserves	0	0
National Nature Reserves	0	0
Nearest Surface Water Feature	0	1
Ramsar Sites	0	0
Sites of Special Scientific Interest	0	0
Source Protection Zones	0	0
Special Areas of Conservation	0	0
Special Protection Areas	0	0
Water Abstractions	0	0
Protected Countryside Areas		
Forest Parks	0	0
National Parks	0	0
National Scenic Areas	0	0

Summary

Other Factors

	On Site	0-250m
	6	0
Brine Compensation Areas	0	N/A
Coal Mining Affected Areas	0	N/A
Mining Instability	0	0
Natural and Mining Cavities	0	0
Radon Affected Areas	1	N/A
Radon Protection Measures	1	N/A
Potential for Collapsible Ground Stability Hazards	0	0
Potential for Compressible Ground Stability Hazards	1	0
Potential for Ground Dissolution Stability Hazards	0	0
Potential for Landslide Ground Stability Hazards	1	0
Potential for Running Sand Ground Stability Hazards	1	0
Potential for Shrinking or Swelling Clay Ground Stability Hazards	1	0
Shallow Mining Hazards	0	0



Current Land Use

Sources

Description	Ref. No.	Search Buffer	Direction
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Waste/Landfill Sites

Local Authority Landfill Coverage

Lincolnshire County Council, - Had landfill data but passed it to the relevant environment agency. Contact ref: 1	-	On Site	-
South Holland District Council, - Has no landfill data to supply. Contact ref: 2	-	On Site	-

Statutory Authorisations

Local Authority Pollution Prevention and Controls

Little London Service Station, Little London, Spalding, Part B - Fuel and Power Industry Sector, Reference: Not Supplied, Status: Authorised, Positional Accuracy: Manually positioned to the address or location. Contact ref: 2	1	0-250m	NE
Malthurst Petroleum Ltd, London Road, Spalding, Part B - Fuel and Power Industry Sector, Reference: Not Supplied, Status: Authorised, Positional Accuracy: Automatically positioned to the address. Contact ref: 2	2	0-250m	NE
Lafarge Redland Readymix Ltd, Cradge Bank, Spalding, Part B - Mineral Industry Sector, Reference: Not Given, Status: Authorised, Positional Accuracy: Manually positioned to the road within the address or location. Contact ref: 2	3	0-250m	SW

Discharge Consents

Discharge Consents

Welland Yacht Club, Welland Yacht Club River Bank, Spalding, Pe11 3aa, Unknown Discharge, Reference: Pr5lf3041, Version: 1, Status: Post National Rivers Authority Legislation where issue date > 31/08/1989, Positional Accuracy: Located by supplier to within 10m. Contact ref: 3	4	0-250m	S
G R Hastings, Locksmill House The Island, Cowbit Rd, Spalding, Lincs, Pe12 6aa, Sewage Discharge, Reference: Pmrf09915, Version: 1, Status: Post National Rivers Authority Legislation where issue date > 31/08/1989, Positional Accuracy: Located by supplier to within 100m. Contact ref: 3	5	0-250m	E
Redland Readymix Ltd, Cradge Bank Road Spalding, Trade Discharge, Reference: Pmrf04494, Version: 1, Status: Post National Rivers Authority Legislation where issue date > 31/08/1989, Positional Accuracy: Located by supplier to within 10m. Contact ref: 3	6	0-250m	W
Lafarge Redland Aggregates Limited, Cradge Bank Road Spalding, Trade Discharge, Reference: Pmrf04494, Version: 2, Status: Post National Rivers Authority Legislation where issue date > 31/08/1989, Positional Accuracy: Located by supplier to within 100m. Contact ref: 3	7	0-250m	W

Potentially Contaminative Uses

Contemporary Trade Directory Entries

Motor Repairs, Cradge Bank, Spalding, Garage Services, Status: Active, Positional Accuracy: Automatically positioned to the address	8	0-250m	NE
Motor Repairs, Cradge Bank, Little London, Spalding, Garage Services, Status: Active, Positional Accuracy: Manually positioned within the geographical locality	9	0-250m	W
Rooke Agencies Pet & Animal Feeds Ltd, Cradge Bank, Spalding, Pet Foods & Animal Feeds, Status: Inactive, Positional Accuracy: Automatically positioned to the address	10	0-250m	W
4 W D Services, River Bank, Spalding, Garage Services, Status: Active, Positional Accuracy: Automatically positioned to the address	11	0-250m	NE
Lafarge Aggregates Ltd, Cradge Bank, Spalding, Concrete & Mortar Ready Mixed, Status: Active, Positional Accuracy: Manually positioned within the geographical locality	12	0-250m	W
Svr, Unit 1, 35 Little London, Spalding, Valve Manufacturers & Suppliers, Status: Active, Positional Accuracy: Manually positioned to the address or location	13	0-250m	NW
Bp Express Shopping, Little London, Spalding, Petrol Filling Stations - 24 Hour, Status: Active, Positional Accuracy: Manually positioned to the address or location	14	0-250m	NE

Current Land Use

Description	Ref. No.	Search Buffer	Direction
Contemporary Trade Directory Entries			
A H Lewis, ,50,Cradge Bank,Spalding, Asphalt & Coated Macadam Laying Contractors, Status: Inactive, Positional Accuracy: Automatically positioned to the address	15	0-250m	SW
Fuel Station Entries			
Malthurst Spalding, London Road,Little London,Spalding. Fuel Station, Status: Open, Positional Accuracy: Automatically positioned to the address	16	0-250m	NE



Historical Land Use

Sources

Description	Ref. No.	Search Buffer	Direction
Potentially Contaminative Uses			
Historical Tanks And Energy Facilities			
Oil Industry Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1973	1	0-250m	S
Tanks, Scale of Mapping: 1:2,500, Date of Mapping: 1973	2	0-250m	SW
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1968 - 1973	3	0-250m	NE
Potential Tanks, Scale of Mapping: 1:2,500, Date of Mapping: 1968 - 1973	4	0-250m	NE
Electrical Sub Station Facilities, Scale of Mapping: 1:2,500, Date of Mapping: 1968	5	0-250m	SW
Potentially Contaminative Industrial Uses (Past Land Use)			
Road haulage, Date of mapping: 1992	6	0-250m	NW
Factory or works - use not specified, Date of mapping: 1992	7	0-250m	SW
Sewage, Date of mapping: 1932-1938	8	0-250m	NW
Potentially Infilled Land			
Potentially Infilled Land (Water)			
Unknown Filled Ground (Pond, marsh, river, stream, dock etc), Date of Mapping: 1932	9	0-250m	N
Unknown Filled Ground (Pond, marsh, river, stream, dock etc), Date of Mapping: 1932	10	0-250m	N

Historical Land Use

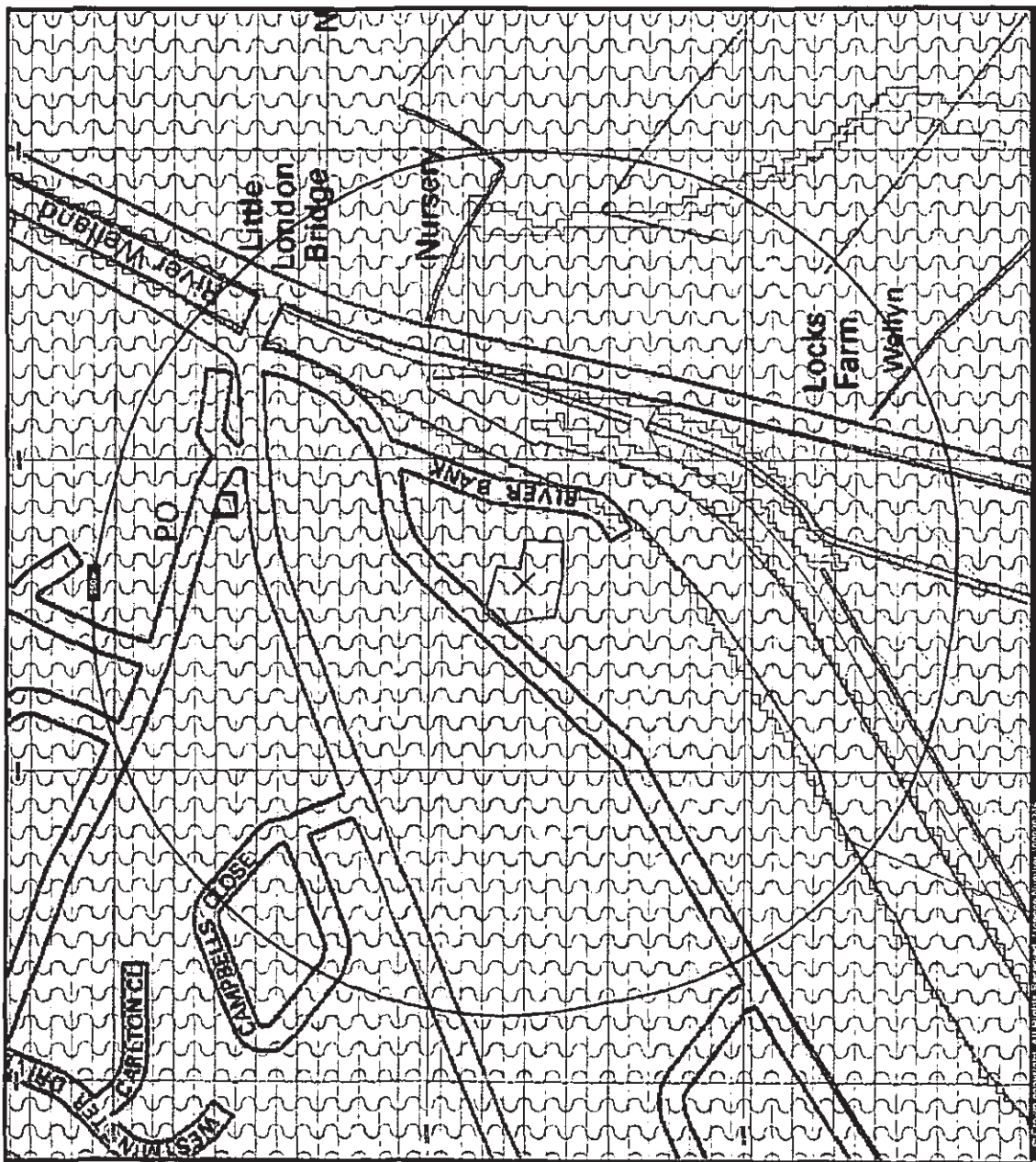
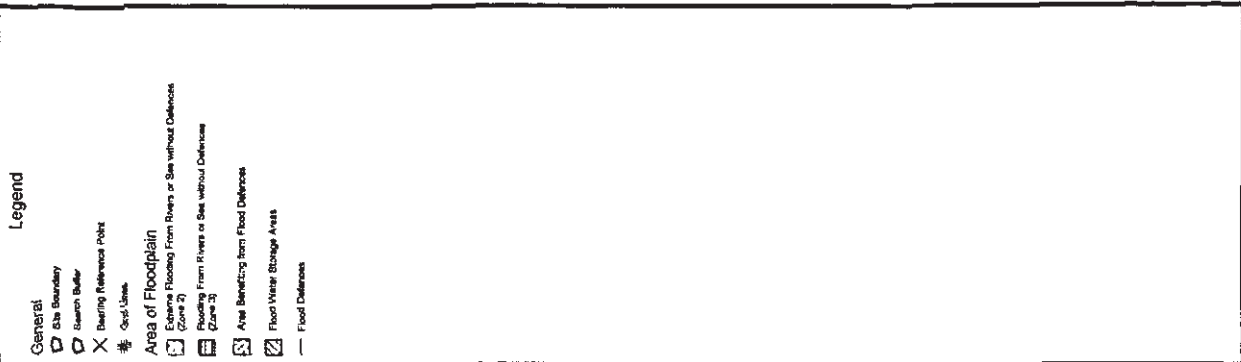
Map Details

The following maps have been analysed for Historical Tanks and Energy Facilities.

1:2,500	Mapsheet	Published Date
National Grid	TF2320	1968
National Grid	TF2321	1968
National Grid	TF2420	1968
National Grid	TF2421	1968
National Grid	TF2421	1973

The following maps have been analysed for Potentially Contaminative Uses and Potentially Infilled Land information.

1:10,560	Mapsheet	Published Date
Lincolnshire	142_NW	1889
Lincolnshire	142_NW	1906
Lincolnshire	142_NW	1932
Lincolnshire	142_NW	1938
National Grid	TF22SW	1959
1:10,000	Mapsheet	Published Date
National Grid	TF22SW	1992



Pathways and Receptors

Description	Ref. No.	Search Buffer	Direction
Pathways			
Groundwater Vulnerability			
Geological Classification: Non Aquifer (Negligibly permeable) - Formations which are generally regarded as containing insignificant quantities of groundwater. However, groundwater flow through such rocks, although imperceptible, does take place and needs to be considered in assessing the risk associated with persistent pollutants, Soil Classification: Not classified, Map Scale: 1:100,000, Map Name: Sheet 24 North Northamptonshire. Contact ref: 3	-	On Site	-
Drift Deposits			
No	-	N/A	
Extreme Flooding from Rivers or Sea without Defences			
Fluvial. Contact ref: 3	-	On Site	-
Flooding from Rivers or Sea without Defences			
Fluvial. Contact ref: 3	-	On Site	-
Areas Benefiting from Flood Defences			
No	-	N/A	
Flood Water Storage Areas			
Flood Water Storage Areas. Contact ref: 3	-	0-250m	SE
Flood Defences			
No	-	N/A	



Pathways and Receptors

Description

Ref. No.	Search Buffer	Direction
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Environmentally Sensitive Receptors

Nearest Surface Water Feature

0-250m

1	0-250m	E
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Other Factors

Description	Search Buffer	Direction
Brine Compensation Areas		
No	N/A	
Coal Mining Affected Areas		
In an area which may not be affected by coal mining	N/A	
Radon Affected Areas		
Less than 1% of homes are above the Action Level. Contact ref: 4	On Site	-
Radon Protection Measures		
No radon protective measures are necessary in the construction of new dwellings or extensions. Contact ref: 5	On Site	-
Potential for Collapsible Ground Stability Hazards		
No Hazard	N/A	
Potential for Compressible Ground Stability Hazards		
Moderate. Contact ref: 5	On Site	-
Potential for Ground Dissolution Stability Hazards		
No Hazard	N/A	
Potential for Landslide Ground Stability Hazards		
Very Low. Contact ref: 5	On Site	-
Potential for Running Sand Ground Stability Hazards		
Moderate. Contact ref: 5	On Site	-
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
Low. Contact ref: 5	On Site	-
Shallow Mining Hazards		
No Hazard	N/A	

Useful Information

Useful Information

Registered Landfill Sites

At present no complete national data set exists for landfill site boundaries, therefore a point grid reference, provided by the data supplier, is used for some landfill sites. In certain cases the point grid references supplied provide only an approximate position, and can vary from the site entrance to the centre of the site. Where the exact position of the site is unclear, Landmark construct either a 100 metre or 250 metre "buffer" around the point to warn of the possible presence of landfill. The size of this 'buffer' relates to the positional accuracy that can be attributed to the site. The "buffer" is shown on the map as an orange cross-hatched circle and is referred to in the map legend as a Potential Landfill Buffer. Where actual boundaries are available, the landfill site area is shown on the map as a red diagonal hatched polygon and referred to in the map legend as Registered Landfill Site.

Local Authority Recorded Landfill Sites

Local Authority landfill data are sourced from individual local authorities that were able to provide information on sites operating prior to the introduction of the Control of Pollution Act (COPA) in 1974.

Appropriate authorities are listed under Local Authority Landfill Coverage with an indication of whether or not they were able to make landfill data available. Details of any records identified are disclosed. You should be aware that if the local authority 'Had landfill data but passed it to the relevant environment agency' it does not necessarily mean that local authority landfill data is included in our other Landfill datasets.

In addition if no data has been made available, for all or part of the search area, you should be aware that a negative response under 'Local Authority Recorded Landfill Sites' does not necessarily confirm that no local authority landfills exist.

Flooding

The Sitecheck report flood map plots all flood related features revealed within the search area as supplied by the relevant agency. However, to avoid confusion, the text entry in the body of the report only reveals the detail of the nearest feature in each flood data set.

This is also reflected in the summary table where only a single entry is included to indicate the search buffer of the nearest occurrence.

Mining Instability Data

The Mining Instability data was obtained on Licence from Ove Arup & Partners Limited (for further information, contact mining.review@arup.com). No reproduction or further use of such Data is to be made without the prior written consent of Ove Arup & Partners Limited. The information and data supplied in the Product are derived from publicly available records and other third party sources and neither Ove Arup & Partners nor Landmark warrant the accuracy or completeness of such information or data.



Useful Contacts

Contact Name and Address

- 1** **Lincolnshire County Council**
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Lincolnshire
LN1 1DN

PublicRelations@lincolnshire.gov.uk
www.lincolnshire.gov.uk

Telephone 01522 552222
Fax 01522 552288
- 2** **South Holland District Council Environmental Services**
Council Offices
Priory Road
Spalding
Lincolnshire
PE11 2XE

www.sholland.gov.uk
- 3** **Environment Agency National Customer Contact Centre (NCCC)**
PO Box 544
Templeborough
Rotherham
S60 1BY

enquiries@environment-agency.gov.uk

Telephone 08708 506 506
- 4** **Health Protection Agency**
Chilton
Didcot
Oxfordshire
OX11 0RQ

Telephone 01235 831600
Fax 01235 833891
- 5** **British Geological Survey Enquiry Service**
British Geological Survey
Kingsley Dunham Centre
Keyworth
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NG12 5GG

enquiries@bgs.ac.uk
www.bgs.ac.uk

Telephone 0115 936 3143
Fax 0115 936 3276

Please note that the Environment Agency / SEPA have a charging policy in place for enquiries.

Other Contacts

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solving underlying problems