Rochford District Council

Council Offices, South Street
Rochford Essex SS4 1BW
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Application for approval of details reserved by condition.

Town and Country Planning Act 1990

Planning (Listed Buildings and Conservation Areas) Act 1990

You can complete and submit this form electronically via the Planning Portal by visiting www.planningportal.gov.uk/apply

Publication of applications on planning authority websites

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website. If you require any further clarification, please contact the Authority's planning department.

Please complete using block capitals and black ink.
It is important that you read the accompanying guidance notes as incorrect completion will delay the processing of your application.

1. Applicant Name and Address

Title:	MR
First name:	WARREN
Last name:	SPARKES
Company (optional):	TAYLOR WIMPEY EAST LONDON
Unit:	
House number:	
House suffix:	
House name:	KINGS HOUSE
Address 1:	101-135 KINGS ROAD
Address 2:	
Address 3:	
Town:	BRENTWOOD
County:	ESSEX
Country:	
Postcode:	CM14 4DR

2. Agent Name and Address

Title:	
First name:	
Last name:	
Company (optional):	
Unit:	
House number:	
House suffix:	
House name:	
Address 1:	
Address 2:	
Address 3:	
Town:	
County:	
Country:	
Postcode:	

3. Site Address Details

Please provide the full postal address of the application site.

Unit:	
House number:	
House suffix:	
House name:	THE FORMER BRICKWORKS
Address 1:	STAR LANE
Address 2:	GREAT WAKERING
Address 3:	
Town:	
County:	ESSEX
Postcode (optional):	SS13 0PJ.

Description of location or a grid reference.
(must be completed if postcode is not known):

Easting: Northing:

Description:

4. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application? ☐ Yes ☒ No

If Yes, please complete the following information about the advice you were given. (This will help the authority to deal with this application more efficiently).

Please tick if the full contact details are not known, and then complete as much as possible: ☐

Officer name:

Reference:

Date (DD/MM/YYYY):
(must be pre-application submission)

Details of pre-application advice received?

5. Description Of Your Proposal

Please provide a description of the approved development as shown on the decision letter, including the application reference number and date of decision in the sections below:

REDEVELOPMENT TO PROVIDE 116 DWELLINGS COMPRISING OF 7 NO. ONE-BEDROOMED FLATS, 6 NO. TWO-BEDROOMED FLATS, 24 NO. TWO-BEDROOMED HOUSES, 44 NO. THREE-BEDROOMED HOUSES AND 35 NO. FOUR-BEDROOMED HOUSES, WITH ASSOCIATED PARKING, LANDSCAPING AND OPEN SPACE, ACCESS FROM STAR LANE AND CONSTRUCTION OF SUB-STATION.

Reference number: 12/00252 Date of decision: 25/09/14 (Date must be pre-application submission) (DD/MM/YYYY)

Please state the condition number(s) to which this application relates:

1.	30	6.	38
2.	32	7.	49
3.	34	8.	51
4.	35	9.	
5.	42	10.	

Has the development already started? ☐ Yes ☒ No

If Yes, please state when the development started (DD/MM/YYYY): (date must be pre-application submission)

Has the development been completed? ☐ Yes ☒ No

If Yes, please state when the development was completed (DD/MM/YYYY): (date must be pre-application submission)

6. Discharge Of Condition

Please provide a full description and/or list of the materials/details that are being submitted for approval:

30 - ECOLOGICAL MITIGATION REPORT, 32 - SITE INVESTIGATION REPORT, 34/35/42 - CONSTRUCTION H+S PLAN; 38 DESK BASED ASSESSMENT, 49 MINERALS PLAN, 51-3451, 3453 3458, 3464

7. Part Discharge Of Condition(s)

Are you seeking to discharge only part of a condition? ☐ Yes ☐ No

If Yes, please indicate which part of the condition your application relates to:

8. Planning Application Requirements - Checklist

Please read the following checklist to make sure you have sent all the information in support of your proposal. Failure to submit all information required will result in your application being deemed invalid. It will not be considered valid until all information required by the Local Planning Authority has been submitted.

The original and 3 copies of a completed and dated application form: ☑

The original and 3 copies of other plans and drawings or information necessary to describe the subject of the application: ☑

The correct fee: ☑

9. Declaration

I/we hereby apply for planning permission/consent as described in this form and the accompanying plans/drawings and additional information. I/we confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the person(s) giving them.

Signed - Applicant: W Sparkes

Or signed - Agent:

Date (DD/MM/YYYY): 01/07/15. (date cannot be pre-application)

10. Applicant Contact Details

Telephone numbers

Country code:	National number:	Extension number:
01277	236800	6875

Country code: Mobile number (optional):

Country code: Fax number (optional):

Email address (optional): warren.sparkes@taylorwimpey.com

11. Agent Contact Details

Telephone numbers

Country code:	National number:	Extension number:

Country code: Mobile number (optional):

Country code: Fax number (optional):

Email address (optional):

12. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land? ☐ Yes ☐ No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact? *(Please select only one)* ☐ Agent ☐ Applicant ☐ Other (if different from the agent/applicant's details)

If Other has been selected, please provide:

Contact name: Telephone number:

Email address:

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ADDRESS
Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
TELEPHONE 01603 298076
FAX 01603 298075
EMAIL info@geosphere-environmental.co.uk

GROUND ENGINEERING

Newark Road
Peterborough PE1 5UA
Tel: 01733 566566 Fax: 01733 315280

SITE INVESTIGATION REPORT

STAR LANE

GREAT WAKERING

Report Reference No. C12519

On behalf of:-

Taylor Wimpey
Taylor Wimpey East London
Kings House
101-135 Kings Road
Brentwood
CM14 4DR

December 2011

TAYLOR WIMPEY

ELLIS & MOORE

CONSULTING ENGINEERS

REPORT ON A SITE INVESTIGATION

AT

STAR LANE

GREAT WAKERING

ESSEX

Report Reference No. C12519 **December 2011**

INTRODUCTION

Taylor Wimpey, the client, intends to redevelop a former brick works site at Star Lane, Great Wakering, Essex for residential purposes. The buildings, kilns, chimneys and other structures of the former brick works were demolished in 2007.

The proposed dwellings are to be two or three-storey buildings with anticipated strip loadings at ground level in the order of 100kN per metre run.

Ground Engineering Limited was instructed by the client's Consulting Engineers, Ellis & Moore, to carry out a site investigation comprising a desk study into the former uses of the site and a ground investigation. The ground investigation was to determine the nature and geotechnical properties of the underlying soils in relation to foundation design and construction. In addition, a contamination assessment was to be included within the scope of this investigation.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

Great Wakering is a village situated some 6km north-east of the centre of Southend-on-Sea and 2.5km north of Shoeburyness within eastern Essex. Star Lane is a south to north aligned minor road, the B1017, which runs southwards from the western end of the village towards North Shoebury. The site is located on the eastern side of Star Lane 400m south of the northern end of Star Lane and is centred at National Grid Reference TQ 93451 87419.

The rectangular site has a 150m long frontage onto the eastern side of Star Lane from which it extends east for 200m. The site is bounded to the east by flooded former brick clay and sand and gravel pits; to the south by arable fields; and to the north by a small industrial estate.

At the time of this investigation the site was covered by extensive areas of concrete hardstanding, old roadways and the former floor slabs of the brick works buildings. Locally the surface was covered with crushed brick rubble and compacted stone. The western, southern and eastern limits of the site were formed by overgrown Brambles and Hawthorn hedges lining fencing that was locally dilapidated. A track ran along the southern side of the site and vehicular access was via gated entrances at the western end of this track and within the centre of the Star Lane frontage. The latter had a number of large concrete blocks placed behind the gates. A 2m deep ditch was present between the western site boundary and Star Lane.

The level site generally stands at an approximate elevation of 11.0mOD, although its south-eastern corner falls gently down towards the east to about 9.5mOD. The surrounding area slopes down gently to about 2mOD on the Thames estuary coast, some 2km to the south-east of the site.

The 1976 geological map for the area at 1:50,000 scale, Sheet 258, shows the site to be covered by First Terrace Loam (Brickearth) and underlain by First Terrace Sand and Gravel, and the solid geology of the London Clay. An extensive area of worked out ground is depicted

on this map immediately to the south and east of the site, former brick clay and sand and gravel pits.

A previous initial contamination assessment report was undertaken by DTS Raeburn (Reference E11997/2) in December 2006 and targeted three areas identified by a previous desk study. These areas were a 40,000 litre above ground diesel storage tank at the western edge of the site; three external above ground oil and diesel tanks near the kilns; and the area around the former transport building.

The investigation found a surface cover of made ground between 0.10m and 1.00m thick, which covered sandy clay to between 2.00m and 3.00m below ground level, and then water-bearing sand to at least 4.00m depth where the deepest holes were completed. Groundwater was encountered at about 3.00m depth below the lowest, south-eastern corner of the site.

Elevated extractable petroleum hydrocarbons were recorded in the sand at 3.70m depth in a pit close to the southern end of the 40,000 litre above ground diesel storage tank at the western edge of the site, whilst in a single sample of near surface made ground in another pit 'elevated concentrations of arsenic, lead and nickel' were reported.

HISTORY OF THE SITE

Historical maps dating between 1873 and the present day have been reviewed as part of this desk study together with some internet research. Based on the available information from these sources it was not considered necessary to reference street or trade directories for this site. Selected map sheets are presented in Appendix 1 and a preliminary unexploded ordnance (UXO) risk assessment is presented in Appendix 2.

The 1st Edition O.S. map for the area, Essex Sheet LXXIX.5, was published at 1:2500 scale in 1873 and shows the site within a large open field on the eastern side of the tree-lined Star Lane. The southern limit of the site was marked by a field boundary that had occasional trees dotted along it (Figure A).

The 1897, 2nd Edition O.S. map for the area at the scale as the 1st Edition, Essex Sheet LXXIX.5 (Figure B), shows the site unchanged and as before.

The 1923, 3rd Edition O.S. map, Essex Sheet LXXXIII.16 at 1:2500 scale, shows the site unchanged (Figure C). A pumping station (Southend Water Works Company) was marked 250m to the west of the site.

The Star Lane Brick Works opened in 1932 but was not depicted on the 1938, Provisional Edition of Essex Sheet LXXXIII SE at 1:10,560 scale (Figure D). This shows the site still undeveloped but with a track running across its southern half. Immediately to the north of the site two buildings are outlined on the eastern side of Star Lane, whilst further north a row of six small buildings, aligned west to east, are detailed. This map shows the village of Great Wakering to the north-east of the site and ribbon residential development along the roads to the north. An old clay pit was marked some 850m to the north at the southern end of Little Wakering; extensive brick pits were denoted to the north of Great Wakering; and a small excavation, called Paton's Pit, was present at the western end of Great Wakering near Horner's Corner.

The UXO risk assessment (Appendix 2) indicates a low bombing density for the local area with no World War Two bomb strikes recorded within the site boundary.

The first available post-war map of the area, the 1961 edition of TQ 98 NW at 1:10,560 scale, has the site (Figure E) occupied by a works (the brick works), which had a north to south aligned range of buildings within its centre and a line of small buildings along its western side, the eastern side of Star Lane. The works included the row of six buildings to the north and had an access road to the northern end of the main works building. The track along the southern side of the works extended eastwards to an irregularly shaped, flooded sand and gravel pit. The land to the north of the water-filled pit had changes of slope marked indicating the presence of a large shallow rectangular excavation to the south-west of the village. Similar large shallow excavations were marked 500m to the south of the site.

The 1966 edition of TQ 9387 at 1:2500 scale (Figure F) shows the brick works in detail with four sets of chimneys and associated buildings (kilns) on either side of the previously described works buildings within the centre of the site. Two open-sided buildings were also present at the northern end of the central range of works buildings. The land to the south of the site had been apparently worked by the time of this survey as a 'break in slope' was depicted immediately beyond the track along the southern site boundary showing that this field was now at a lower level than the brick works site. A similar excavation was also detailed some 100m north of the site. The irregular ponds to the east were much larger than in 1961 and now encroached within 50m of the north-eastern corner of the site.

The 1971 edition of TQ 98 NW at 1:10,000 scale has the site (Figure G) and immediate surrounding area unchanged from 1966, although in less detail. A garage was now depicted opposite Horner's Corner about 220m to the north of the site and an unspecified works was also marked at the southern end of Great Wakering, some 400m south-east of the site unchanged; the ponds to the east as before, and the construction of a small industrial estate immediately to the north of the brick works.

The 1982 edition of TQ 9387 at 1:2500 scale (Figure H) shows the brick works with an additional building and associated fifth chimney within the north-eastern quarter of the site. Three new buildings and a compound had also been added within the south-eastern corner of the site, and an electricity sub-station was also marked at the southern end of the central main building, the southern end of which had been extended westwards by this date. Another electricity sub-station was present within the industrial estate immediately to the north of the site, which also contained two buildings denoted as factories. The ponds to the east were as before although a rectangular building had been built near their north-western corner, close to the north-eastern corner of the brick works. The land to the south of the site was still shown to be at a lower elevation to the brick works.

The 1989 revision of TQ 98 NW (Figure I) at 1:10,000 scale shows the site and immediate surrounding area largely unchanged from 1982, apart from the large eastward extension of the southern end of the main brick works building.

The 1998 revision of TQ 9387 at 1:2500 scale (Figure J) shows the brick works unchanged and the large building in the south-eastern part of the site in detail.

The topographical survey drawing of the site provided by the Engineer was dated April 2007 and details the buildings along the western site edge to be offices, a small store and a storage tank. The four kilns and associated chimneys, stores and oil tanks were depicted to the west and east of the main works building. The latter had associated storage tanks on its southern and northern sides, together with the previously described electricity sub-station. A row of six, north to south aligned water tanks were present within the south-eastern quarter of the site, which were reportedly 'filled in' at the time of this survey. A site plan depicting former structures/features of the brick works is presented at the rear of this report, following the site plan that details the exploratory hole positions.

According to the previous investigation by DTS Raeburn the site was latterly occupied by Hanson Brick and ceased production in April 2005, although stockpiles of bricks

were still being removed in late 2006 when that investigation was undertaken. The brick works is known to have been demolished between September and November 2007.

The undated recent site location map presented on page 1 of Appendix 2 shows the site open and vacant as it is in 2011 but the aerial photograph on page 2 shows the site as it was in 2006 with works buildings, chimneys, kilns, offices as marked on the topographical survey but with stockpiles of bricks within the northern and north-eastern parts of the Brick Works. The northern part of the land immediately to the south appeared to be associated with the brick works and may have contained heaps of brick rubble or stockpiled bricks. The remainder of the field to the south, together with the land on the western side of Star Lane, was under cultivation. The industrial estate to the north of the site and the ponds to the east were shown as they were at the time of this investigation in 2011.

Summary

In summary, the site was open fields until 1932 when Star Lane Brick Works was built. The brick works was progressively expanded through the remainder of the Twentieth Century and the works were closed in 2005. The site was cleared in Autumn 2007 and has remained vacant from that time through to the present day.

The immediate surrounding area has been worked for brick clay and, to the east, apparently also for sand and gravel. An industrial estate was constructed to the immediate north of the site during the late 1960s. A number of large shallow excavations indicative of brick clay workings have been present within the district around Great Wakering throughout the Twentieth Century.

ENVIRONMENTAL SEARCHES

Appendix 3 contains information from Environmental Databases for a radius of up to 2km from the site. The information covers various datasets and contributors include the Environment Agency, Local Authorities, British Geological Survey, Ordnance Survey and the Coal Authority. The results obtained are presented together with a detailed search on selected areas of enquiry, and have been described below for a radius of 250m from the site.

Environmental Permits, Incidents & Registers

The following is a summary of the main points for environmental authorisations:

Statutory Authorisations

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) or Integrated Pollution Prevention and Control (IPPC) on, or within 250m of the site.

Water Industry Act Referrals: There are no (0) recorded referrals under the Water Industry Act on or within 250m of the site.

Red List Discharge Consents: There are no (0) recorded consents of potentially harmful discharges to controlled water on or within 250m of the site.

List 1 Dangerous Substances Inventory Sites: There are no (0) recorded List 1 Dangerous Inventory Sites on or within 250m of the site.

List 2 Dangerous Substances Inventory Sites: There are no (0) recorded List 2 Dangerous Inventory Sites on or within 250m of the site.

Part A (2) and Part B Activities & Enforcements: There are two (2) recorded Part A (2) and Part B Activities & Enforcements within 250m of the site. These are for enforcements at Star Lane brick works, for some reason shown 51m south of the site, and at the garage 175m north of the site, where data requested had not been received by the Environment Agency.

Category 3 or 4 Radioactive Substances Authorisations: There are no (0) recorded sites registered by the Environment Agency under the Radioactive Substances Act 1993, authorised to keep or use radioactive materials on or within 250m of the site.

Discharge Consents

Discharges to Water: There is a single (1) consent recorded, by the Environment Agency, to discharge to watercourses in accordance with the Water Resources Act 1991 within 250m of the site. This was some 67m to the north-east and was a discharge of surface water into the north-western corner of the nearby ponds. It was revoked in February 2011.

Storage of Hazardous Substances

Storage of Hazardous Substances: 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.

Control of Major Accidents: 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.

Storage of Dangerous 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 or within 250m of the site.

Pollution Incidents

Pollution Incidents and Prosecutions: There are three (3) recorded incidents within 250m of the site, relating to authorised processes. These were for Category 3 (minor) and 4 (no) impacts at three sites within the adjacent industrial estate.

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

Landfill & Waste Sites

The following is a summary of the main points for the Waste section:

Landfill Sites: There are no (0) recorded current or former landfills licenced by the Environment Agency under Part II of the Environmental Protection Act 1990 on or within 250m of the site.

Registered Landfill or Local Authority Recorded Landfill Sites: There are no (0) recorded operational or non-operational landfills located on or within 250m of the site.

Registered Waste Transfer Site: There is one (1) recorded operational non-hazardous waste transfer site recorded, in error, within the site. This is for No.36 Star Lane Industrial Estate, to the north of the site, whilst five (5) more industrial waste transfer records are for Nos.36 and 37 Star Lane Industrial Estate.

Waste Treatment, Transfer and Disposal: There are no (0) former or current recorded sites licensed by the Environment Agency under Part II of the Environmental Protection Act 1990 on or within 250m of the site.

Potentially Contaminative Uses

Current Industrial Sites: There are no (0) recorded potentially contaminative uses listed for the site address and twenty-two (22) within 250m of the site. The latter include vehicle repairers, clothes suppliers, engineering works, industrial plastics producers, electronic equipment suppliers, electricity sub-stations, a gas valve compound, stone masons, hauliers, refrigeration engineers, welding services, a telephone exchange, a car dealer and unspecified works. These all lie to the north of the site and predominantly within the adjacent industrial estate.

Fuel Station Entries: There is one (1) recorded fuel station entry within 250m of the site, the Total filling station some 230m to the north, although this is listed as obsolete.

Underground High Pressure Oil & Gas Pipelines: There are no (0) recorded high pressure underground pipelines within 250m of the site

Geology & Hydrogeology – Pathways & Receptors

The following is a summary of the main points for the sensitivity section:

Artificial Ground and Made Ground: The site is recorded as being within 50m of worked ground, the adjacent former brick clay workings.

Drift Deposits & Solid Geology: The site is recorded as being covered by superficial deposits, River Terrace Deposits (clay/silt and sand/gravel) of the First Terrace. The site is underlain by the solid geology of the London Clay Formation.

Groundwater Vulnerability: The site is designated as being mainly covered by superficial Unproductive strata whilst Secondary (A) Aquifer, the First Terrace Sand and Gravel, underlies the eastern edge of the site and the area of worked ground to the immediate south and east of the site. The site area is shown to be underlain by Unproductive strata, the solid geology of the London Clay Formation. Based on the topography of the site and surrounding area the direction of near surface groundwater flow would be expected to be from west to east, towards the coast.

Water Abstractions: There are two (2) groundwater abstraction licences held within 250m of the site. These are both within the ponds to the east and are used for general purposes and spray irrigation. There are no surface water abstractions or potable water abstractions within 250m of the site.

Source Protection Zones: The site does not lie within a Source Protection Zone.

River Network & Surface Water Features: There are no river networks listed within 250m of the site. There are surface water features within 250m of the site; the flooded former brick clay and sand and gravel workings to the immediate east of the site.

Flood Risk: The site is not within Zone 2 or Zone 3 floodplains as indicated by the EA. The site is in an area with a 'Very High' susceptibility to groundwater flooding. The site is not within a zone benefiting from flood defences, and is not within an area used for flood storage. It should be noted that Great Wakering lies within an area that was badly affected by flooding in 1953 when sea defences on the Thames Estuary were breached.

Environmentally Sensitive Receptors

Environmentally Sensitive Areas: There are no (0) environmentally sensitive areas or reserves located on or within 250m of the site. The site is recorded as not being within a Nitrate Vulnerable Zone.

Protected Countryside Areas: There are no (0) National Parks or other protected areas or parks recorded as being either on or within 250m of the site.

Natural Hazards & Mining

Natural Subsidence Risk: According to the British Geological Survey there is a 'Moderate' hazard rating for Shrinking and Swelling clays and Collapsible Rocks; a 'Very Low' hazard rating for Landslides and Running Sand; and a 'Negligible' hazard for Compressible Ground, Soluble Rocks and Shallow Mining.

Coal Mining: The site is not within 75m of any areas affected by coal mining.

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

Radon Protection Measures: The site lies within an area where no radon protection measures are necessary for new dwellings or extensions in accordance with Building Research Establishment report BR211 (1999).

Brine Compensation Area: The site is not within 75m of a Brine Compensation Area.

PRELIMINARY 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 that 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 a 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 the identified previous uses are listed below in Table 1.

Table 1: Identified Potential Contaminant Sources

Contaminant Source	*Comments*
Drainage	Effluent from leaking drains would provide a contaminant source.
Soil Beneath Site	Contamination may be present within any made ground materials beneath the site associated with the former buildings, electricity sub-station, storage tanks, chimneys, kilns, and 'filled in' structures.
Soil Gas	Potential soil gas generated from made ground or natural soils.
Ground Contamination Outside Site Boundary	Ground contamination migrating from nearby sites, which include former workings, a petrol filling station and an industrial estate.
Building Materials	Asbestos containing material (ACM) may have been present within the demolished buildings, the rubble from which has been used to infill the former water tanks.

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 a number of possible pathways for the contaminants identified on the site to impact human and/or environmental receptors and these are summarised in Tables 2 and 3.

Table 2: Human Receptors and Pathways

Human Receptor-Mechanism	***Typical Exposure Pathway***
Human Inhalation	Breathing Dust and Fumes Breathing Gas emissions
Human Ingestion	Eating -contaminated soil, for example by small children -plants grown on contaminated soil Ingesting dust or soil on fruit or vegetables Drinking contaminated water
Human Contact	Direct skin contact with contamination Direct skin contact with contaminated liquids

Table 3: Water Receptors and Pathways

Receptor-Water Environment	***Typical Exposure Pathway***
Groundwater The site is partly underlain by a Secondary (A) Aquifer (First Terrace Deposits) at shallow depth. The site is underlain by a significant thickness of Unproductive London Clay, an aquitard.	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and migrate to 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 There are no water courses within 250m of the site. The surface water features within 250m of the site are the flooded former pits some 50m to the east of the site.	Surface infiltration of atmospheric waters into the soils beneath the site could wash or dissolve potential contaminants and laterally migrate. Contamination leads to a restriction/prevention of use: -as drinking water resource -for amenity use Effects on aquatic life

Preliminary 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 preliminary conceptual model relative to the construction phase and completed development is presented below in Table 4.

Table 4: Preliminary Conceptual Model Relative to Construction/Future Use of Site

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources				
		Drainage	Soil Beneath Site	Soil Gas	Ground Contamination Outside Site Boundary	Building Materials
Human Health – ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Likely	Likely	Low likelihood	Low likelihood	Low likelihood
Human Health – users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Unlikely	Likely	Low likelihood	Low likelihood	Low likelihood
Water Environment	Migration through ground into surface water or groundwater	Likely	Likely	Low likelihood	Low likelihood	Unlikely
Flora	Vegetation on site growing on contaminated soil.	Low likelihood	Low likelihood	Unlikely	Low likelihood	Unlikely
Building Materials	Contact with contaminated invaded soil	Low likelihood	Low likelihood	Unlikely	Low likelihood	Unlikely

Key to Table 4

Estimated Potential for Linkage with Contaminant Source	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.
N/A	Not Applicable

SITE WORK

Three boreholes were scheduled at pre-determined positions that were designed to provide adequate site coverage for geotechnical purposes. In addition, eighteen trial pits were excavated to provide samples of made ground for chemical testing and, where possible, establish the thickness of concrete slabs, hardstanding and other former brick works structures. The exploratory hole positions are depicted on the site plan at the rear of this report.

Buried services information was obtained and referenced in relation to the borehole and trial pit positions prior to boring/excavation. The elevation of the ground level at each hole position has been interpolated from the site survey drawing provided by the Engineer.

Trial Pits

Eighteen trial pits (TPs 1 to 18) were undertaken using a JCB type excavator with breaker attachment on 25th, 26th and 27th September 2011, with the first day taken up with breaking out concrete floor slabs and hardstanding at the proposed pit positions. Each position was scanned with a CAT before excavation commenced. The exposed strata were logged and the soils sampled by the supervising Geotechnical Engineer. The pits were generally completed at depths between 2.90m and 3.70m, but TPs 15 and 18 were abandoned on concrete obstructions, probable floors, at 1.20m and 1.60m below ground level, respectively.

Small and bulk disturbed samples of soil were taken at regular intervals throughout these pits and placed in polycarbonate pots (D samples) and large plastic bags (B samples). Where potentially hydrocarbon-impacted soils were encountered small disturbed samples were also taken in amber glass jars and vials. A sample of water was recovered in an amber glass bottle from TP 16.

An immediate assessment of the apparent soil cohesion was made using a Pilcon hand shear vane (V) in clay soils. The average of three readings was recorded at this position.

A Mackintosh Probe (MP) was used to ascertain the relative in-situ density of coarse and fine grained soils in the trial pits. The 25mm diameter solid cone point of the probe was screwed onto the rods and driven into the ground by repeated blows of a 4.5kg slide hammer with a fall of 0.30m. The blow counts for each 0.30m driven were recorded or, where the blow count exceeded 100 blows the depth driven for 100 blows was recorded.

The trial pit records give the descriptions and depths of the various strata encountered, details of all samples taken and the groundwater conditions observed during excavation and on completion. Following completion the excavated spoil was returned to the excavations in compacted layers.

Cable Percussive Boreholes

Three boreholes (BH 1 to BH 3) were undertaken by a standard cable percussive boring rig between 26th September and 3rd October 2011. The borehole positions were chosen following a scan using a cable avoidance tool (CAT). Prior to boring, where necessary, the surface layer of hardstanding was broken out using the excavator's hydraulic breaker attachment and a starter pit was dug to 1.20m depth using hand tools, in order to ensure the absence of buried services. The boreholes were then advanced using weighted shell and claycutter tools, initially working within 150mm diameter casing.

An attempt to set up at position BH 2 was compromised due to the unstable nature of the brick rubble surface layer once the starter pit to the borehole had reached 1.10m below ground level. This position was abandoned and the rig moved to position BH 2A. Boreholes BH 1 and BH 3 were completed at 20.00m and 25.00m below ground level, respectively, whilst in BH 2 chiselling techniques were used from 9.00m below ground level to penetrate a layer of concretionary limestone. The latter could not be broken up sufficiently for recovery and was driven ahead of the drilling and sampling tools from 9.00m to 13.00m depth where this borehole was abandoned.

Undisturbed (U) samples 100mm in diameter were taken in clay at regular intervals. The ends of the samples were capped and sealed to maintain them in as representative condition as possible during transit to the laboratory.

Standard penetration tests were undertaken in order to give an indication of the in-situ relative density/shear strength of the made ground and coarse grained soils encountered. The test was made by driving a solid cone point (C) or split spoon and open shoe sampler (S) into the soil at the base of the borehole by means of an automatic trip hammer weighing 63.50kg falling freely through 760mm. The penetration resistance was determined as the number of blows (N) required to drive the tool the final 300mm of a total penetration of 450mm into the soil ahead of the borehole. The results have been tabulated and are presented following the borehole records.

Representative small (D) and bulk (B) disturbed samples of soil were taken from the boring tools at regular intervals throughout the depth of the borehole. Samples of groundwater (W) were recovered once sufficient water had accumulated in the boreholes for collection.

On completion of boreholes BH 1, BH 2A and BH 3, 50mm diameter HDPE standpipes were installed to 7.00m below ground level. The annulus around each standpipe was backfilled with pea gravel and a bentonite seal was placed around the top of the installations within 1.00m of ground level. A gas tap was installed in the top of the standpipes. A protective stopcock cover was concreted into the ground flush with the surface over the installations.

The borehole records give the descriptions and depths of the various strata encountered, results of the in-situ tests, details of all samples taken and the groundwater conditions observed during boring, on completion and within the standpipe installations. .

Monitoring

The three borehole standpipes were monitored for methane, carbon dioxide and oxygen gas levels on three occasions during October and November 2011. Ambient pressures and flow rates were recorded together with the depth to groundwater. The latter has been added

to the borehole records, whilst the gas/groundwater results are presented in Appendix 4. Samples of groundwater were recovered from the standpipes using nominated bailers on 11th October 2011. These samples were taken in plastic and amber glass bottles and delivered to the analysing laboratory on the same day.

LABORATORY TESTING

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

The chemical testing schedule was devised by Ground Engineering Limited for a broad suite of potential contaminants, outlined by the Environment Agency (EA) and National House Building Council (NHBC) document R&D 66; 2008 'Guidance for the Safe Development of Housing on Land Affected by Contamination'. This suite was considered sufficient based on the history of the site and the known land uses within the surrounding area.

The geotechnical tests were conducted to BS1377:1990 and other industry standards, and the results are presented following the exploratory hole records, whilst the results of the chemical tests are presented in Appendix 5.

Geotechnical Testing

The index properties of selected soil samples were determined as a guide to soil classification and behaviour. The liquid limit was determined by the cone penetrometer method.

The particle size distribution of selected samples was obtained by sieve analysis. The results of these tests are given as a particle size distribution curves at the end of this report.

Test specimens were prepared at full diameter from selected undisturbed samples from the boreholes. Immediate undrained triaxial compression tests were made on each sample at full diameter at a cell pressure approximately equivalent to the overburden pressure for that sample's depth or using the multi-stage technique. The results have been plotted against depth in Figure 1. The moisture content and bulk densities of the specimens were also determined.

An indication of the settlement characteristics of a selected sample was obtained from tests in the consolidation apparatus or oedometer. The test was performed on a 75mm diameter sample, about 19mm thick, contained in a steel ring. The sample was saturated and the

swelling pressure balanced prior to applying a constant load with drainage at both ends. When primary compression was complete, the load was increased and this repeated for three increments of load. The sample was then unloaded in equal stages. The rate and total amount of consolidation were continually monitored using a computer controlled E.L.E. Datasystem 7 Unit. The results were plotted and analysed by the computer for each increment of load to obtain the coefficients of compressibility (m_v), and of consolidation (c_v), which govern the amount and rate of settlement, respectively.

California Bearing Ratio (CBR) tests were performed on selected recompacted samples of near surface soils. The test consisted of jacking into the remoulded soil a cylindrical plunger with a cross sectional area of 1935mm^2. A force of 50N was applied initially to seat the plunger on the soil surface and then the plunger was made to penetrate the soil at a uniform rate of 1mm/min. Readings of force were taken at intervals of penetration of 0.25mm to a penetration not exceeding 7.50mm. The CBR value is the ratio of the force required to achieve 2.50mm or 5.00mm penetration to standard forces expressed as a percentage.

Selected samples of soil and water were analysed to determine the concentration of soluble sulphates. The pH values were also determined using an electrometric method.

Chemical Testing

Seventeen soil samples recovered from the exploratory holes were tested for total concentrations of arsenic, cadmium, chromium, lead, mercury, selenium, nickel and benzo[a]pyrene, together with speciated polyaromatic hydrocarbons (PAH), boron, copper and zinc, phenols, total and free cyanide, hexavalent chromium, sulphate, sulphide and pH. The soil samples were also tested for organic content.

Twenty soil samples were also screened for asbestos-containing materials (ACM) by a chemist using optical microscopy.

In addition, ten soil samples were screened for total petroleum hydrocarbons (TPH) and subsequently one of these samples was tested for speciated TPH (TPHCWG,

aliphatic/aromatic split). Two soils samples were also tested for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

The three water samples recovered from the borehole standpipes were tested for a general suite of contaminants similar to that detailed for the soil samples together with TPHCWG, VOCs, SVOCs and MTBE (methyl tert-butyl ether).

Two samples of made ground from TPs 2 and 14 were prepared and tested so that the results could be compared with Waste Acceptance Criteria (WAC).

GROUND CONDITIONS

The ground conditions encountered were broadly as expected from the geological records, the previous investigation and the known site history with the site covered by between 0.15m and 1.60m thick of made ground associated with the construction and infilling of former brick works buildings and associated structures. The made ground mantled First Terrace Loam, then First Terrace Sand and Gravel. These superficial soils were proved in the completed boreholes to depths about 5.00m below ground level where it was underlain by the initially reworked solid geology of the London Clay Formation. The latter was found to at least 25.00m below ground level.

A west to east longitudinal section has been plotted in Figure 2 depicting the strata encountered in the three boreholes and selected trial pits.

Made Ground

The surface layer at half of the twenty-two exploratory hole positions was of concrete or reinforced concrete, either 0.15m or 0.20m thick, which formed the hardstanding, service yards and roadways, and former building floor slabs. This concrete was often laid directly on to natural ground but in several positions was cast on a coarse grained sub-base of dark brown and dark grey silty sand and gravel that had a gravel fraction of brick, concrete, flint, pottery, asphalt, coal, tile and glass, which in TPs 7 and 8 also contained much ash.

Elsewhere the surface cover included brick rubble, notably at the former kiln positions (BHs 2 and 2A, TPs 9 and 17), but also where it had been used as a sub-base material (TP 3), as a surface layer (TP 15), and to infill former water tanks (TP 18). In TP 9, through the footprint of a former kiln, the brick rubble covered a 0.10m thick layer of brickwork between 1.40m and 1.50m depth, the presumed floor to the former structure. Similarly in TP 17, through the footprint of another kiln, some 0.80m of brick rubble covered a 0.30m thick layer of 'weak' concrete, which the excavator removed using its bucket.

At approximately half of the hole positions these surface layers covered a firm or stiff dark brown and dark grey mottled slightly gravelly, slightly sandy clay fill with a gravel fraction of brick, concrete, flint, glass, coal, tile, slate and locally ash. This clay fill was generally penetrated within 0.60m of the surface apart from in BH 3, TP 1, TP 15 and TP 16, where it continued to depths between 0.85m and 1.60m below ground level.

At 0.50m depth in TP 13, close to the position of the former electricity sub-station, a 0.20m thick layer of grey and grey green silty sand was met beneath the concrete and sub-base layers was met and proved to 0.70m below ground level.

Trial pits TP 15 and TP 18 within the eastern part of the site were abandoned at 1.20m and 1.60m depth where a concrete obstruction and concrete slab at the base of the former water tanks could not be penetrated, respectively. Borehole BH 2 was also abandoned, at 1.10m depth, within 'very loosely' infilled brick rubble and crushed brick within the footprint of a former kiln.

The base of the made ground was generally proved at depths between 0.30m and 0.70m below ground level but was locally found to 1.50m (TP 9) and 1.60m (BH 3).

First Terrace Loam

Natural ground was met at 0.15m to 1.60m below ground level across this site and was initially a firm or stiff light brown or red brown slightly sandy, silty clay with occasional sub-angular to sub-rounded flint gravel. This First Terrace Loam (Brickearth) was between 0.50m (BH 3) and 2.70m (TP 8) thick, reflecting the variation in thickness of the overlying made ground, and was proved to depths between 2.10m to 3.20m below ground level, 7.60mOD to 9.00mOD.

First Terrace Sand and Gravel

First Terrace Sand was met beneath the Loam at 2.10m and 3.20m depth and was medium dense to dense orange brown silty, slightly gravelly to gravelly, fine and medium sand with a gravel fraction of angular to sub-rounded flint and occasional quartz.

All of the trial pits that entered natural ground were completed within this stratum at 2.90m to 3.70m below ground level. The three boreholes (BHs 1, 2A and 3) continued within this sand and proved its base at depths of between 4.00m and 5.90m, although where thickest in BH 2A it did contain a 0.90m thick layer of dense orange brown slightly silty sand and gravel between 3.10m and 4.00m below ground level.

In boreholes BH 1 and BH 3 the First Terrace Sand graded down into medium dense or dense orange brown slightly silty sand and gravel at 4.00m and 5.10m depth, respectively. This First Terrace Gravel had a gravel fraction of sub-angular to rounded flint and was the same deposit as that intercalated with the First Terrace Sand in BH 2A. The base of the First Terrace Sand and Gravel deposits was proved at 5.60m to 6.10m below ground level, 4.80mOD to 5.40mOD, a combined thickness of 3.30m to 4.00m.

London Clay

The solid geology of the London Clay was met at 5.60m to 6.10m depth in the three completed boreholes and was initially reworked to firm or stiff, brown and locally orange brown mottled slightly gravelly clay with sand partings and a gravel fraction of angular to rounded flint. This reworked horizon was between 0.20m and 0.60m thick.

Below 5.80m to 6.50m depth the London Clay was stiff, closely fissured, grey brown clay with occasional silt partings. In BH 2A, the London Clay contained a cobble size nodule of strong concretionary limestone at 9.00m depth, and from 10.00m below ground level this stratum became very stiff, locally hard, and also contained rare medium gravel size pyrite nodules and fossil shell debris.

The three boreholes were completed within London Clay, which was found to at least 25.00m depth in the deepest borehole, BH 3.

Groundwater

Water was noted within the base of the former water tanks at 1.40m below ground level (TP 18) and at 2.90m depth (7.10mOD) in TP 16, which was located within the lower ground in the south-eastern corner of the site. The sixteen other trial pits, which were excavated from the general site level, were dry.

In the boreholes it was necessary to add water to enable boring within the First Terrace Sand and Gravel until water was met at 3.30m or 3.50m below ground level. These inflows were sealed out by the casing when it entered the underlying London Clay and the completed BHs 1 and 3 were both dry on completion. A water seepage was recorded at 9.10m depth in BH 2A, associated with the concretionary limestone nodule met at 9.00m, and stood at 12.00m depth when this hole was abandoned at 13.00m below ground level.

Groundwater levels were recorded within the three 7.00m deep borehole standpipes at depths between 3.78m and 4.05m below ground level, approximately 7.10mOD, the same elevation as the water met in TP 16.

Excavation Stability

The sides of trial pits TP 9 and TPs 16 to 18 were reported to be unstable during excavation within the coarse grained fill encountered within the footprints of these former kilns, buildings and water tanks. The sides of the other excavations were generally stable during excavation and on completion.

Live Roots

Live roots were observed within some of the exploratory holes to depths between 0.20m and 0.70m below ground level.

Evidence of Contamination

Based on inspection the made ground contained fragments of brick, concrete, ash, mortar, tile, slate, charcoal, asphalt, coal, glass, plastic, pottery and ceramic. No olfactory or visual evidence of hydrocarbon contamination was detected in the exploratory holes of this investigation. No visual evidence of asbestos containing material was detected within the exploratory holes.

COMMENTS ON THE GROUND CONDITIONS IN RELATION TO FOUNDATION DESIGN AND CONSTRUCTION

The investigation found a 0.15m to 1.60m thick cover of made ground. Foundations for the residential development will need to penetrate this made ground and be based on the underlying First Terrace Loam. This stratum should have adequate bearing properties to support the likely building loads of two or three-storey housing on shallow strip or trench fill foundations, which may need to be locally deepened where building footprints coincide with an increased thickness of made ground associated with the former brick works structures.

Foundation Depths

The exploratory holes encountered made ground to between 0.15m and 1.60m below ground level but could locally be found to greater depths, notably where the infilled former water tanks were present in the south-eastern quarter of the site. Large scale processes of natural sedimentation allow a certain degree of confidence to be placed in the absence of important variation of the engineering properties of natural soils across sites. By contrast, made ground, whose history is not completely known, must, despite any amount of investigation, inevitably present the possibility of conditions existing which could not be accepted when considering the material as a bearing stratum.

The underlying First Terrace Loam had modified plasticity indices of between 7% and 17% and so it is of low volume change potential. In open natural ground, well away from existing trees, a minimum foundation depth of 0.75m below ground level would be required.

The presence of trees and hedges around the perimeters of this site will locally have increased the depth affected by seasonal changes in moisture content of clay soils. Reference to the National House Building Council (NHBC) Standards Chapter 4.2 "Building near trees" (2010) indicates an increased footing depth in the order of 1.80m at 5.00m from a mature high water demand Hawthorn.

Evidence of tree root-induced desiccation was not generally apparent in the exploratory holes, primarily due to their distance from the edges of the site and live roots were only observed to depths between 0.20m and 0.70m below ground level.

Foundation excavations should be inspected for live roots, and where present in clay soils, deepened to at least 0.50m below the deepest visible root in the side of the footing trench.

Desiccated ground may also be found within the soils beneath and around the former brick kilns with the sustained high temperatures within these semi-buried structures 'drying out' or 'baking' the adjacent First Terrace Loam clay. This desiccation will have resulted in lower moisture contents, increased shear strengths and perhaps some mineralogical and colour changes to the clay minerals that make up this soil.

Although this stratum has only a low heave potential it would not be considered prudent to place foundations on such desiccated soils, and it will consequently be necessary to deepen foundations beneath and close to the former kiln positions to penetrate desiccated clay. Where new building footprints coincide with these positions then visual inspection should be used to assess the presence of such desiccated soils. According to Table 9 of the previously cited NHBC Standards, voids are not required against the sides of foundations or ground beams to accommodate heave movement in low volume change potential soils although Tables 9 and 10 of this document indicate that they would be necessary beneath beams and floors, in this regard.

Bearing Capacity

Based on the results of the laboratory triaxial compression strength tests and in-situ vane tests, the firm, non-desiccated clay beneath this site, at 0.75m depth, has a maximum safe bearing capacity of 155kN/m^2 and 140kN/m^2 for 0.60m and 1.00m wide strip foundations, respectively, incorporating a factor of safety (FoS) of 3.0 against general shear failure. These values should be sufficient to support two-storey buildings with anticipated consolidation settlement of such strip footings well within tolerable limits for load bearing brickwork.

Increased foundation depths in the order of 2.00m below ground level to penetrate made ground and desiccated clay soils could use slightly higher design bearing capacity values, of 160kN/m^2 and 170kN/m^2 for 0.60m and 1.00m wide strip foundations, respectively (FoS=3.0).

Foundations to support heavier loads could be supported on the underlying medium dense First Terrace Sand, which was generally met at depths between 2.00m and 3.00m below ground level. Based on the results of the in-situ penetration tests, the medium dense sand could support an allowable bearing pressure of 210kN/m^2 for foundations up to 1.20m wide for immediate settlement of up to 25mm.

Piled Foundations

Based on the proposed low-rise residential development, piled foundations should not be necessary on this site.

Excavations/Groundwater

The base of foundation excavations should be inspected on completion to ensure that the condition of the soil complies with that assumed in design. Should pockets of inferior material be present, they should be removed and replaced with well graded hardcore or lean mix concrete. The excavated surface should be protected from deterioration and a blinding layer of concrete used where foundations are not completed without delay.

Water was met within the First Terrace Sand and Gravel at 2.90m to 3.50m below ground level and so below likely foundation excavations. Excavations may encounter groundwater 'perched' within the made ground during wetter periods of the year or within former buried structures such as the infilled water tanks in the south-eastern quarter of the site. Such inflows should be countered using screened sump pump techniques.

Safety precautions should not be neglected especially where personnel are to enter excavations, when close side support will be required in order to maintain excavation stability. All excavations should be undertaken in accordance with CIRIA Report 97 '*Trenching Practice*'.

The near-surface soils encountered should be readily excavated using modern plant, although the removal of former foundations and floors will require the use of a breaker attachment.

Floor Slabs

Lightly loaded floor slabs for the new buildings could generally be ground bearing following careful inspection and preparation using a vibratory roller. The adoption of a ground bearing floor slab greatly depends on the careful and correctly supervised placement of such fill.

Even so a careful check should be made for soft and loose ground, particularly where infilled former brick works structures are present, such as the kilns and water tanks. If present, such poor ground should also be removed and replaced with well compacted coarse grained fill. Similarly differential settlement could take place where former foundations and floors remain in the ground, as these would form "hard spots". These should be removed and replaced with compacted coarse grained fill material prior to floor slab construction.

As discussed previously it would be considered prudent to suspend floor slabs, with a sub-floor gap, to accommodate potential heave where desiccated clay soils are not removed from beneath the former kilns. Suspended floor slabs could also be required close to peripheral trees and hedges.

Pavement Design

The CBR results obtained from the made ground and First Terrace Loam were between 4.1% and 34%, with the latter value reflecting the coarse grained nature of the sub-grade at this position.

For roads based within the near surface First Terrace Loam, Table 5.1 of Interim Advice Note (IAN) 73/06, Revision 1 (2009), indicates design CBR values of between 3.0% and 4.0% for a thin road on a site underlain by clay with a plasticity index of 10% and 20%, respectively. The plasticity indices obtained from this slightly sandy, silty clay indicate that it

would locally be frost susceptible (plasticity index <15%) beneath this site and so a minimum construction thickness of 450mm would be prudent to avoid the damaging affects of frost action.

A preliminary design value of 3.0% could be adopted, taking into account the frost susceptible nature of the sub-grade, but it is recommended that further CBR testing is undertaken closer to the time of construction when the likely sub-grade levels have been determined and the new site layout established.

Drainage

In the absence of in-situ test data in respect of the permeability of the near surface soils beneath this site, B.S.8004:1986 Figure 6 indicates that the First Terrace Loam could be expected to have a coefficient of permeability (k) in the order of 10^{-6}m/s to 10^{-7}m/s. Similarly using this document the underlying First Terrace Sand, met at 2.00m to 3.00m depth, would be expected to have a coefficient of permeability (k) in the range of 10^{-4}m/s to 10^{-6}m/s. Consequently a soakaway drainage system may be considered feasible but full scale BRE Digest 365 infiltration tests should be undertaken to confirm the soakaway drainage potential of the soils beneath this site.

The use of soakaway drainage on this site will also need to take into account the possibility that very loose coarse grained fill could be present, for example where former structures were loosely infilled with demolition rubble. Such fill could be prone to collapse compression on inundation and so it is strongly recommended that a soakaway drainage scheme, if adopted within this site, should be kept as far away as possible (>10m) from buildings and hardstanding in order to avoid future related subsidence problems.

Buried Concrete

Sulphate analysis of the soil and water samples tested gave results in Design Sulphate Classes DS-1, DS-2 and DS-3 of the BRE Special Digest 1, Table C2 (2005) presented in Appendix 6. The pH results were between 7.3 and 10.1 and so alkaline.

Using the characteristic sulphate value (1100mg/kg) for the twenty-one near surface soil sulphate results and the characteristic sulphate value for the groundwater (700mg/l), an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-2 would be considered appropriate for buried concrete as detailed in the above cited BRE document.

COMMENTS ON THE CHEMICAL TEST RESULTS

The results of the laboratory chemical testing on ten near surface soil samples have been compared to CLEA Soil Screening Values (SSVs) which have been used as a screening tool for use in the assessment of land affected by contamination.

Atkins Limited has derived ATRISKsoil SSVs based on the default assumptions provided in SR3, which have been used in the development of the Soil Guideline Values (SGVs) published by the Environment Agency in 2009. Atkins SSVs have been derived in line with the Environment Agency 2009 guidance (SR2, SR3, SR4, SR7) using the CLEA v1.04 and CLEA v1.06 software. These are provided under licence to Ground Engineering Limited, and respective toxicology reports and technical details on the derivation of the SSVs can be provided on request.

The following standard land uses form the basis of the assessment in relation to soils:

- Residential use with home grown produce
- Residential use without home grown produce
- Commercial and industrial usage

The intended purpose of the SSVs are 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, Table 5 compares the test results with the SSVs in relation to the specified usage. The numbers of test results, which exceed these values, are also provided.

Table 5: Comparison of Chemical Test Results with SSVs

Determinand	Number of Samples	Min Value (mg/kg)	Max Value (mg/kg)	Number of Samples Exceeding SSV for:			Measured 95th Percentile (mg/kg)	Soil Screening Criteria SSV (1% SOM)			
				Residential with home grown produce	Residential without home grown produce	Commercial/ Industrial		Assessment Method	Residential with home grown produce (mg/kg)	Residential without home grown produce (mg/kg)	Commercial/ Industrial (mg/kg)
Organic matter	17	<0.40	52	-	-	-	-	-	-	-	-
Arsenic	17	2.6	73	2	2	0	24.97	SSV	32	35	640
Cadmium	17	<0.10	0.38	0	0	0	0.22	SSV	10	83	230
Trivalent* Chromium	17	5.0	32	0	0	0	19.22	SSV	12,800	15,500	21,300
Hexavalent Chromium	17	<0.5	0.8	0	0	0	0.55	SSV	14	38	330
Lead	17	5.4	1200	6	5	0	174.50	SSV	276	383	6490
Mercury	17	<0.10	0.66	0	0	0	0.27	SSV	6	7	66
Selenium	17	<0.20	0.56	0	0	0	0.27	SSV	350	595	13,000
Nickel	17	<5.0	98	0	0	0	31.03	SSV	130	130	1800
Phenols	17	<0.3	<0.3	0	0	0	<0.30	SSV	162	262	686
Benzo[a]pyrene	17	<0.1	2.4	3	3	0	0.8	SSV	0.8	0.9	14
Copper	17	<5.0	4300	1	0	0	769.45	SSV	3970	8370	109,000
Zinc	17	20	1000	0	0	0	258.94	SSV	16,900	46,800	917,000
Free Cyanide	17	<0.50	<0.50	0	0	0	<0.50	SSV	34	34	34

Notes

*The concentration of Trivalent Chromium assumed to be equivalent to the Total Chromium concentration. This is because most naturally occurring chromium is in the trivalent (chromic) state.

Discussion of Results and Statistics

The results of the laboratory analysis indicate the heterogeneous made ground locally contains elevated concentrations of arsenic, lead, benzo[a]pyrene and copper, which locally exceeded residential soil screening criteria. None of the results obtained exceeded commercial/industrial soil screening criteria.

The elevated results were recorded from samples of made ground containing fragments of ash and coal, notably in TPs 2, 4, 8, 12, 14 and 16, which are spread across the whole site.

Statistical analysis, based on the mean value test, indicates that the US95 values for arsenic, lead, benzo[a]pyrene and copper did not exceed the corresponding screening values for residential or commercial/industrial end uses.

The results of this analysis indicate that the near surface made ground tested across this large site would be within residential soil screening criteria. The soils tested would also be within commercial/industrial soil screening criteria. In light of the size of this 3 hectare site and the variety of former structures and processes that formerly were undertaken within the brick works, and the heterogeneous nature of the made ground encountered by this investigation, this analysis should be regarded as a preliminary one.

Hydrocarbon Pollution in Soil

Visual and olfactory evidence of hydrocarbon fuel impacted soils was not detected during the investigation beneath this site. Nine of the ten TPH results determined were <10mg/kg, which confirms the general absence of hydrocarbon contamination in the soils beneath this site, however, a single sample of clay fill at 0.60m depth in TP 16 recorded a TPH result of 3900mg/kg. This sample was re-examined after this result was known and it was confirmed that no hydrocarbon odours emanated from the clay fill tested. The clay fill did include a number of coal fragments and it is considered likely that the elevated TPH result at this position reflects the presence of coal rather than petroleum.

Volatile Compounds (MTBE/BTEX/VOCs/SVOCs) in Soil

The results of the soil tests for MTBE, BTEX, VOCs and SVOCs from two soil samples from TP 10 did not record concentrations above the very low detection limits of the testing apparatus, whilst the sample where an elevated TPH result was recorded from TP 16 yielded some PAH results marginally above detection limits, again suggesting the origin of the elevated TPH result was from the presence of coal rather than petroleum fuel.

MTBE, an additive to fuel, was not detected above the detection limit of 1µg/kg.

Asbestos

No asbestos containing material (ACM) was found during sample preparation prior to chemical analysis or within the samples that were screened in the laboratory. Visual evidence of ACM was not recorded during this investigation.

GROUNDWATER TEST RESULTS

The samples of water recovered from the three standpipes were 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'.

This amends the 1991 version, which provides a standard of 10µg/l for dissolved or emulsified hydrocarbons represented by TPH in the laboratory analysis. There is no amendment indicated in Statutory Instrument 2000 No.3184 and so in the absence of an amendment or update we refer to the 1991 standard, which is generally accepted.

The results are presented in Appendix 5 and fractions of test results that exceed these levels are summarised below in Table 6.

Table 6: Comparison of Chemical Test Results with Water Supply Regulations

Determinand	Minimum Value detected in samples	Maximum Value detected in samples	The Water Supply (Water Quality) Regulations Maximum Concentration/Value for Consumers Taps	Fraction of samples Exceeding Water Supply Regulation
Arsenic (total) µg/l	<1.0	1.8	10 µg/l	**0/3**
Boron (Water Soluble) µg/l	190	660	1000 µg/l	**0/3**
Cadmium (total) µg/l	<0.080	<0.080	5.0 µg/l	**0/3**
Chromium (total) µg/l	3.8	5.0	50 µg/l	**0/3**
Copper (total) µg/l	<1.0	1.6	2000 µg/l	**0/3**
Cyanide (total) mg/l	<0.05	<0.05	0.05 mg/l	**0/3**
Lead (total) µg/l	<1.0	<1.0	25 µg/l	**0/3**
Mercury (total) µg/l	<0.5	<0.5	1.0 µg/l	**0/3**
Nickel (total) µg/l	2.8	6.7	20 µg/l	**0/3**
pH value	7.3	7.7	6.5 (minimum) 10.0 (maximum)	**0/3**
Phenols mg/l	<0.03	<0.03	0.0005 mg/l	**-/3**
Selenium (total) µg/l	12	36	10 µg/l	**3/3**
Sulphate (soluble) mg/l	22	920	250 mg/l	**2/3**
Sulphide mg/l	<0.05	<0.05	No limit	**0/3**
Zinc (total) µg/l	12	22	5000 µg/l	**0/3**
PAHs µg/l	<0.2	1	0.10 µg/l	**1/3**
TPH µg/l	<10	<10	10 µg/l	**0/3**

Determinand	Minimum Value detected in samples	Maximum Value detected in samples	The Water Supply (Water Quality) Regulations Maximum Concentration/Value for Consumers Taps	Fraction of samples Exceeding Water Supply Regulation
Benzo[a]pyrene µg/l	<0.01	<0.01	0.01 µg/l	**0/3**
Vinyl chloride µg/l	<1.0	<1.0	0.50 µg/l	**-/3**
Benzene µg/l	<1.0	<1.0	1.0 µg/l	**0/3**
1,2 Dichloroethane µg/l	<2.0	<2.0	3.0 µg/l	**0/3**
Tetrachloromethane µg/l	<1.0	<1.0	3.0 µg/l	**0/3**
Tetrachloroethene µg/l	<1.0	<1.0	10 µg/l	**0/3**
MTBE µg/l	<1.0	<1.0	-	**-/3**

With regard to the water quality recorded, most of the levels recorded did not exceed standard thresholds within the samples recovered from the standpipes installed in the three boreholes. The exceptions were selenium in all three boreholes, sulphate in two of the holes, and PAH in BH 2A.

It would appear that the water beneath the site has not been impacted by petroleum hydrocarbon pollution with the TPH detection limit of <10µg/l not exceeded. Similarly none of the VOCs, SVOCs and BTEX compounds were recorded at concentrations above the very low detection limits of the analysing laboratory.

The above described results are considered to characterise the groundwater within the superficial soils beneath this site. The elevated values obtained are not considered to represent significant evidence of groundwater contamination.

SOIL GAS MONITORING RESULTS

Three return visits to monitor gas levels at this site were made during October and November 2011 to record the concentrations of landfill type gases (methane, carbon dioxide, oxygen) in the standpipes. The results are presented in Appendix 4. The recorded concentrations of methane were all less than 0.1%, whilst the carbon dioxide results ranged between <0.1% and 6.6%, with those greater than 5.0% all recorded from BH 3. The recorded oxygen concentrations were also significantly depleted relative to atmospheric conditions in BH 3. The in-situ measurement confirmed a negligible gas emission rate with a maximum recorded flow rate of 0.4l/hr.

Assuming a positive flow rate of 0.4l/hr, the results give a Gas Screening Value (GSV) of 0.0264l/hr. This GSV falls within the modified Wilson and Card Characteristic Situation 1 or 'Green' classification of the NHBC traffic light system (for low rise housing), as defined by the Construction Industry Research and Information Association, CIRIA Report C665, 'Assessing risks posed by hazardous ground gasses to buildings'.

The maximum carbon dioxide values recorded from BH 3 at the eastern end of the site were greater than 5%, in which case it would be necessary to increase the classification to Characteristic Situation 2 or Amber 1 for this site. The results of the three visits can be considered a robust dataset although it did not include results when the atmospheric pressure was below 1000mB, and so based on the information obtained a Characteristic Situation 2 or Amber 1 should be assumed for this site and appropriate gas infiltration prevention measures adopted in any dwellings. The markedly depleted oxygen levels will also need to be taken into account in relation to below ground structures within the completed redevelopment and the safety of groundworkers.

OFF-SITE DISPOSAL OF SOIL ARISINGS

Two samples of made ground were tested so that the results could be compared with the Waste Acceptance Criteria (WAC) detailed in the Interim Landfill (England and Wales) (Amendment) Regulations 2005 for waste. The laboratory test certificates are enclosed in Appendix 5 and a summary of the results in relation to limit values for the acceptance of wastes for landfills for hazardous and inert waste is provided.

Table 7 – Summary of WAC results

Location	Depth (m)	Soil Description	Inert Waste Landfill	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste landfill
TP 2	0.20	Made Ground: Grey and red brown silty SAND and GRAVEL. Gravel fraction including brick, concrete, tile, ceramic and glass.	Leachate limit values exceeded for sulphate and TDS. Total limit values not exceeded.	Leachate limit values and total limit values not exceeded.	Leachate limit values and total limit values not exceeded.
TP 14	0.20	Made Ground: Firm brown, grey and dark grey slightly gravelly, slightly sandy CLAY. Gravel fraction including brick, ash and coal.	Leachate limit value for antimony exceeded. Total limit values not exceeded.	Leachate limit values and total limit values not exceeded.	Leachate limit values and total limit values not exceeded.

The sulphate and total dissolved solids (TDS) results from TP 2 and the antimony results from TP 14 marginally exceeded their respective leachate limiting values for inert waste at landfill. None of the other leachate or total limiting values for inert waste at landfill were exceeded.

UPDATED CONCEPTUAL MODEL

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

A generalised conceptual model, updated following the intrusive works, monitoring and testing, and targeted to provide coverage across the site, relative to the construction phase and completed development, is presented below in Table 8.

Table 8: Updated Conceptual Model Relative to Construction and Future Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources				
		Drainage	Soil Beneath Site	Soil Gas	Ground Contamination Outside Site Boundary	Building Materials
Human Health – ground workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Moderate	Low	Moderate	Very Low	Low
Human Health – users of completed development	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	N/A	Low to Moderate	Moderate	Very Low	N/A
Water Environment	Migration through ground into surface water or groundwater	N/A	Low	Very Low	Very Low	N/A
Flora	Vegetation on site growing on contaminated soil.	N/A	Very Low	Very Low	Very Low	N/A
Building Materials	Contact with contaminated/ invaded soil	N/A	Very Low	Very Low	Very Low	N/A

Key to Table 7

RISK	Definition
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or, there is evidence that severe harm to a designated receptor is currently happening. The risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) and remedial works may be necessary in the short term and likely over the long term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.
N/A	Not Applicable because the proposed development will remove the source.

COMMENTS ON GROUND CONTAMINATION IN RELATION TO PROPOSED DEVELOPMENT

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.

This investigation, which involved sample recovery at twenty-two exploratory hole positions, may not have revealed the full extent of contamination on this 3 hectare site and appropriate professional advice should be sought if subsequent site works reveal materials that may appear to be contaminated.

Contaminated Soil

The site is underlain by between 0.15m to 1.60m of made ground. The made ground across the site contained locally elevated concentrations of arsenic, lead, benzo[a]pyrene and copper, although statistically these did not exceed their respective residential soil screening criteria. The number of tests undertaken within this relatively large former industrial site means that the latter should be viewed as a preliminary conclusion.

Existing Drainage/Buildings/Tanks

Redundant foul or surface water 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 where they are to be retained, any damaged sections should be replaced prior to development. The latter measures should remove any future risk to human health and to the water environment.

The former buildings may have had asbestos containing materials within them, which could have been incorporated within demolition rubble used to infill former below ground structures, such as the water tanks in the south-eastern quarter of the site. Suitable precautions, in

line with current best practice, should be put in place to protect workers from the effects of asbestos material, during the construction phase.

Any former interceptors, redundant fuel lines and other associated pipework or unknown buried tanks will need to be carefully decommissioned and removed prior to construction of the proposed redevelopment. Precautions should ensure that any remaining hydrocarbons are directly disposed off-site and are not allowed to impact the soils beneath this site.

Human Health - Construction Workers

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 (The Blue Book) HS(G)66.

For the protection of 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 groundworkers, 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) Dust suppression measures such as 'damping down', could also be adopted to prevent the spread of soil contaminants.

e) In respect of the elevated concentrations of carbon dioxide and locally significantly reduced oxygen levels, safe working procedures to be adopted on this site should follow the principles given by the Health and Safety Executive guidance notes with regards to exposure limits and entry into deep excavations/confined spaces. Gas detection equipment and

an alarm system for personnel working in excavations may be required, together with other safety facilities.

f) There is a potential for groundworkers to come into contact with soils and groundwater impacted by hydrocarbons from leaking former fuel and oil tanks, despite the fact that these structures have been removed site and no significant evidence of hydrocarbon contamination was found during the investigation. In addition, the potential presence of hydrocarbon vapours and possible reduced oxygen levels means that safe working procedures should be adopted on this site, as described above.

Human Health - Users of Completed Development

The risk of the encountered ground contamination affecting the site users when present beneath buildings and permanent areas of hardstanding would be considered to be very low. This is because it would be highly unlikely that the general site users would normally be able to penetrate the building floors and hardstanding, which would be necessary for them to uncover any contaminated soils beneath the site.

The presence of locally elevated arsenic, lead, benzo[a]pyrene and copper within ashy made ground means that it may be prudent to remove such soils from within gardens and soft landscaping in the proposed redevelopment. These soils will need to be removed from such areas and either disposed of off-site, covered with an adequate capping layer to break the pathway, or left/placed beneath areas of hardstanding, if geotechnically suitable.

Soil Gas

According to database information, there are no active landfills within influencing distance of the site and no significant thicknesses of putresible or peaty matter were encountered by the exploratory holes in the made ground. However, such ground may well be present beneath the adjacent site to the east, the flooded former brick clay and gravel pits.

The gas monitoring has determined that a Wilson and Card Characteristic Situation 1 classification may apply. However, the typical maximum carbon dioxide concentrations recorded mean that a Characteristic Situation 2 or Amber 1 classification should be assumed and appropriate gas infiltration prevention measures adopted.

The site lies within an area where radon protection measures are not required for new dwellings in accordance with BR211.

Water Environment

Significant soil contamination was not identified by the investigative works; the water table was present at about 3.80m below ground level within the underlying Secondary (A) Aquifer (First Terrace Sand and Gravel), and there are no natural surface water features, source protection zones or groundwater abstractions within 250m of the site.

The results of the water testing are considered to characterise the groundwater beneath this site with the elevated results for selenium and sulphate considered to represent natural background concentrations within the superficial soils beneath the district and the PAH results representative of very low levels of contamination. The absence of TPH and other volatile organics within the groundwater tested indicates that any localised leakage from former fuel and oil tanks, notably the hydrocarbon-impacted soil formerly recorded in the DTS Raeburn preliminary investigation adjacent a 40,000 litre above ground diesel storage tank at the western edge of the site, has either dispersed since the removal of the tank in 2007 or was of such a limited extent that it has not impacted the underlying water table, as monitored/tested from the nearby BH 1 standpipe in late 2011.

It is considered unlikely that the proposed residential development would impact the quality of the water environment.

Effects on Services

Guidance on the selection of materials for use as water supply pipes should be sought from the local water supplier.

Flora

The trees and shrubs around the site are considered unlikely to be affected by the levels of contamination found by this investigation.

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 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.

The results of the WAC tests on the made ground indicate that the made ground may not be disposed of as inert waste based on its marginally elevated sulphate, TDS and antimony content. The advice of landfill operators should be sought in respect of the classification of waste generated during construction on this site.

It is expected that clean arisings from foundation excavations into the natural soils across this site would also fall into the inert category under the European Waste Catalogue description 'Soil and Stones', EWC code 17 05 04 with restrictions excluding topsoil and peat.

Soils and water beneath this site that has been impacted by hydrocarbons will need to be disposed of as special waste.

REMEDIATION STRATEGY

Summary of Proposed Works

The proposed redevelopment will comprise the construction of a large number of two and three-storey residential dwellings. The existing site is detailed on the site plan at the rear of this report. The proposed site layout will need to be provided as part of the planning submission. This plan will need to clearly identify areas of gardens and soft landscaping.

Existing Drainage/Buildings

Redundant foul or surface water drain runs, should be removed and precautions should ensure that any remaining effluent is directly disposed off-site. Infilled former below ground structures may have asbestos containing materials within them. Suitable precautions, in line with current best practice, should then be put in place to protect workers from the effects of asbestos material, during the construction phase.

Contaminated Soil

On the basis of the work carried out, the laboratory testing undertaken to date indicates that the samples of made ground tested did not contain statistically elevated concentrations of contaminants in excess of the SSVs for residential or commercial end uses, although the number of tests undertaken within this relatively large former industrial site means that this should be viewed as a preliminary conclusion.

The intended end use is considered to be comparable to a residential with home grown produce setting, for private gardens, and residential without home grown produce, for communal gardens and landscaping.

Remediation

In order to create gardens on this site, as a minimum, it will be necessary to remove the existing surface layers of concrete, compacted coarse grained fill and it is recommended, where present, ashy fill and replace them with imported topsoil and subsoil material. The removal of 0.60m of made ground would be considered sufficient for gardens and soft landscaping. Where the made ground is less than 0.60m thick, as it was across large parts of the site, then the natural ground should be exposed and an imported topsoil and subsoil layer of a suitable thickness placed.

The removal of the surface layers and their replacement with up to 0.60m of imported topsoil and subsoil will provide a viable layer for such private and communal gardens.

In areas where the made ground is of an increased thickness and is not all removed it may be considered prudent to undertake further chemical testing at that time to establish that the 0.60m cover layer thickness is adequate.

Topsoil

It will be necessary to import topsoil to create gardens and soft landscaping within this site. This material should have appropriate certificates confirming its suitability prior to placement.

Remediation Plan

This remediation strategy should be used with the proposed development plan to derive a remediation plan, clearly labelled to show the different land uses (for example - hardstanding, buildings, communal gardens, private rear gardens), which should be submitted to satisfy planning conditions.

Validation

The implementation of this remediation strategy should be checked during construction and on completion, and appropriate records kept so that a Validation Report can be compiled and subsequently submitted to the local authority.

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Site: STAR LANE, GREAT WAKERING

BOREHOLE BH1

Date: 30/09/11 to 03/10/11

Hole Size: 150mm dia to 20.00m

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
					MADE GROUND - CONCRETE.		0.20	10.80
0.30	D1				MADE GROUND - Stiff, dark brown, slightly gravelly, silty CLAY. Gravel fraction of chalk, brick, flint and concrete.		0.60	10.40
0.60-1.10	B1				Stiff, light brown, slightly sandy, silty CLAY with occasional sub-rounded flint gravel.			
0.60	D2							
1.10	D3							
1.20-1.70	U1	55						
1.70	D4				(FIRST TERRACE LOAM)			
2.00-2.50	U2	65	1.50					
2.50	D5						2.30	8.70
2.60-3.10	B2				Medium dense becoming dense, orange brown silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz.			
2.60	D6		2.00					
2.75-3.05	S	N20						
3.50-4.00	B3				(FIRST TERRACE SAND)			
3.50	D7							
3.50	W1		3.40					
3.65-3.95	C	N33						
					Medium dense, orange brown, slightly silty SAND and GRAVEL. Gravel fraction of sub-angular to rounded flint.		4.00	7.00
4.50-5.00	B4							
4.50	D8							
4.65-4.95	C	N25	4.40		(FIRST TERRACE GRAVEL)			
5.60	D9						5.60	5.40
5.80	D10				Stiff, brown, slightly gravelly CLAY with occasional sand partings. Gravel fraction of sub-angular to rounded flint. (REWORKED LONDON CLAY)		5.80	5.20
5.90-6.30	U3	70	5.80		Stiff, closely fissured, grey brown CLAY with occasional silt partings.			
6.30	D11							
7.00	D12							
7.50-8.00	U4	75	7.20					
8.00	D13				(LONDON CLAY)			
8.50	D14							
9.00-9.50	U5	80	7.20					
9.50	D15							
10.00	D16						10.00	1.00

REMARKS
1. Excavating a pit from 0.00m to 1.20m for 1 hour
2. Water added from 2.30m to 4.00m
3. Borehole cased to 7.20m depth
4. Gas monitoring standpipe installed to 7.00m depth

Project No 12519

Scale 1:50 | Page 1/2

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
S/C - SPT Spoon/Cone
▽ Water Strike
▼ Water Rise
N - SPT Blows for 0.3m
* - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes

No	Depth m Struck	Rose to	Rate	Cased	Sealed
1	3.50	2.50	medium	3.40	5.60

Groundwater Observations

Date	Depth m Hole	Casing	Water
30/09/11	11.00	7.20	dry
03/10/11	11.00	7.20	9.80
03/10/11	20.00	7.20	dry
11/10/11	7.00		3.78
10/11/11	7.00		4.03

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Site: STAR LANE, GREAT WAKERING

BOREHOLE BH1

Date: 30/09/11 to 03/10/11

Hole Size: 150mm dia to 20.00m

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
				BENEATH INSTALLATION	Very stiff, locally very closely fissured to stiff at 12.00m, closely fissured, grey brown CLAY with occasional silt partings and rare fossil shell debris.		10.00	1.00
10.60-11.10	U6	80	7.20	BENEATH INSTALLATION				
10.80	D17			BENEATH INSTALLATION				
11.50	D18			BENEATH INSTALLATION				
12.00-12.50	U7	85	7.20	BENEATH INSTALLATION				
12.50	D19			BENEATH INSTALLATION				
13.10	D20			BENEATH INSTALLATION				
13.60-13.90	U8	100	7.20	BENEATH INSTALLATION				
13.90	D21			BENEATH INSTALLATION				
14.50	D22			BENEATH INSTALLATION				
15.10-15.40	U9	100	7.20	BENEATH INSTALLATION	(LONDON CLAY)			
15.40	D23			BENEATH INSTALLATION				
16.00	D24			BENEATH INSTALLATION				
16.40-16.70	U10	100	7.20	BENEATH INSTALLATION				
16.70	D25			BENEATH INSTALLATION				
17.50	D26			BENEATH INSTALLATION				
18.00-18.20	U11	100	7.20	BENEATH INSTALLATION				
18.20	D27			BENEATH INSTALLATION				
19.00	D28			BENEATH INSTALLATION				
19.60-20.00	U12	100	7.20	BENEATH INSTALLATION				
20.00	D29			BENEATH INSTALLATION			20.00	-9.00

REMARKS

Borehole completed at 20.00m depth

Project No 12519

Scale 1:50 | Page 2/2

KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
S/C - SPT Spoon/Cone
▽ Water Strike
▼ Water Rise
N - SPT Blows for 0.3m
. - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water
						18/11/11	7.00		3.85

GROUND ENGINEERING LIMITED

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Site: STAR LANE, GREAT WAKERING

BOREHOLE BH2

Date: 26/09/11

Hole Size: 150mm dia to 1.10m

Ground Level: 11.05m. O.D.

Samples and in-situ Tests			(Date) Casing	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows					
0.10-0.60	B1			MADE GROUND - Light brown, silty, sandy GRAVEL and COBBLES of brick and concrete.			
0.10	D1						
0.20	D2						
0.70-1.10	B2					0.70	10.35
0.70	D3			MADE GROUND - Red brown, silty, gravelly SAND. Gravel fraction of brick, flint, concrete and mortar.			
						1.10	9.95
				Borehole abandoned at 1.10m depth			

REMARKS
1. Excavating a pit from 0.00m to 1.10m for 1 hour
2. Excavation of starter pit resulted in unstable ground in brick rubble and movement of drilling rig
3. Borehole abandoned and rig moved to position BH2A

Project No 12519

Scale 1:50 | Page 1/1

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
S/C - SPT Spoon/Cone
▼ Water Strike
▼ Water Rise
N - SPT Blows for 0.3m
• - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water
						26/09/11	1.10		dry

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Site: STAR LANE, GREAT WAKERING

BOREHOLE
BH2A

Date: 26/09/11 to 27/09/11

Hole Size: 150mm dia to 13.00m

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
0.20	D1				MADE GROUND - Light brown, silty, sandy GRAVEL and COBBLES of brick and concrete.			
0.50-1.10	B1						0.50	10.50
0.50	D2				MADE GROUND - Red brown, silty, gravelly SAND. Gravel fraction of brick, flint and concrete.		0.70	10.30
1.20-1.70	B2				Stiff, becoming firm below 1.20m, red brown, slightly gravelly, slightly sandy, silty CLAY. Gravel fraction of sub-angular to sub-rounded flint.			
1.20	D3							
1.35-1.65	S	N14			(FIRST TERRACE LOAM)			
2.00-2.50	B3							
2.00	D4							
2.15-2.45	S	N16	1.50				2.40	8.60
3.10-3.60	B4				Medium dense, orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.10	7.90
3.10	D5		3.00					
3.25-3.55	S	N37			Dense, orange brown, slightly silty SAND and GRAVEL. Gravel fraction of sub-angular to rounded flint. (FIRST TERRACE GRAVEL)			
3.50	W1							
4.00-4.50	B5						4.00	7.00
4.00	D6							
4.15-4.45	C	N34	3.90		Dense, becoming medium dense below 5.00m, orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz.			
5.10-5.60	B6							
5.10	D7		5.00		(FIRST TERRACE SAND)			
5.25-5.55	C	N19						
5.90-6.40	B7						5.90	5.10
5.90	D8		5.70		Firm, brown CLAY with occasional sand partings. (REWORKED LONDON CLAY)			
6.05-6.35	C	N13					6.50	4.50
6.50	D9				Stiff, locally very stiff, closely fissured, grey brown CLAY with occasional silt partings. Cobble size nodule of strong grey concretionary limestone met at 9.00m depth.			
7.00-7.30	U1	75	6.80					
7.30	D10							
8.00	D11				(LONDON CLAY)			
8.50-8.80	U2	80	7.20					
8.90	D12							
10.00-10.50	B8						10.00	1.00

REMARKS
1. Excavating a pit from 0.00m to 1.20m for 1 hour
2. Water added from 3.00m to 4.00m
3. Borehole cased to 7.20m depth
4. Chiselling from 12.00m to 13.00m for 1 hour
5. Unable to remove concretionary limestone nodule driven from 9.10m to 13.00m depth, borehole abandoned
6. Gas monitoring standpipe installed to 7.00m depth

Project No 12519

Scale 1:50

Page 1/2

KEY
- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- W - Water Sample
- S/C - SPT Spoon/Cone
- ▼ Water Strike
- ▼ Water Rise
- N - SPT Blows for 0.3m
- . - Blows for quoted penetration
- V - Vane Shear Test Cohesion ( ) kPa
- ▼c Level on completion
- c▼w Level casing withdrawn
- ▼s Standpipe Level

Groundwater Strikes

No	Struck	Rose to	Rate	Cased	Sealed
	Depth m				
1	3.50	3.20	medium seepage	3.40	not
2	9.10				

Groundwater Observations

Date	Depth m Hole	Depth m Casing	Depth m Water
26/09/11	4.50	3.90	dry
27/09/11	4.50	3.90	3.00
27/09/11	13.00	7.20	12.00
11/10/11	7.00		3.93
10/11/11	7.00		3.85

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Site: STAR LANE, GREAT WAKERING

BOREHOLE BH2A

Date: 26/09/11 to 27/09/11

Hole Size: 150mm dia to 13.00m

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
10.00	D13							
10.15-10.45	S	N63	7.20		Very stiff, closely fissured, grey brown CLAY with occasional silt partings.		10.00	1.00
11.00	D14							
12.00-12.50	B9		c▼w		(LONDON CLAY)			
12.00	D15							
12.15-12.45	S	N90	7.20					
					Borehole abandoned at 13.00m depth		13.00	-2.00

REMARKS

Project No 12519

Scale 1:50 | Page 2/2

KEY
D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
S/C - SPT Spoon/Cone
▼ Water Strike
▼ Water Rise
N - SPT Blows for 0.3m
* - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes

No	Depth m Struck	Rose to	Rate	Cased	Sealed

Groundwater Observations

Date	Depth m Hole	Casing	Water
18/11/11	7.00		4.05

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Site: STAR LANE, GREAT WAKERING

Date: 29/09/11

Hole Size: 150mm dia to 25.00m

BOREHOLE BH3

Ground Level: 10.90m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
					MADE GROUND - CONCRETE.		0.20	10.70
0.20	D1				MADE GROUND - Dark brown, silty, sandy GRAVEL. Gravel fraction of brick, concrete, flint, pottery and glass.		0.50	10.40
0.60-1.10	B1				MADE GROUND - Firm, brown, slightly gravelly, sandy, silty CLAY. Gravel fraction of coal, ash, brick, glass and flint.			
0.60	D2							
1.20-1.70	B2							
1.20	D3							
1.35-1.65	S	N7					1.60	9.30
					Firm, light brown, slightly sandy, silty CLAY. (FIRST TERRACE LOAM)			
2.10	D4						2.10	8.80
2.20-2.70	B3				Dense, becoming medium dense below 3.00m, orange brown, silty, gravelly to very gravelly, fine and medium SAND. Gravel fraction of sub-angular to rounded flint.			
2.20	D5		1.50					
2.35-2.65	C	N31						
3.00-3.50	B4							
3.00	D6							
3.15-3.45	C	N13	2.90		(FIRST TERRACE SAND)			
3.30	W1							
4.10-4.60	B5							
4.10	D7		4.00					
4.25-4.55	C	N27						
5.10-5.60	B6						5.10	5.80
5.10	D8		5.00		Medium dense, orange brown, slightly silty SAND and GRAVEL. Gravel fraction of sub-angular to sub-rounded flint. (FIRST TERRACE GRAVEL)			
5.25-5.55	C	N18						
6.10	D9						6.10	4.80
					Stiff, brown and orange brown mottled, slightly gravelly CLAY. Gravel fraction of sub-rounded to rounded flint. (REWORKED LONDON CLAY)		6.40	4.50
6.50-6.90	U1	65	6.40		Stiff, closely fissured, grey brown CLAY with occasional silt partings.			
6.90	D10							
7.50	D11							
8.00-8.40	U2	75	7.20		(LONDON CLAY)			
8.40	D12							
9.10	D13							
9.50-9.90	U3	80	7.20					
9.90	D14						10.00	0.90

REMARKS
1. Excavating a pit from 0.00m to 1.20m for 1 hour
2. Water added from 2.10m to 3.30m
3. Borehole cased to 7.20m depth
4. Gas monitoring standpipe installed to 7.00m depth

Project No 12519

Scale 1:50 | Page 1/3

KEY
- D - Disturbed Sample
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- W - Water Sample
- S/C - SPT Spoon/Cone
- ▼ Water Strike
- ▼ Water Rise
- N - SPT Blows for 0.3m
- * - Blows for quoted penetration
- V - Vane Shear Test Cohesion ( ) kPa
- ▼c Level on completion
- c▼w Level casing withdrawn
- ▼s Standpipe Level

Groundwater Strikes

No	Depth m: Struck	Rose to	Rate	Cased	Sealed
1	3.30	3.00	medium	3.00	6.40

Groundwater Observations

Date	Depth m: Hole	Casing	Water
29/09/11	25.00	7.20	dry
11/10/11	7.00		3.82
10/11/11	7.00		3.85
18/11/11	7.00		3.87

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Site: STAR LANE, GREAT WAKERING

Date: 29/09/11

Hole Size: 150mm dia to 25.00m

BOREHOLE BH3

Ground Level: 10.90m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
					Very stiff, closely fissured, grey brown CLAY with occasional silt partings, rare medium gravel size pyrite nodules and fossil shell debris. Locally hard at 17.00m and very closely fissured to stiff at 19.00m depth.		10.00	0.90
10.60	D15							
11.00-11.40	U4	80	7.20					
11.40	D16							
12.10	D17							
12.60-13.00	U5	100	7.20					
13.00	D18							
13.50	D19							
14.00-14.30	U6	100	7.20					
14.30	D20							
15.00	D21				(LONDON CLAY)			
15.60-15.80	U7	100	7.20					
15.80	D22							
16.50	D23							
17.00-17.30	U8	100	7.20					
17.30	D24							
18.00	D25							
18.60-19.00	U9	100	7.20					
18.90	D26							
19.50	D27							
20.00-20.20	U10	100	7.20				20.00	-9.10

REMARKS

Project No 12519

Scale 1:50 | Page 2/3

KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
W - Water Sample
S/C - SPT Spoon/Cone
▼ Water Strike
▼ Water Rise
N - SPT Blows for 0.3m
* - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water

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Site: STAR LANE, GREAT WAKERING

BOREHOLE BH3

Date: 29/09/11

Hole Size: 150mm dia to 25.00m

Ground Level: 10.90m. O.D.

Samples and in-situ Tests			(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
20.20	D28				Very stiff, locally hard, closely fissured, grey brown CLAY with occasional silt partings.		20.00	-9.10
20.80	D29							
21.40-21.70	U11	100	7.20					
21.70	D30							
22.50	D31							
23.00-23.30	U12	100	7.20		(LONDON CLAY)			
23.30	D32							
24.00	D33							
24.60-25.00	U13	100	7.20					
25.00	D34				Borehole completed at 25.00m depth		25.00	-14.10

REMARKS

Project No 12519

Scale 1:50 | Page 3/3

KEY

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S/C - SPT Spoon/Cone
▽ Water Strike
▼ Water Rise
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. - Blows for quoted penetration
V - Vane Shear Test Cohesion ( ) kPa
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	Date	Hole	Casing	Water

Borehole Number	Depth (m)	Casing Depth (m)	Depth to Water (m)	Type of Test *	Seating Drive: Blows/Penetration (mm)	Test Drive: 300mm Blows for each successive 75 mm Penetration				N Value	Extrapolated Value
BH1	2.60 - 3.05	2.00		S	6/150	5	5	5	5	20	
	3.50 - 3.95	3.40	2.50	C	10/150	10	7	7	9	33	
	4.50 - 4.95	4.40	3.40	C	10/150	12	5	3	5	25	
BH2A	1.20 - 1.65			S	5/150	3	5	3	3	14	
	2.00 - 2.45	1.50		S	5/150	5	3	3	5	16	
	3.10 - 3.55	3.00	2.80	S	15/150	10	10	7	10	37	
	4.00 - 4.45	3.90	3.50	C	10/150	10	7	10	7	34	
	5.10 - 5.55	5.00	4.10	C	5/150	5	4	5	5	19	
	5.90 - 6.35	5.70	5.10	C	2/150	2	3	4	4	13	
	10.00 - 10.45	7.20	9.80	S	10/150	10	13	20	20	63	
	12.00 - 12.45	7.20	11.20	S	11/150	20	20	25	25	90	
BH3	1.20 - 1.65			S	2/150	1	2	2	2	7	
	2.20 - 2.65	1.50		C	10/150	7	7	7	10	31	
	3.00 - 3.45	2.90	2.70	C	5/150	3	3	3	4	13	
	4.10 - 4.55	4.00	3.00	C	10/150	7	6	7	7	27	
	5.10 - 5.55	5.00	4.00	C	4/150	4	4	5	5	18	

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* C denotes test using a solid cone
S denotes test using a split barrel sampler

Results of Standard/Cone Penetration Tests

12519

STAR LANE, GREAT WAKERING

Table No

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP1

Date: 26/09/11

Pit Size: 3.20m L x 0.60m W x 3.20m D.

Ground Level: 11.20m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - Brown, angular GRAVEL of flint, granite and asphalt.		0.03	11.17
0.30	D1			MADE GROUND - Stiff, dark brown and dark grey mottled slightly gravelly, slightly sandy CLAY. Gravel fraction of brick, tile, flint and charcoal.			
0.50-0.60	B1						
0.60	D2						
0.60	V1	(108)					
0.90	D3					1.00	10.20
1.20	D4			Stiff, light brown, slightly sandy, silty CLAY with rare sub-angular flint gravel.			
1.50-1.60	B2						
1.50	D5						
1.50-1.80	MP1	87					
2.00	D6			(FIRST TERRACE LOAM)			
						2.30	8.90
2.30-2.60	MP2	98		Medium dense, orange brown, silty, slightly gravelly to gravelly fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz.			
2.40-2.50	B3						
				(FIRST TERRACE GRAVEL)			
3.10-3.20	B4					3.20	8.00
				Pit completed at 3.20m 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. Live roots observed to 0.30m depth
2. Pit sides stable
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP2

Date: 26/09/11

Pit Size: 3.30m L x 0.60m W x 3.10m D.

Ground Level: 11.20m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.20	D1			MADE GROUND - Grey brown and red brown silty SAND and GRAVEL. Gravel fraction of brick, flint, concrete, tile, ceramic and glass.		0.30	10.90
0.50-0.60	B1			Firm, locally stiff, light brown, slightly sandy, silty CLAY. Gravel size calcareous nodule at 2.50m depth.			
0.60	D2						
0.60	V1	(69)					
0.90	D3			(FIRST TERRACE LOAM)			
1.20	D4						
1.20-1.50	MP1	84					
1.50	D5						
2.00-2.10	B2						
2.50	D6						
						2.70	8.50
3.00-3.10	B3			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.10	8.10
				Pit completed at 3.10m 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. Live roots observed to 0.70m depth
2. Pit sides stable
3. Pit dry

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP3

Date: 26/09/11

Pit Size: 3.30m L x 0.60m W x 3.70m D.

Ground Level: 11.10m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - CONCRETE.		0.20	10.90
0.30	D1			MADE GROUND - Red brown silty, sandy GRAVEL and COBBLES of brick.		0.40	10.70
0.50-0.60	B1			MADE GROUND - Stiff, dark brown and dark grey mottled slightly gravelly, slightly sandy CLAY. Gravel fraction of brick, flint and glass.		0.60	10.50
0.50	D2			Firm, light brown, slightly sandy, silty CLAY.			
0.60	V1	(69)					
0.90	D3						
1.20	D4						
1.20-1.50	MP1	74					
1.50	D5						
2.00-2.10	B2			(FIRST TERRACE LOAM)			
2.50	D6						
3.00	D7					3.00	8.10
3.10-3.20	MP2	68		Medium dense, orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)			
3.60-3.70	B3					3.70	7.40
				Pit completed at 3.70m 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. Pit sides stable
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP4

Date: 26/09/11

Pit Size: 3.20m L x 0.60m W x 3.00m D.

Ground Level: 11.10m. O.D.

Samples and In-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.30	D1			MADE GROUND - Stiff, light brown, slightly gravelly, slightly sandy CLAY. Gravel fraction of brick, flint and glass.		0.40	10.70
0.50-0.60	B1						
0.50	D2			MADE GROUND - Stiff, dark grey and red brown mottled slightly gravelly, slightly sandy CLAY with occasional cobble size pieces of brick. Gravel fraction of brick, coal, flint, tile and ash.		0.70	10.40
0.80	D3						
1.00	V1	(71)		Firm, light brown, slightly sandy, silty CLAY.			
1.20	D4						
1.50	D5			(FIRST TERRACE LOAM)			
1.50-1.80	MP1	54					
2.00-2.10	B2						
2.50	D6						
						2.70	8.40
2.90-3.00	B3			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.00	8.10
				Pit completed at 3.00m 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
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Live roots observed to 0.40m depth
2. Pit sides stable
3. Pit dry

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT TP5

Date: 26/09/11

Pit Size: 3.10m L x 0.60m W x 3.00m D.

Ground Level: 11.20m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			MADE GROUND - Dark grey and dark brown, sandy GRAVEL. Gravel fraction of asphalt, brick, concrete, coal and tile.		0.20	11.00
0.30	D2			MADE GROUND - Stiff, dark brown, slightly gravelly, slightly sandy CLAY. Gravel fraction of flint, brick, glass and concrete.		0.40	10.80
0.50-0.60	B1						
0.60	D3						
0.70	V1	(117)		Stiff, becoming firm, light brown, slightly sandy, silty CLAY.			
0.90	D4						
1.20-1.50	MP1	79					
1.50	D5			(FIRST TERRACE LOAM)			
2.00	D6						
2.40	D7					2.50	8.70
2.90-3.00	B2			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.00	8.20
				Pit completed at 3.00m 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
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. Live roots observed to 0.40m depth
2. Pit sides stable
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

Date: 27/09/11

Pit Size: 3.10m L x 0.60m W x 3.10m D.

TRIAL PIT
TP6

Ground Level: 10.90m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - Reinforced CONCRETE.		0.15	10.75
0.30	D1			Firm, red brown, slightly sandy, silty CLAY. (FIRST TERRACE LOAM)			
0.50	V1	(69)				0.50	10.40
0.60-0.70	B1			Firm, light brown, slightly sandy, silty CLAY.			
0.60	D2						
0.90	D3						
1.00	V2	(69)					
1.20	D4						
1.50	D5			(FIRST TERRACE LOAM)			
2.00	D6						
2.00-2.30	MP1	62					
2.50	D7						
						2.60	8.30
3.00-3.10	B2			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.00	7.90
				Pit completed at 3.00m 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
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

REMARKS

1. No live roots observed
2. Pit sides stable
3. Pit dry

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP7

Date: 27/09/11

Pit Size: 3.10m L x 0.60m W x 3.40m D.

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.20	D1			MADE GROUND - CONCRETE.		0.15	10.85
0.50-0.60	B1			MADE GROUND - Dark grey and brown, silty SAND and GRAVEL with much ash. Gravel fraction of flint, concrete, brick and slate.		0.40	10.60
0.60	D2						
0.70	V1	(79)		Firm, red brown, slightly sandy, silty CLAY.			
0.90	D3			(FIRST TERRACE LOAM)			
1.20	D4						
1.20-1.50	MP1	72				1.40	9.60
1.50	D5			Firm, light brown, slightly sandy, silty CLAY.			
2.00	D6			(FIRST TERRACE LOAM)			
2.10-2.40	MP2	55					
2.50	D7						
						2.90	8.10
3.30-3.40	B2			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.40	7.60
				Pit completed at 3.40m 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. Pit sides stable
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP8

Date: 27/09/11

Pit Size: 3.30m L x 0.60m W x 3.60m D.

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.10	D1			MADE GROUND - Brown and red brown, silty, sandy GRAVEL. Gravel fraction of brick, asphalt, concrete, glass and tile.		0.20	10.80
0.30	D2			MADE GROUND - Dark grey and black silty, SAND and GRAVEL with much ash. Gravel fraction of flint, brick, concrete, glass and ceramic.		0.40	10.60
0.60-0.70	B1			Stiff, becoming firm, light brown, slightly sandy, silty CLAY with rare sub-angular flint gravel.			
0.60	D3						
0.80	V1	(87)					
0.90	D4						
1.20	D5						
1.50	D6						
1.90-2.20	MP1	64		(FIRST TERRACE LOAM)			
2.00-2.10	B2						
2.50	D7						
3.20	D8			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.10	7.90
3.50-3.60	B3					3.60	7.40
				Pit completed at 3.60m 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. Live roots observed to 0.20m depth
2. Pit sides stable
3. Pit dry

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

Date: 27/09/11

Pit Size: 2.50m L x 1.70m W x 2.90m D.

TRIAL PIT TP9

Ground Level: 11.05m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.50-0.60	B1			MADE GROUND - Red brown and grey brown, silty, sandy GRAVEL and COBBLES. Gravel and cobble fractions of brick and concrete, occasional fragments of slate and glass.		1.40	9.65
1.60	D1			MADE GROUND - BRICKWORK.		1.50	9.55
2.00	D2			Firm, light brown, slightly sandy, silty CLAY. (FIRST TERRACE LOAM)			
2.50	D3					2.60	8.45
2.80-2.90	B2			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND) Pit completed at 2.90m depth		2.90	8.15

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. Live roots observed to 0.60m depth
2. Pit sides unstable from GL to 1.50m depth
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP10

Date: 26/09/11

Pit Size: 3.50m L x 0.60m W x 3.40m D.

Ground Level: 11.00m. O.D.

Samples and In-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - Reinforced CONCRETE.		0.20	10.80
0.30	D1			MADE GROUND - Firm, brown, dark brown and grey mottled slightly gravelly, slightly sandy CLAY. Gravel fraction of flint, brick and concrete.		0.50	10.50
0.50-0.60	B1						
0.60	D2						
0.70	V1	(68)		Firm, locally stiff, light brown, slightly sandy, silty CLAY.			
0.90	D3						
1.20	D4						
1.40-1.70	MP1	87		(FIRST TERRACE LOAM)			
1.80-1.90	B2						
						2.20	8.80
2.30-2.40	B3			Medium dense, orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz.			
2.40-2.70	MP2	82					
				(FIRST TERRACE SAND)			
3.30-3.40	B4						
				Pit completed at 3.40m depth		3.40	7.60

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. Live roots observed to 0.50m depth
2. Pit sides unstable below 2.50m depth
3. Pit dry

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP11

Date: 26/09/11

Pit Size: 3.00m L x 0.60m W x 3.10m D.

Ground Level: 10.90m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - Reinforced CONCRETE.		0.15	10.75
0.30	D1			MADE GROUND - Stiff, dark brown, slightly gravelly, slightly sandy CLAY. Gravel fraction of brick, concrete, flint and coal.		0.40	10.50
0.50-0.60	B1						
0.60	D2						
0.60	V1	(93)		Stiff, light brown, slightly sandy, silty CLAY.			
0.90	D3						
1.20	D4						
1.50-1.60	B2			(FIRST TERRACE LOAM)			
1.60-1.90	MP1	91					
						2.30	8.60
2.30-2.40	B3			Medium dense, orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)			
2.40-2.70	MP2	74					
3.00-3.10	B4						
						3.10	7.80
				Pit completed at 3.10m 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. Live roots observed to 0.40m depth
2. Pit dry
3. Pit sides stable

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP12

Date: 26/09/11

Pit Size: 3.10m L x 0.60m W x 3.20m D.

Ground Level: 11.20m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - CONCRETE.		0.15	11.05
0.30	D1			MADE GROUND - Firm, dark brown, slightly gravelly, slightly sandy CLAY. Gravel fraction of brick, concrete, coal and flint.		0.40	10.80
0.50-0.60	B1						
0.60	D2						
0.60	V1	(96)		Stiff, locally firm, light brown, slightly sandy, silty CLAY.			
0.90	D3						
1.20	D4						
1.20	V2	(111)		(FIRST TERRACE LOAM)			
2.10-2.20	B2						
2.20-2.50	MP1	78				2.20	9.00
2.30-2.40	B3			Medium dense, orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)			
3.10-3.20	B4					3.20	8.00
				Pit completed at 3.20m 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. Live roots observed to 0.20m depth
2. Pit sides stable
3. Pit dry

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP13

Date: 27/09/11

Pit Size: 3.90m L x 0.60m W x 3.30m D.

Ground Level: 11.30m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - Reinforced CONCRETE.		0.15	11.15
0.30	D1			MADE GROUND - Brown and dark brown, silty SAND and GRAVEL. Gravel fraction of brick, flint, glass, coal and concrete.			
0.40-0.50	B1					0.50	10.80
0.60	D2			MADE GROUND - Grey and grey green silty SAND.		0.70	10.60
0.80	V1	(61)		Firm, light brown, slightly sandy, silty CLAY with rare sub-angular flint gravel.			
0.90	D3						
1.20	D4						
1.20-1.50	MP1	56					
1.50	D5						
1.90-2.20	MP2	45		(FIRST TERRACE LOAM)			
2.00	D6						
2.50	D7						
						3.00	8.30
3.20-3.30	B2			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.20	8.10
				Pit completed at 3.20m 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. Pit sides stable
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP14

Date: 27/09/11

Pit Size: 2.80m L x 0.60m W x 3.40m D.

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - CONCRETE.		0.20	10.80
0.30	D1			MADE GROUND - Firm, brown, grey and dark grey mottled slightly gravelly, slightly sandy CLAY. Gravel fraction of flint, coal, brick and ash.		0.40	10.60
0.60-0.70	B1			MADE GROUND - CONCRETE.		0.60	10.40
0.60	D2			Firm, light brown, slightly sandy, silty CLAY with occasional sub-rounded to rounded flint below 2.00m.			
0.80	V1	(69)					
0.90	D3						
1.20	D4						
1.50	D5			(FIRST TERRACE LOAM)			
1.50-1.60	MP1	62					
2.00	D6						
2.10-2.40	MP2	57					
2.50	D7						
3.20-3.30	B2					3.20	7.80
				Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)		3.40	7.60
				Pit completed at 3.40m 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. Pit sides stable
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP15

Date: 27/09/11

Pit Size: 3.80m L x 0.60m W x 1.21m D.

Ground Level: 10.60m. O.D.

Samples and In-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.30	D1			MADE GROUND - Red brown and grey silty SAND and GRAVEL. Gravel fraction of brick, flint, concrete, glass, coal and plastic.			
0.60	D2					0.50	10.10
0.60	MP1	93		MADE GROUND - Stiff, red brown, slightly sandy, silty CLAY.			
0.90	D3					1.20	9.40
				MADE GROUND - CONCRETE obstruction.		1.21	9.39
				Pit abandoned at 1.21m 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. Live roots observed to 0.50m depth
2. Pit sides stable
3. Pit dry
4. Pit abandoned on concrete obstruction at 1.20m depth

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP16

Date: 27/09/11

Pit Size: 3.10m L x 0.60m W x 3.20m D.

Ground Level: 10.00m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - Reinforced CONCRETE.		0.20	9.80
0.30	D1			MADE GROUND - Stiff, dark brown and dark grey mottled slightly gravelly, slightly sandy CLAY with much ash. Gravel fraction of brick, concrete, flint, glass, coal and tile.		0.40	9.60
0.50-0.60	B1						
0.60	D2						
0.60	V1	(103)					
				MADE GROUND - Stiff, grey brown slightly gravelly, slightly sandy CLAY. Gravel fraction of flint and brick.		0.85	9.15
0.90	D3			Firm, light brown, slightly sandy, silty CLAY.			
1.20	D4						
1.50-1.60	B2						
1.50-1.80	MP1	70		(FIRST TERRACE LOAM)			
2.00	D5						
2.10-2.40	MP2	62					
2.50-2.60	B3					2.40	7.60
			▽ 1	Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (FIRST TERRACE SAND)			
2.90	W1						
3.10-3.20	B4					3.20	6.80
				Pit completed at 3.20m 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 met at 2.90m depth
3. Pit sides unstable below 2.40m depth

Project No	
12519	
Scale	Page
1:50	1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP17

Date: 27/09/11

Pit Size: 3.20m L x 1.20m W x 3.20m D.

Ground Level: 11.00m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.40-0.50	B1			MADE GROUND - Red brown, silty, sandy GRAVEL and COBBLES of brick.		0.80	10.20
				MADE GROUND - 'Weak' CONCRETE.		1.10	9.90
1.20	D1			Stiff, light brown, slightly sandy, silty CLAY with rare sub-angular flint gravel.			
1.20-1.50	MP1	121					
1.50	D2						
2.00	D3			(FIRST TERRACE LOAM)			
2.00-2.30	MP2	89					
2.50	D4					2.90	8.10
3.10-3.20	B2			Orange brown, silty, slightly gravelly to gravelly, fine and medium SAND. Gravel fraction of angular to sub-rounded flint and occasional quartz. (RIVER TERRACE SAND)		3.20	7.80
				Pit completed at 3.20m 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. Live roots observed to 0.30m depth
2. Pit sides unstable from GL to 0.80m depth
3. Pit dry

Project No 12519

Scale 1:50

Page 1/1

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Site: STAR LANE, GREAT WAKERING

TRIAL PIT
TP18

Date: 27/09/11

Pit Size: 4.10m L x 1.60m W x 1.60m D.

Ground Level: 10.80m. O.D.

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.50-0.60	B1			MADE GROUND - Red brown, silty, sandy GRAVEL and COBBLES of bricks and concrete blocks.			
1.30-1.40	B2		▽			1.40	9.40
				MADE GROUND - CONCRETE.		1.60	9.20
				Pit abandoned at 1.60m 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. Live roots observed to 0.30m depth
2. Pit sides unstable
3. Water met at 1.40m depth
4. Pit abandoned as excavator unable to penetrate slab

Project No	
12519	
Scale	Page
1:50	1/1

LABORATORY TEST RESULTS

CONTRACT **STAR LANE, GREAT WAKERING**

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				C.B.R.		Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	Top %	Base %	
BH1	B1	0.60 - 1.10				19	2.05	1.34										4.1	6.4	1% retained on a 20mm sieve
	U1	1.20 - 1.70	37	20	17	19	2.10	1.77	QM	215 254 321	50 100 200	132	0							SOIL CLASSIFICATION = CI 2% retained on 425µm sieve
	U2	2.00 - 2.50				8.3	2.18	2.01	QM	119 150 183	50 100 200	76	0		107		8.1			
	W1	3.50														255	8.2			
	U3	5.90 - 6.30				25	2.06	1.64	Q	265	120	133	0							
	U4	7.50 - 8.00				27	2.03	1.60	Q	254	160	127	0							
	U5	9.00 - 9.50				30	2.03	1.56	Q	234	190	117	0		612		7.4			
	U6	10.60 - 11.10				24	2.05	1.65	Q	445	220	223	0							
	U7	12.00 - 12.50				26	2.03	1.61	Q	243	250	122	0							
	U8	13.60 - 13.90				23	2.04	1.66	Q	612	280	306	0							

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

C.B.R. - CALIFORNIA BEARING RATIO

12519

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LABORATORY TEST RESULTS

CONTRACT **STAR LANE, GREAT WAKERING**

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				C.B.R.		Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	Top %	Base %	
BH1	U9	15.10 - 15.40				25	2.05	1.64	Q	434	340	217	0							
	U10	16.40 - 16.70				25	2.06	1.65	Q	382	340	191	0							
	U11	18.00 - 18.20				25	2.01	1.61	Q	443	360	222	0							
	U12	19.60 - 20.00				27	2.05	1.61	Q	509	400	255	0							
BH2A	B1	0.50 - 1.10				17	1.99	1.70										33	34	2% retained on a 20mm sieve
	B2	1.20 - 1.70	29	22	7	19									1614		7.8			SOIL CLASSIFICATION = CL 5% retained on 425µm sieve
	B3	2.00 - 2.50	25	18	7	17														SOIL CLASSIFICATION = CL 2% retained on 425µm sieve
	W1	3.50														543	8.2			
	U1	7.00 - 7.30				27	2.03	1.60	Q	205	150	102	0		325		7.7			
	U2	8.50 - 8.80				24	2.05	1.65	Q	326	180	163	0							

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

C.B.R. - CALIFORNIA BEARING RATIO

12519

GROUND ENGINEERING LIMITED
Tel: 01733 586566
www.groundengineering.co.uk

LABORATORY TEST RESULTS

CONTRACT STAR LANE, GREAT WAKERING

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)			pH	C.B.R.		Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil Total % Dry Wt.	Soil Aqueous Extract mg/l	Water mg/l		Top %	Base %	
BH3	B2	1.20 - 1.70													271		7.9			
	W1	3.30														296	8.2			
	U1	6.50 - 6.90				27	2.03	1.60	Q	204	140	102	0							
	U2	8.00 - 8.40				25	2.05	1.64	Q	270	170	135	0							
	U3	9.50 - 9.90				28	2.04	1.60	Q	291	200	146	0							
	U4	11.00 - 11.40				28	2.02	1.58	Q	308	230	154	0							
	U5	12.60 - 13.00				25	2.06	1.65	Q	469	260	235	0							
	U6	14.00 - 14.30				26	2.06	1.63	Q	475	290	237	0							
	U7	15.60 - 15.80				26	2.04	1.62	Q	542	320	271	0							
	U8	17.00 - 17.30				26	2.02	1.60	Q	601	350	301	0		682		7.7			
	U9	18.60 - 19.00				24	2.05	1.66	Q	272	380	136	0							

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

C.B.R. - CALIFORNIA BEARING RATIO

12519

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

LABORATORY TEST RESULTS

CONTRACT STAR LANE, GREAT WAKERING

Bore-hole	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)			pH	C.B.R		Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l		Top %	Base %	
BH3	U10	20.00 - 20.20				26	2.00	1.59	Q	512	400	256	0							
	U11	21.40 - 21.70				23	2.06	1.68	Q	652	430	326	0							
	U12	23.00 - 23.30				25	2.02	1.62	Q	514	470	257	0		453		8.2			
	U13	24.60 - 25.00				29	2.03	1.57	Q	492	500	246	0							

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

C.B.R. - CALIFORNIA BEARING RATIO

12519

GROUND ENGINEERING LIMITED
Tel: 01733-566588
www.groundengineering.co.uk

LABORATORY TEST RESULTS

CONTRACT STAR LANE, GREAT WAKERING

Trial-pit	Sample	Depth m	Classification				Density		Triaxial Compression					Sulphates (SO_4)				Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m^3	Dry Mg/m^3	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Soil: Total % Dry Wt.	Soil: Aqueous Extract mg/l	Water mg/l	pH	
TP1	D5	1.50	33	19	14													SOIL CLASSIFICATION = CL 2% retained on 425µm sieve
TP2	B2	2.00 - 2.10	32	19	13													SOIL CLASSIFICATION = CL 0% retained on 425µm sieve
TP5	D3	0.60	35	18	17													SOIL CLASSIFICATION = CL/CI 0% retained on 425µm sieve
TP7	D3	0.90	31	22	9													SOIL CLASSIFICATION = CL 1% retained on 425µm sieve
TP10	B2	1.80 - 1.90	30	19	11													SOIL CLASSIFICATION = CL 4% retained on 425µm sieve
TP13	D17	2.50	29	18	11													SOIL CLASSIFICATION = CL 2% retained on 425µm sieve
TP17	D2	1.50	29	21	8													SOIL CLASSIFICATION = CL 0% retained on 425µm sieve

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

12519

GROUND ENGINEERING LIMITED
Tel: 01733-566566
www.groundengineering.co.uk

2304

Enverity

Newark Road Peterborough
t: 01733 555525 f: 01733 315280

e: peterborough@enverity.co.uk

TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road
Peterborough
PE1 5UA

Contact: Steve Fleming

Site Name: Star Lane
Site Address: Great Wakering

Certificate Number: PL3429-1/4/710-2
Client Reference: C12519
Lab Job Number: PL3429-1
Date Sampled: Unknown
Date Received: 11.10.2011
Date Tested: 19.11.2011
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

TEST RESULTS

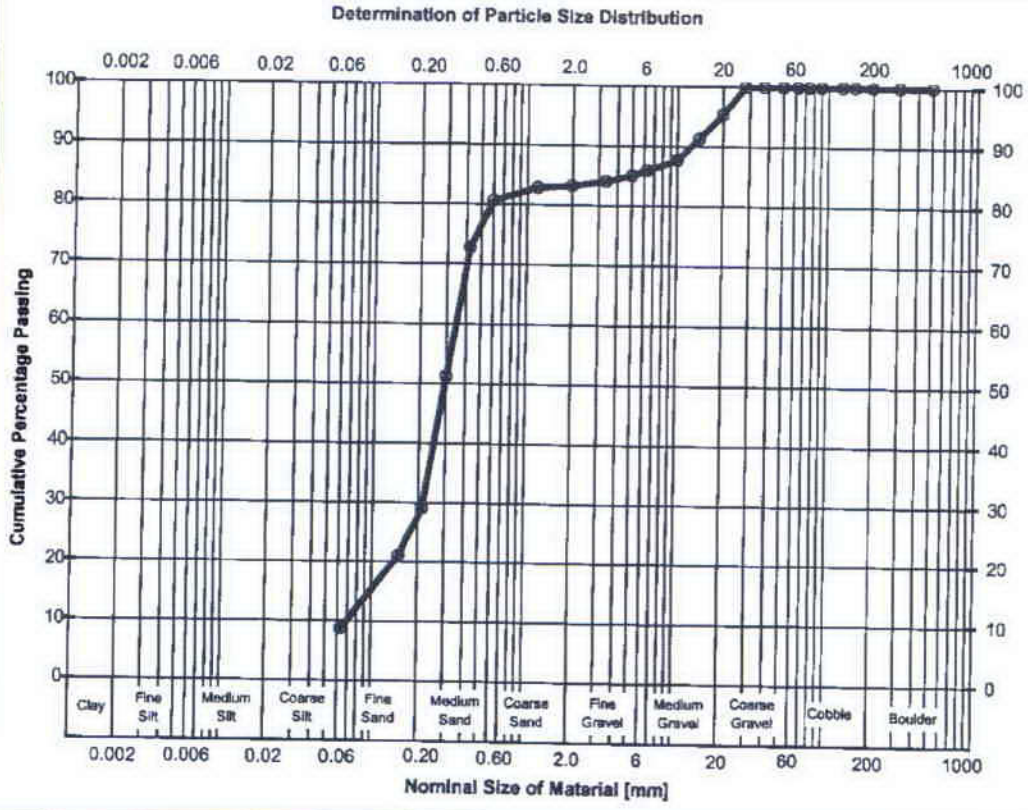
Laboratory Reference: PL3429-1/4
Client Reference: B2

Pre-treatment for organic material:

Sample Description: Orange brown slightly silty gravelly SAND with occasional soft clay lumps

Material Specification: Not Required
Location: BH1
Source:

Depth Top: 2.60m
Depth Base: 3.10m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	96
14	91
10	88
6.3	86
5.0	85
3.35	84
2.00	83
1.18	83
0.600	81
0.425	73
0.300	51
0.212	29
0.150	21
0.063	9
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

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Reg Office: Diasma, Willie Snaith Rd
Newmarket, Suffolk, CB8 7SQ

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Enverity

Newark Road Peterborough
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TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

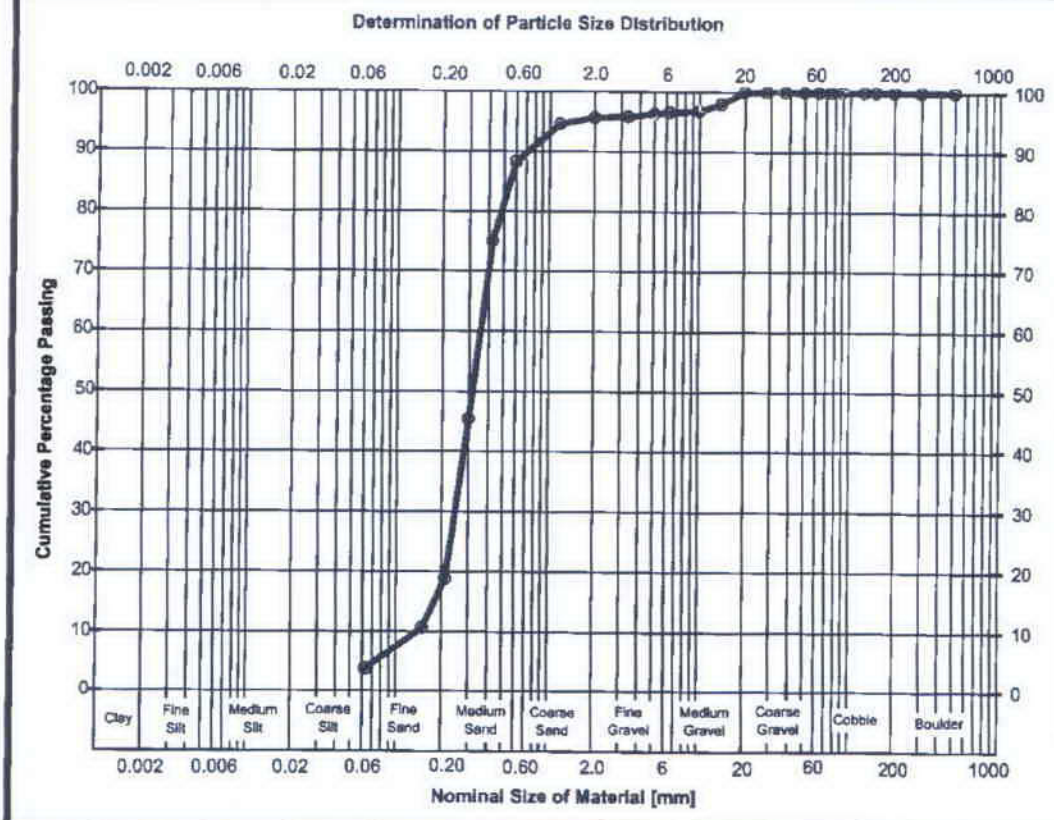
Client:	Ground Engineering Ltd	Certificate Number:	PL3429-1/5/710-2
Client Address:	Newark Road	Client Reference:	C12519
	Peterborough	Lab Job Number:	PL3429-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	11.10.2011
Contact:	Steve Fleming	Date Tested:	19.11.2011
		Certificate of Sampling:	N/A
Site Name:	Star Lane	Sampling Certificate No.:	N/A
Site Address:	Great Wakering	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL3429-1/5 **Pre-treatment for organic material:**
Client Reference: B3

Sample Description: Orange brown light orange brown slightly silty slightly gravelly SAND

Material Specification: Not Required
Location: BH1
Source:

Depth Top: 3.50m
Depth Base: 4.00m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	98
10	97
6.3	97
5.0	96
3.35	96
2.00	96
1.18	95
0.600	88
0.425	75
0.300	45
0.212	19
0.150	11
0.063	4
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Enverity Ltd

Date Reported:

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TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road
Peterborough
PE1 5UA

Contact: Steve Fleming

Site Name: Star Lane
Site Address: Great Wakering

Certificate Number: PL3429-1/7/710-2
Client Reference: C12519
Lab Job Number: PL3429-1
Date Sampled: Unknown
Date Received: 11.10.2011
Date Tested: 19.11.2011
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

TEST RESULTS

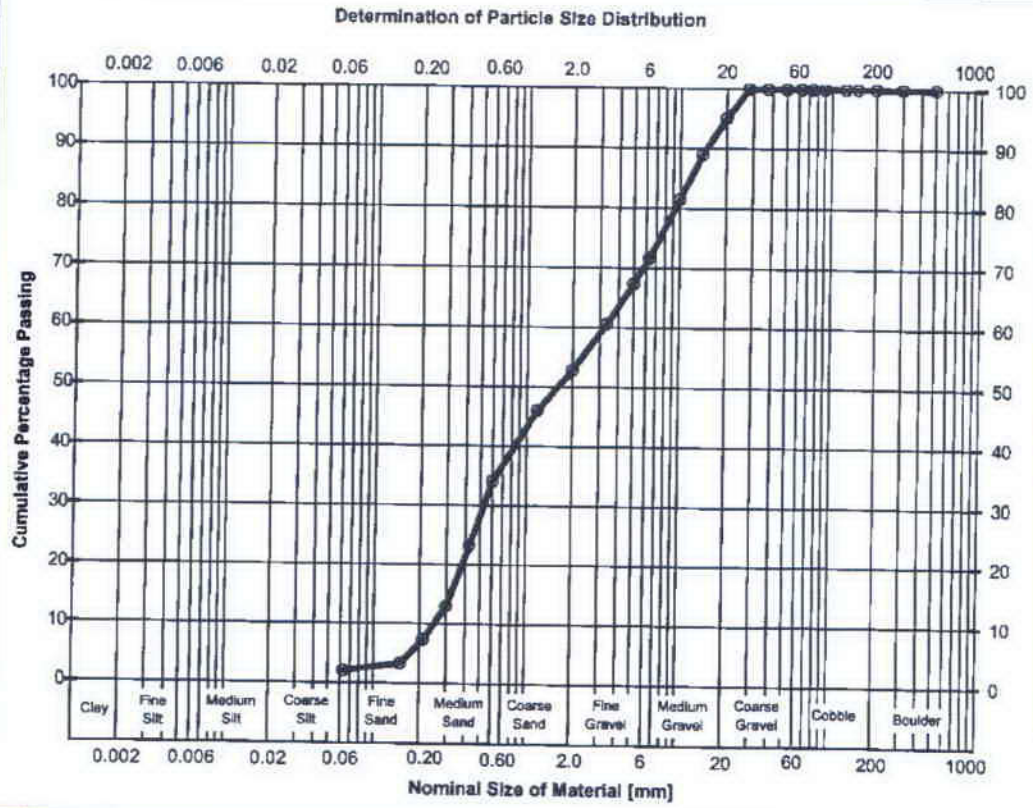
Laboratory Reference: PL3429-1/7
Client Reference: B4

Pre-treatment for organic material:

Sample Description: Orange brown slightly silty very gravelly SAND

Material Specification: Not Required
Location: BH1
Source:

Depth Top: 4.50m
Depth Base: 5.00m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	95
14	89
10	81
6.3	72
5.0	67
3.35	61
2.00	53
1.18	46
0.600	34
0.425	23
0.300	13
0.212	7
0.150	3
0.063	2
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

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TEST CERTIFICATE

Determination of Particle Size Distribution

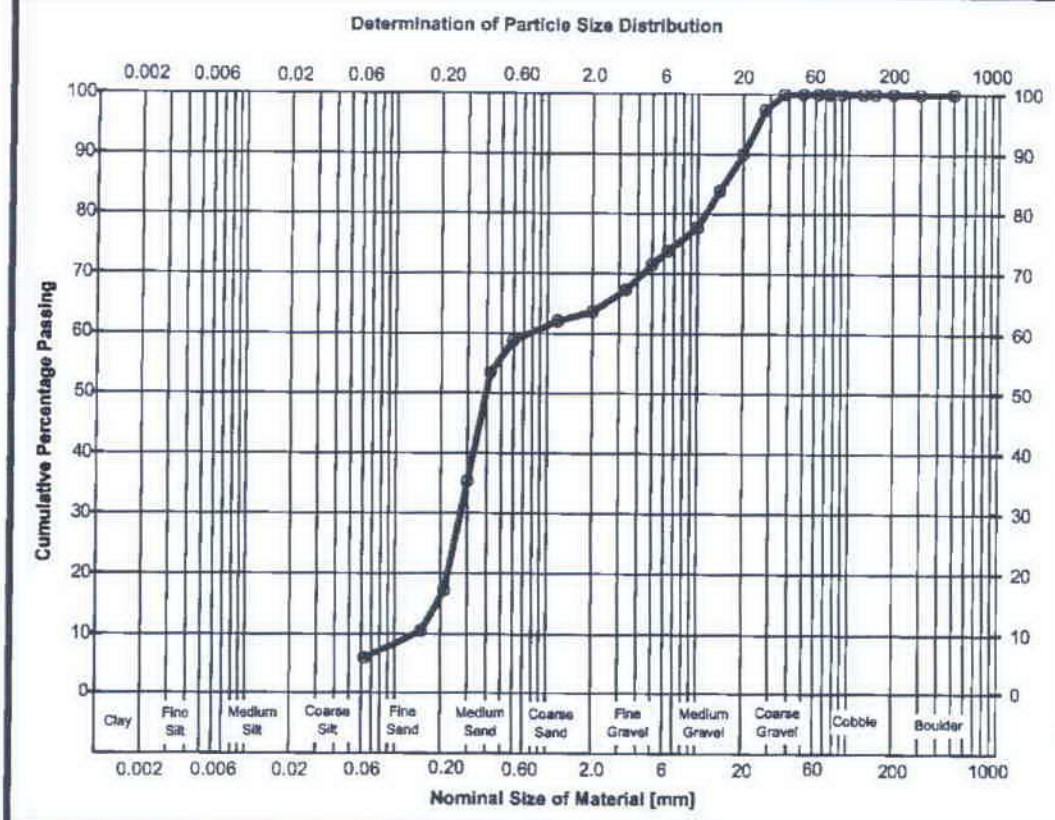
Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL3429-1/21/710-2
Client Address:	Newark Road	Client Reference:	C12519
	Peterborough	Lab Job Number:	PL3429-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	11.10.2011
Contact:	Steve Fleming	Date Tested:	19.11.2011
		Certificate of Sampling:	N/A
Site Name:	Star Lane	Sampling Certificate No.:	N/A
Site Address:	Great Wakering	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL3429-1/21
Client Reference: B4
Pre-treatment for organic material:

Sample Description: Orange brown slightly silty very gravelly SAND

Material Specification: Not Required
Location: BH2a
Source:
Depth Top: 3.10m
Depth Base: 3.60m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	97
20	90
14	84
10	78
6.3	74
5.0	72
3.35	67
2.00	64
1.18	62
0.600	59
0.425	53
0.300	35
0.212	17
0.150	11
0.063	6
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

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TEST CERTIFICATE

Determination of Particle Size Distribution

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e: peterborough@enverity.co.uk

Tested in Accordance with BS 1377-2: 1990: Clause **9.2 & 9.4**
Sieved Grading and Sedimentation by Pipette

Client:	Ground Engineering Ltd	Certificate Number:	PL3429-1/23/710-2
Client Address:	Newark Road Peterborough PE1 5UA	Client Reference:	C12519
		Lab Job Number:	PL3429-1
		Date Sampled:	Unknown
		Date Received:	11.10.2011
Contact:	Steve Fleming	Date Tested:	19.11.2011
		Certificate of Sampling:	N/A
Site Name:	Star Lane	Sampling Certificate No.:	N/A
Site Address:	Great Wakering	Sampled By:	Client

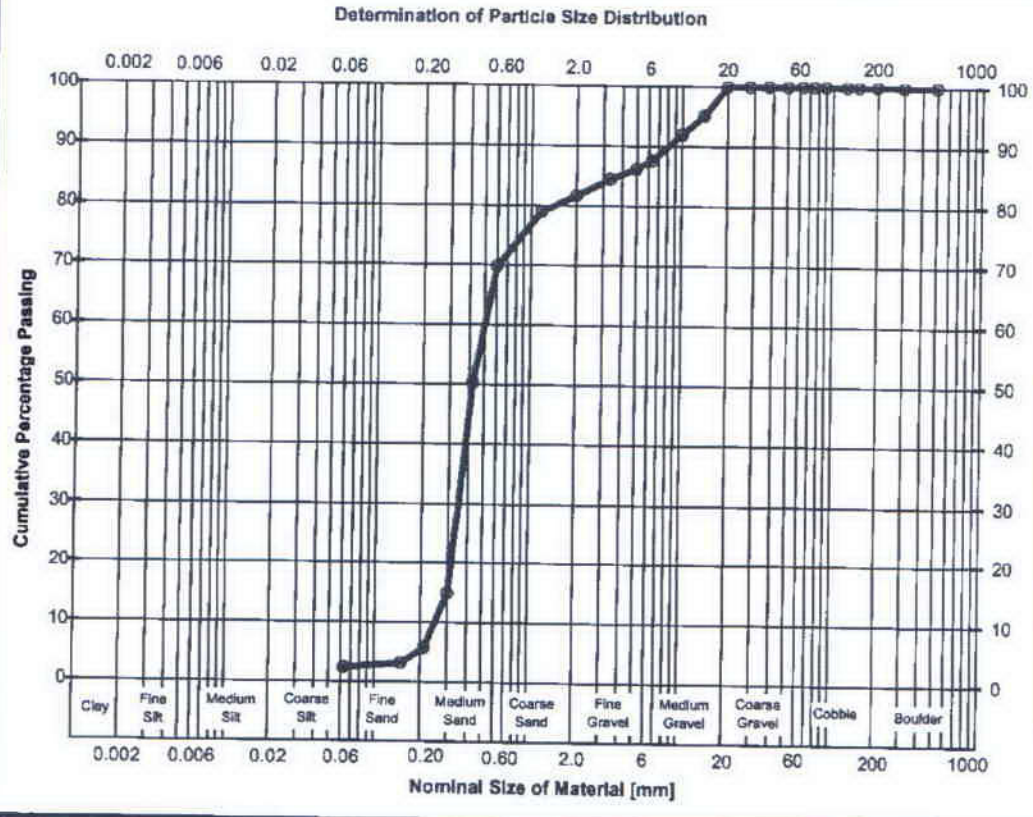
TEST RESULTS **Laboratory Reference:** PL3429-1/23
Client Reference: B5

Pre-treatment for organic material:

Sample Description: Orange brown slightly silty gravelly SAND

Material Specification: Not Required
Location: BH2a
Source:

Depth Top: 4.00m
Depth Base: 4.50m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	95
10	92
6.3	88
5.0	86
3.35	85
2.00	82
1.18	79
0.600	70
0.425	50
0.300	15
0.212	6
0.150	3
0.063	2
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

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TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

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Newark Road Peterborough
t: 01733 555525 f: 01733 315280
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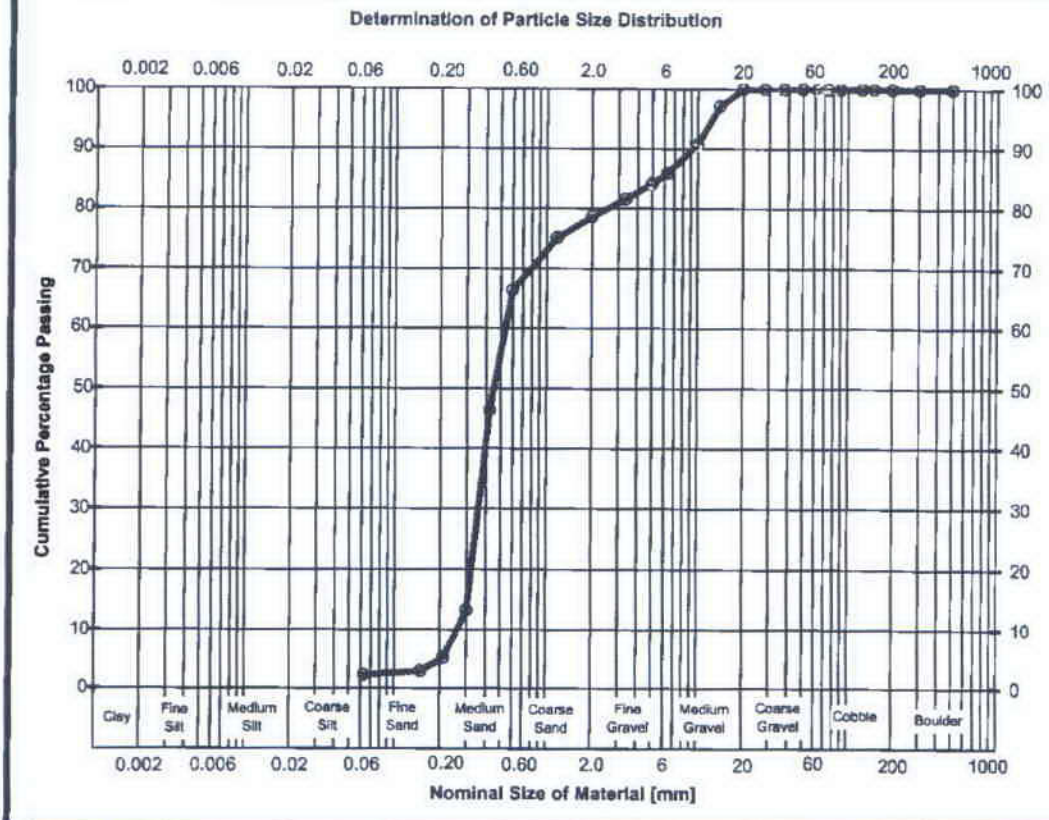
Client:	Ground Engineering Ltd	Certificate Number:	PL3429-1/24/710-2
Client Address:	Newark Road	Client Reference:	C12519
	Peterborough	Lab Job Number:	PL3429-1
	PE1 5UA	Date Sampled:	Unknown
		Date Received:	11.10.2011
Contact:	Steve Fleming	Date Tested:	19.11.2011
		Certificate of Sampling:	N/A
Site Name:	Star Lane	Sampling Certificate No.:	N/A
Site Address:	Great Wakering	Sampled By:	Client

TEST RESULTS **Laboratory Reference:** PL3429-1/24
Client Reference: B6
Pre-treatment for organic material:

Sample Description: Orange brown slightly silty gravelly SAND

Material Specification: Not Required
Location: BH2a
Source:
Depth Top: 5.10m
Depth Base: 5.60m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	97
10	91
6.3	86
5.0	84
3.35	82
2.00	79
1.18	75
0.600	66
0.425	46
0.300	13
0.212	5
0.150	3
0.063	2
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Enverity Ltd

Date Reported:
Form Number: EN/C/709-2 Version 30

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Enverity

Newark Road Peterborough
t: 01733 555525 f: 01733 315280
e: peterborough@enverity.co.uk

TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road
Peterborough
PE1 5UA

Contact: Steve Fleming

Site Name: Star Lane
Site Address: Great Wakering

Certificate Number: PL3429-1/28/710-2
Client Reference: C12519
Lab Job Number: PL3429-1
Date Sampled: Unknown
Date Received: 11.10.2011
Date Tested: 19.11.2011
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

TEST RESULTS

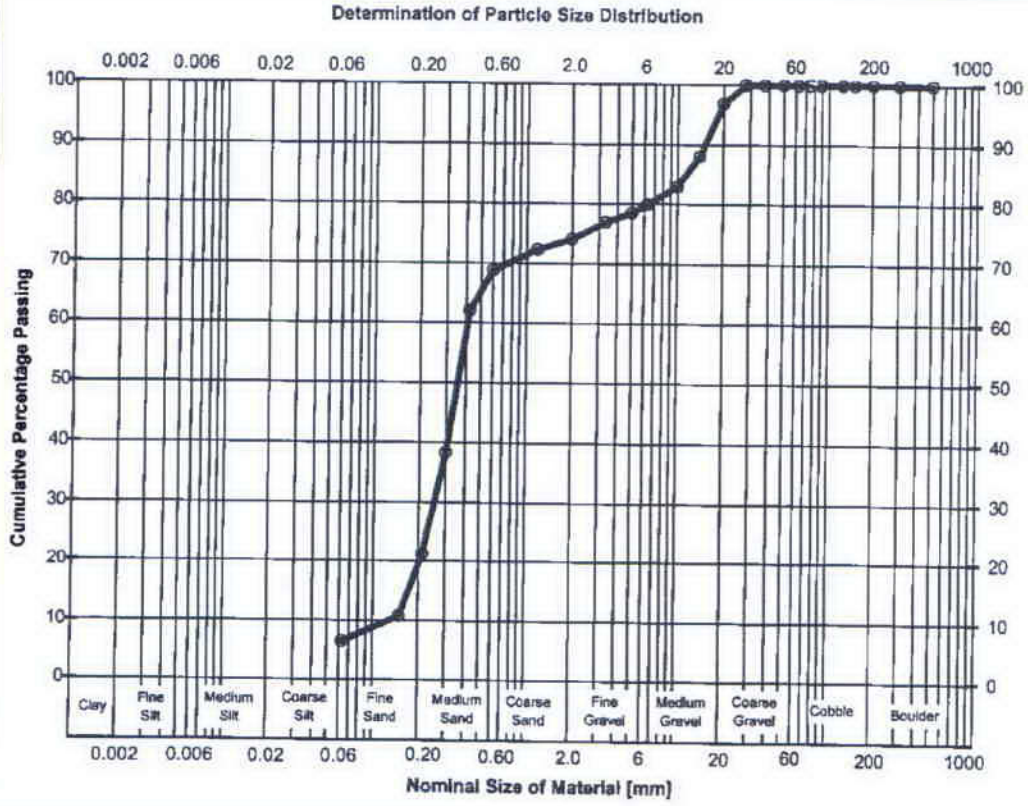
Laboratory Reference: PL3429-1/28
Client Reference: B3

Pre-treatment for organic material:

Sample Description: Orange brown slightly silty gravelly SAND

Material Specification: Not Required
Location: BH3
Source:

Depth Top: 2.20m
Depth Base: 2.70m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	97
14	88
10	83
6.3	80
5.0	79
3.35	77
2.00	74
1.18	72
0.600	69
0.425	62
0.300	38
0.212	21
0.150	11
0.063	6
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

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Registration Number: 6930692
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TEST CERTIFICATE

Determination of Particle Size Distribution

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Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road, Peterborough, PE1 5UA

Contact: Steve Fleming

Site Name: Star Lane
Site Address: Great Wakering

Certificate Number: PL3429-1/29/710-2
Client Reference: C12519
Lab Job Number: PL3429-1
Date Sampled: Unknown
Date Received: 11.10.2011
Date Tested: 19.10.2011
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

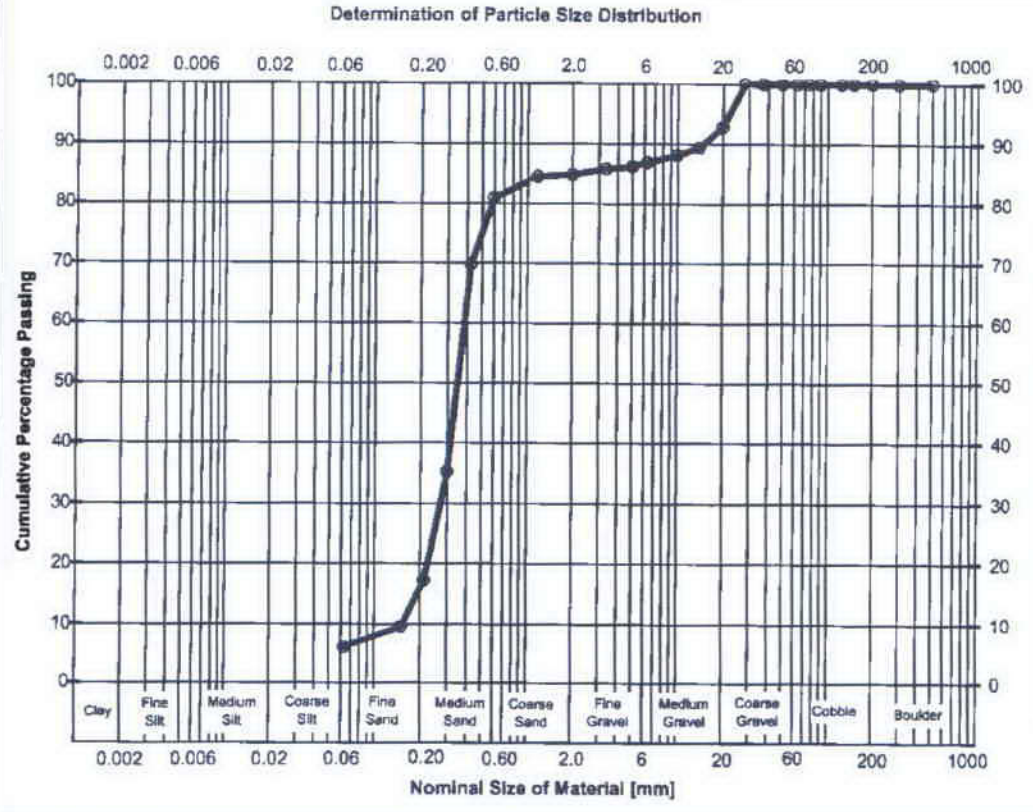
TEST RESULTS **Laboratory Reference:** PL3429-1/29
Client Reference: B4

Pre-treatment for organic material:

Sample Description: Orange brown slightly silty gravelly SAND

Material Specification: Not Required
Location: BH3
Source:

Depth Top: 3.00m
Depth Base: 3.50m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	93
14	89
10	88
6.3	87
5.0	86
3.35	86
2.00	85
1.18	85
0.600	81
0.425	70
0.300	35
0.212	17
0.150	10
0.063	6
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

2304

Enverity

Newark Road Peterborough
t: 01733 555525 f: 01733 315280

e: peterborough@enverity.co.uk

TEST CERTIFICATE

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road
Peterborough
PE1 5UA

Contact: Steve Fleming

Site Name: Star Lane
Site Address: Great Wakering

Certificate Number: PL3429-1/31/710-2
Client Reference: C12519
Lab Job Number: PL3429-1
Date Sampled: Unknown
Date Received: 11.10.2011
Date Tested: 19.11.2011
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

TEST RESULTS

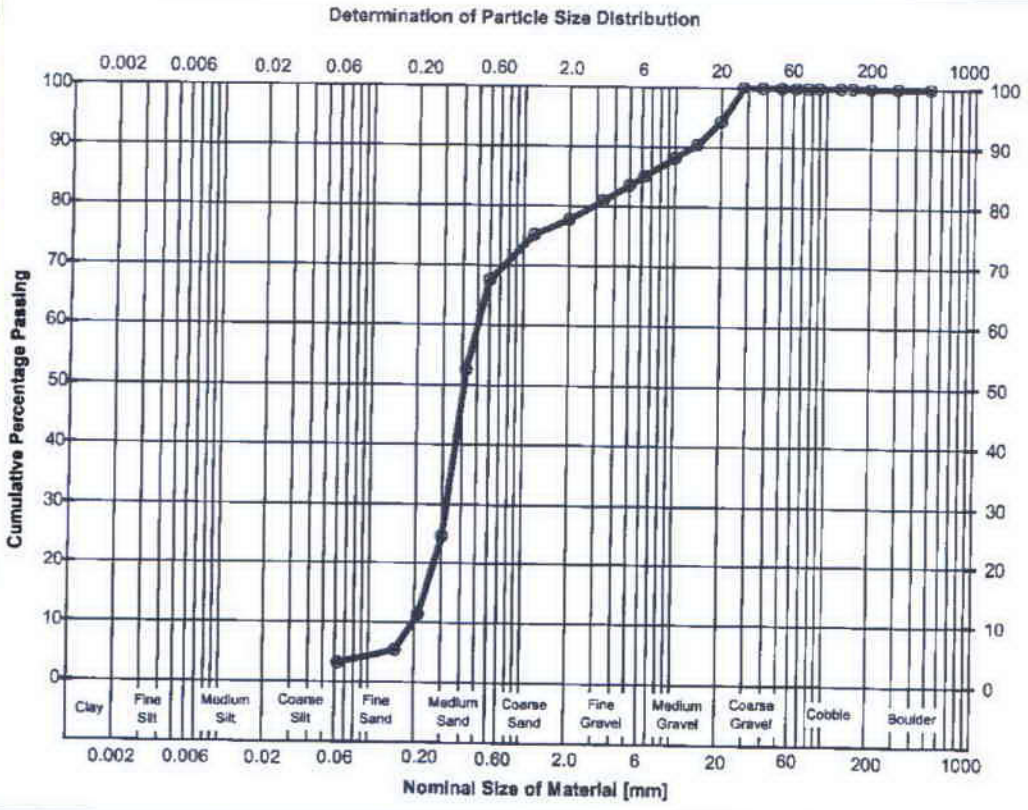
Laboratory Reference: PL3429-1/31
Client Reference: B5

Pre-treatment for organic material:

Sample Description: Orange brown slightly silty gravelly SAND

Material Specification: Not Required
Location: BH3
Source:

Depth Top: 4.10m
Depth Base: 4.60m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	94
14	90
10	88
6.3	85
5.0	84
3.35	81
2.00	78
1.18	75
0.600	68
0.425	53
0.300	25
0.212	11
0.150	5
0.063	3
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

Registered in England & Wales
Registration Number: 6930692
Reg Office: Diasma, Willie Snaith Rd
Newmarket, Suffolk, CB8 7SQ

2304

TEST CERTIFICATE

Determination of Particle Size Distribution

Enverity
Newark Road Peterborough
t: 01733 555525 f: 01733 315280
e: peterborough@enverity.co.uk

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road, Peterborough, PE1 5UA

Contact: Steve Fleming

Site Name: Star Lane
Site Address: Great Wakering

Certificate Number: PL3429-1/32/710-2
Client Reference: C12519
Lab Job Number: PL3429-1
Date Sampled: Unknown
Date Received: 11.10.2011
Date Tested: 19.11.2011
Certificate of Sampling: N/A
Sampling Certificate No.: N/A
Sampled By: Client

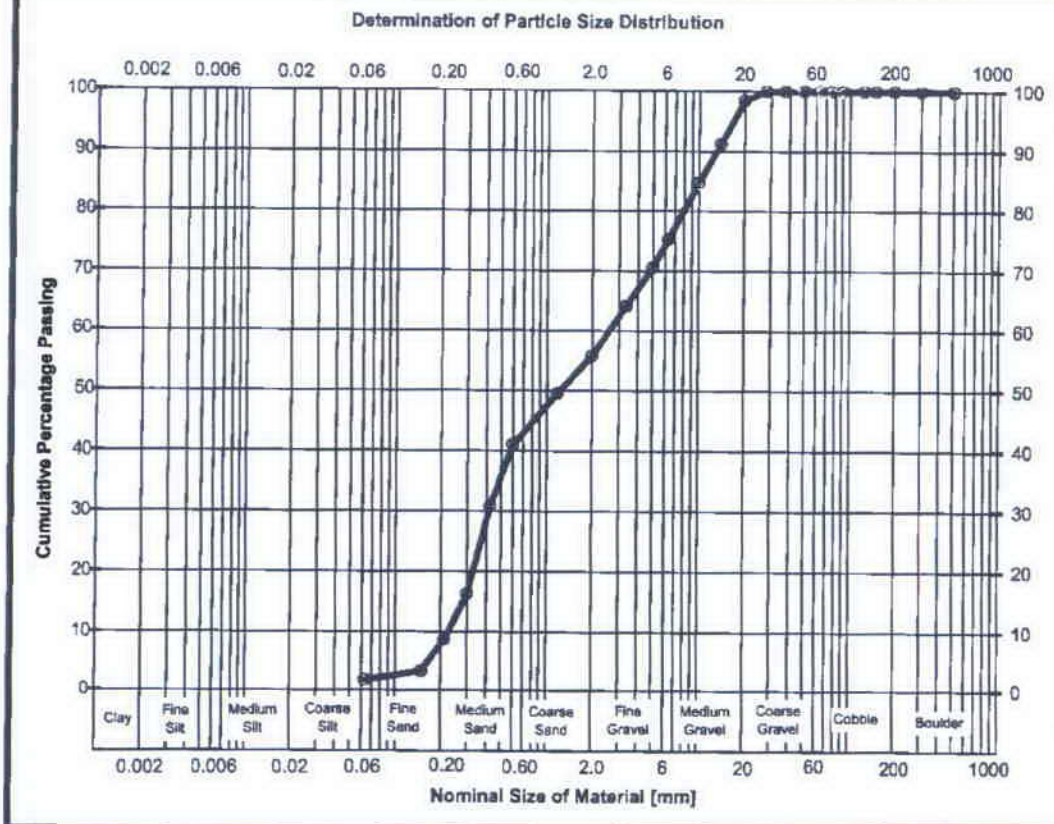
TEST RESULTS

Laboratory Reference: PL3429-1/32
Client Reference: B6
Pre-treatment for organic material:

Sample Description: Orange brown slightly silty very gravelly SAND

Material Specification: Not Required
Location: BH3
Source:

Depth Top: 5.10m
Depth Base: 5.60m
Supplier:



Sieve Analysis

Sieve mm	%Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	98
14	91
10	85
6.3	75
5.0	71
3.35	64
2.00	56
1.18	50
0.600	41
0.425	31
0.300	16
0.212	9
0.150	3
0.063	2
0.020	
0.006	
0.002	

Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Enverity Ltd

Date Reported:

Form Number: EN/C/709-2 Version 30

Enverity

TEST CERTIFICATE

One-Dimensional Consolidation Properties

(Tested in accordance with BS1377 : Part 5 1990)

Newark Road Peterborough
t:01733 555525 f:01733 315280
e: peterborough@enverity.co.uk

Client:	Ground Engineering Ltd
Client Address:	Newark Road Peterborough Cambs
Postcode:	PE1 5UA
Contact:	Chris Ebeling
Site Name:	Star Lane
Site Address:	Great Wakering

Certificate Number:	PL3429-1-2/731
Client Reference Number:	C12519
Date Sampled:	Unknown
Date Received:	11.10.2011
Date Tested:	24.10.2011
Sampling Certificate No:	N/A
Certificate of Sampling:	N/A
Sampled By:	Client

Test Details

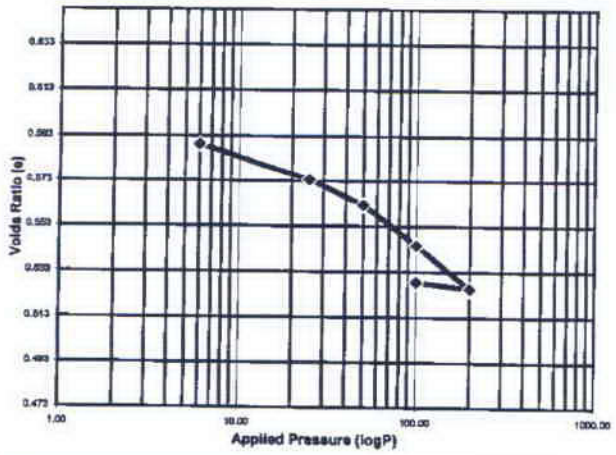
Location:	BH1
Sample Ref:	U1
Sample Description:	Stiff brown silty CLAY

Particle Density (Mg/m^3):	2.73	Assumed
Mean Lab Temp. (°C):	22	
Variations from Standard:	None	
Lab Reference:	PL3429-1-2	
Depth (m):	1.65 m	

Specimen Details

	INITIAL	FINAL
Height (mm):	18.48	17.78
Bulk Density (Mg/m^3):	2.04	2.14
Moisture Content (%):	19	20
Dry Density (Mg/m^3):	1.72	1.79
Voids Ratio:	0.589	0.528
Degree of Saturation (%):	86.2	101.2
Diameter (mm):	74.96	N/A
Swelling Pressure (kPa):	6	N/A
Method of time fitting used:	Square Root Time	

Voids Ratio against logarithm of Applied Pressure



Applied Pressure (kPa)	Coefficient of Compressibility m_v (m^2/MN)	Coefficient of Consolidation c_v (m^2/year)
6		
25	0.52	4.87
50	0.29	1.54
100	0.22	0.34
200	0.13	0.77
100	0.02	—

Comments:

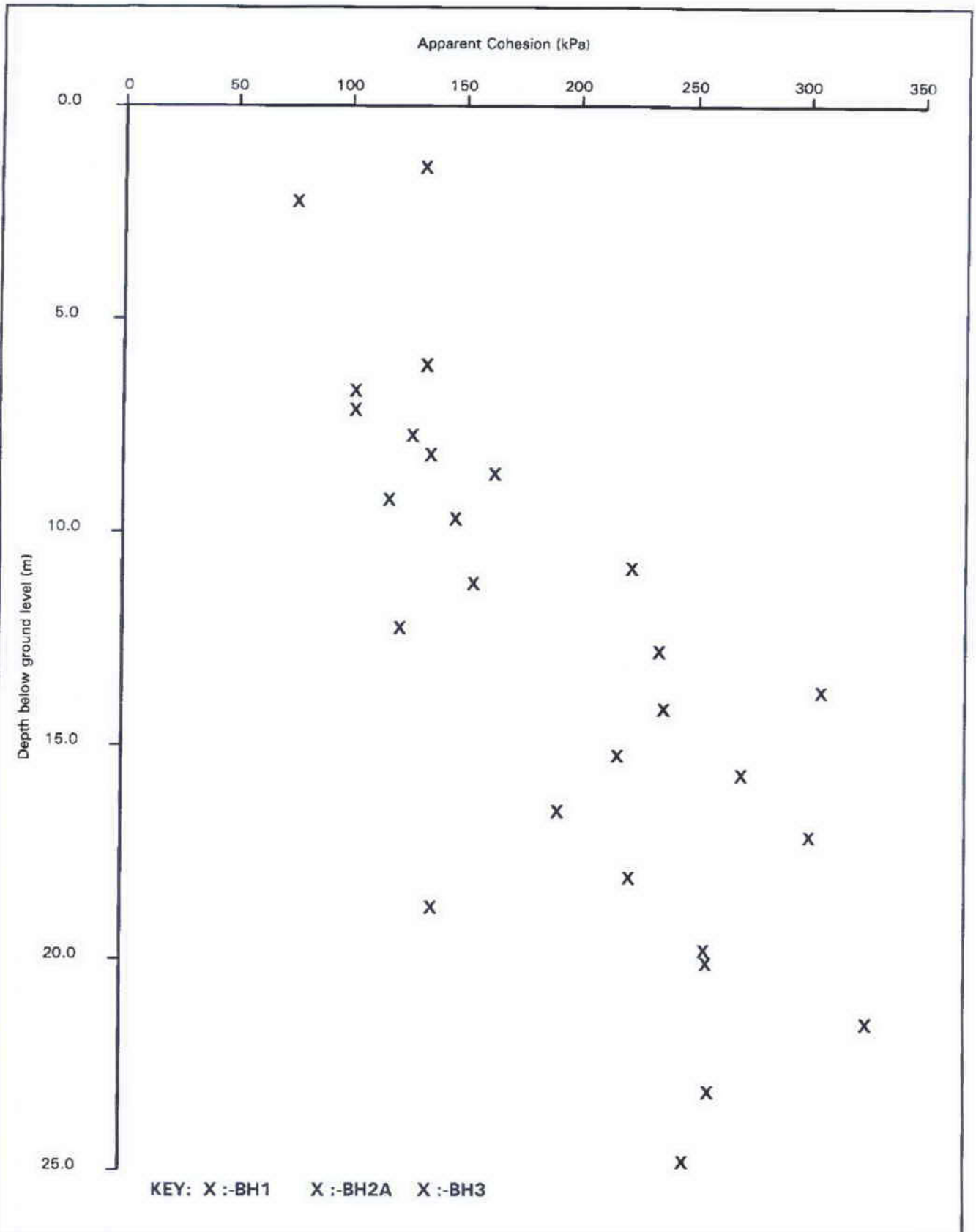
Approved Signatory: [x] M.Hartnup - Laboratory Manager
[ ] G.Meadows - Team Leader

Signed:

for and on behalf of Enverity Ltd

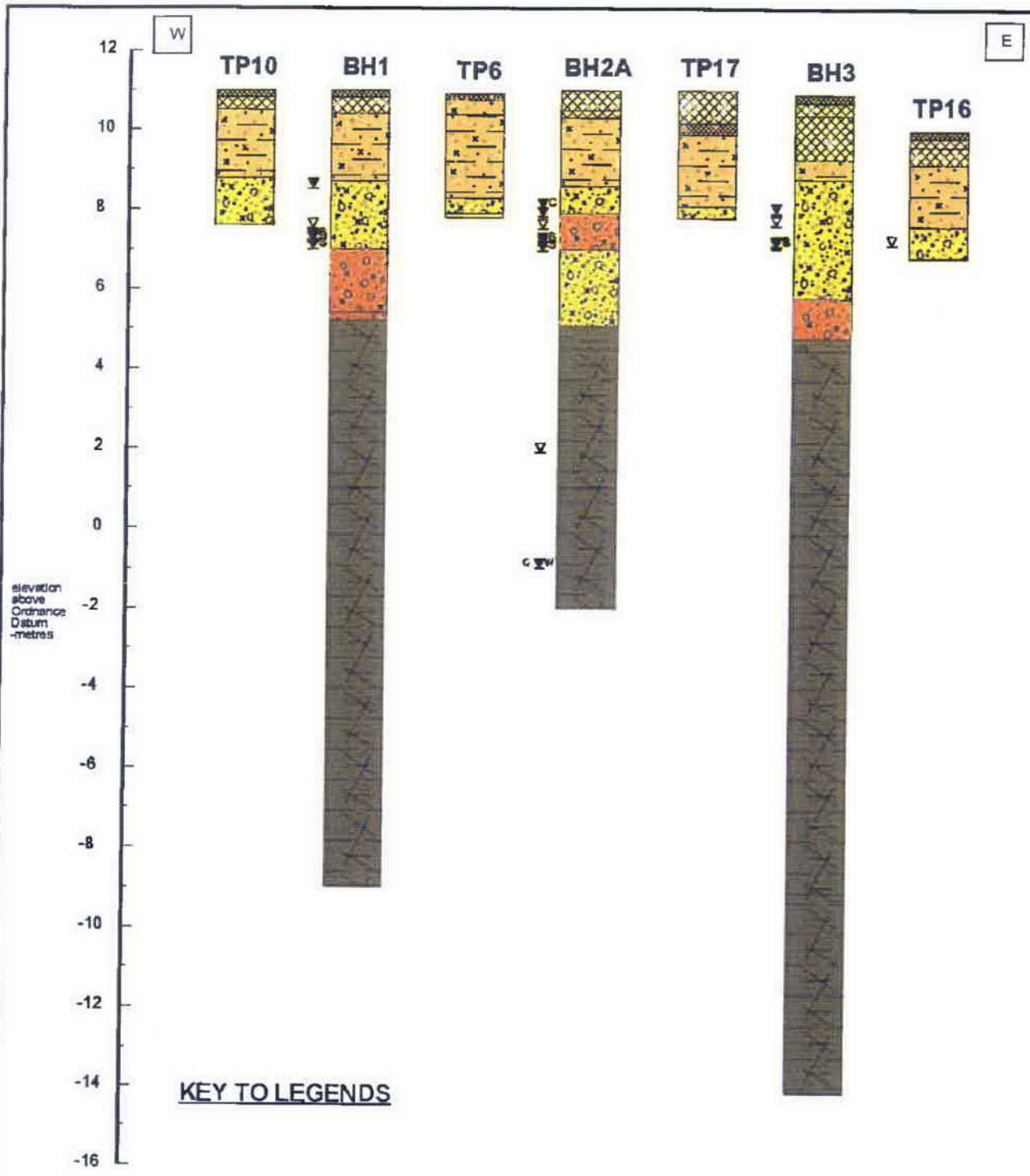
Date Reported: 09/11/2011

Registered in England and Wales
Reg Number 6930692
Registered Office: Diasma
Willie Snaith Rd
Newmarket CB8 7SQ



Apparent Cohesion (kPa) vs Depth below ground level (m).

SITE	STAR LANE, GREAT WAKERING	
CLIENT	TAYLOR WIMPEY	Contract Number 12519
GROUND ENGINEERING LIMITED Tel: 01733-566586 www.groundengineering.co.uk	Date 19/12/11	Figure 1



SITE	STAR LANE, GREAT WAKERING		Contract No. 12519
CLIENT	TAYLOR WIMPEY	Soil Profile	Vertical Scale 1:150
GROUND ENGINEERING LIMITED, PETERBOROUGH. Tel (01733) 566566		Date 19/12/11	Fig. No 2

SITE PLAN

(Based on topographic survey plan provided by Engineer)

Key –

Borehole position BH 1

Trial Pit position TP 1

NOT TO SCALE

Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

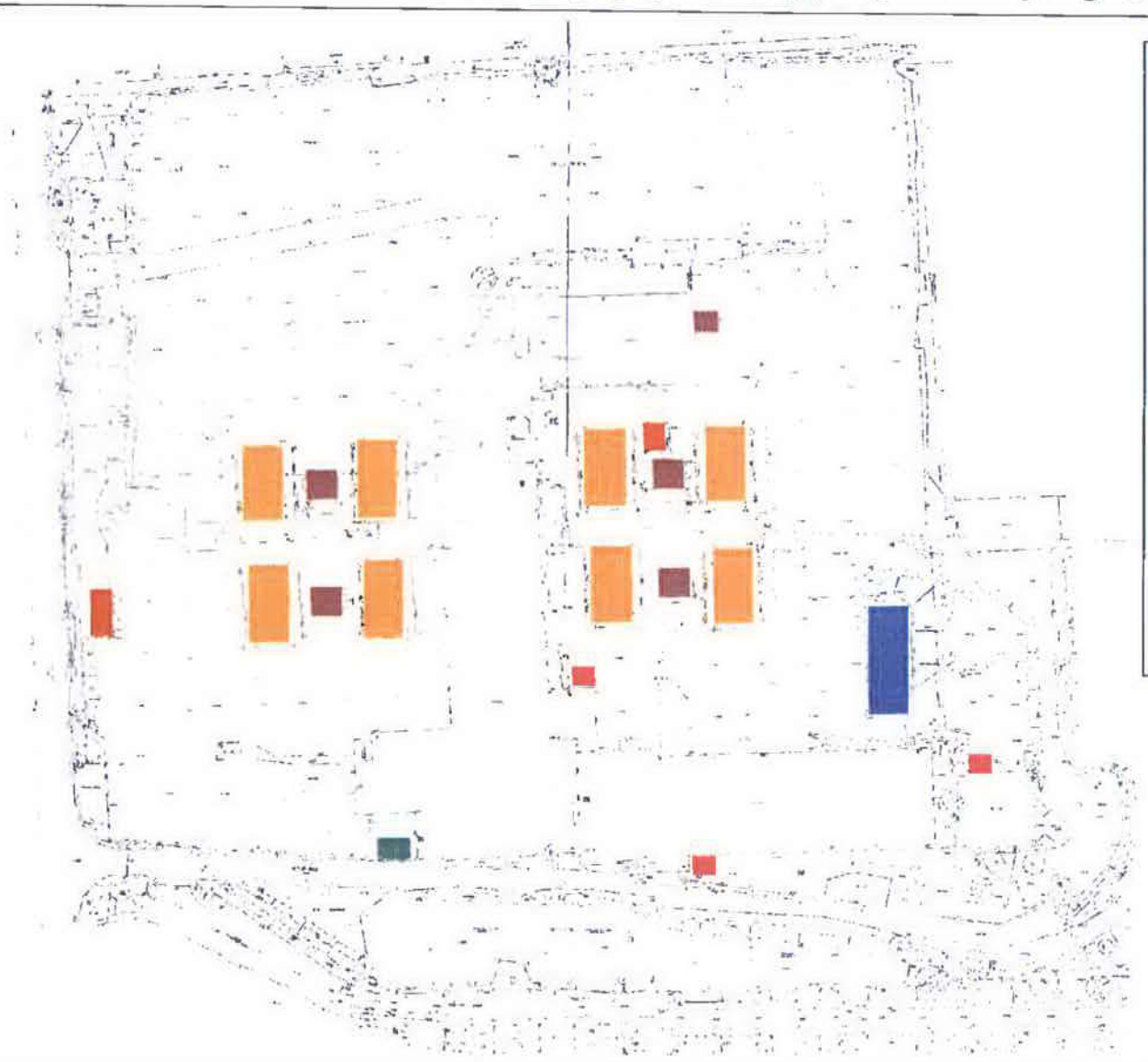
Peterborough Tel : 01733 566566

Project No.

C12519

SITE PLAN DETAILING FORMER STRUCTURES/FEATURES

(Based on topographic survey plan provided by Engineer)



Key –

- Former Kilns
- Infilled Former Water Tanks
- Former Chimney
- Former Diesel/Oil Storage Tanks
- Former Storage Tanks
- Former Electricity Sub-station

N

NOT TO SCALE

Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED
Peterborough Tel : 01733 566566

Project No.
C12519

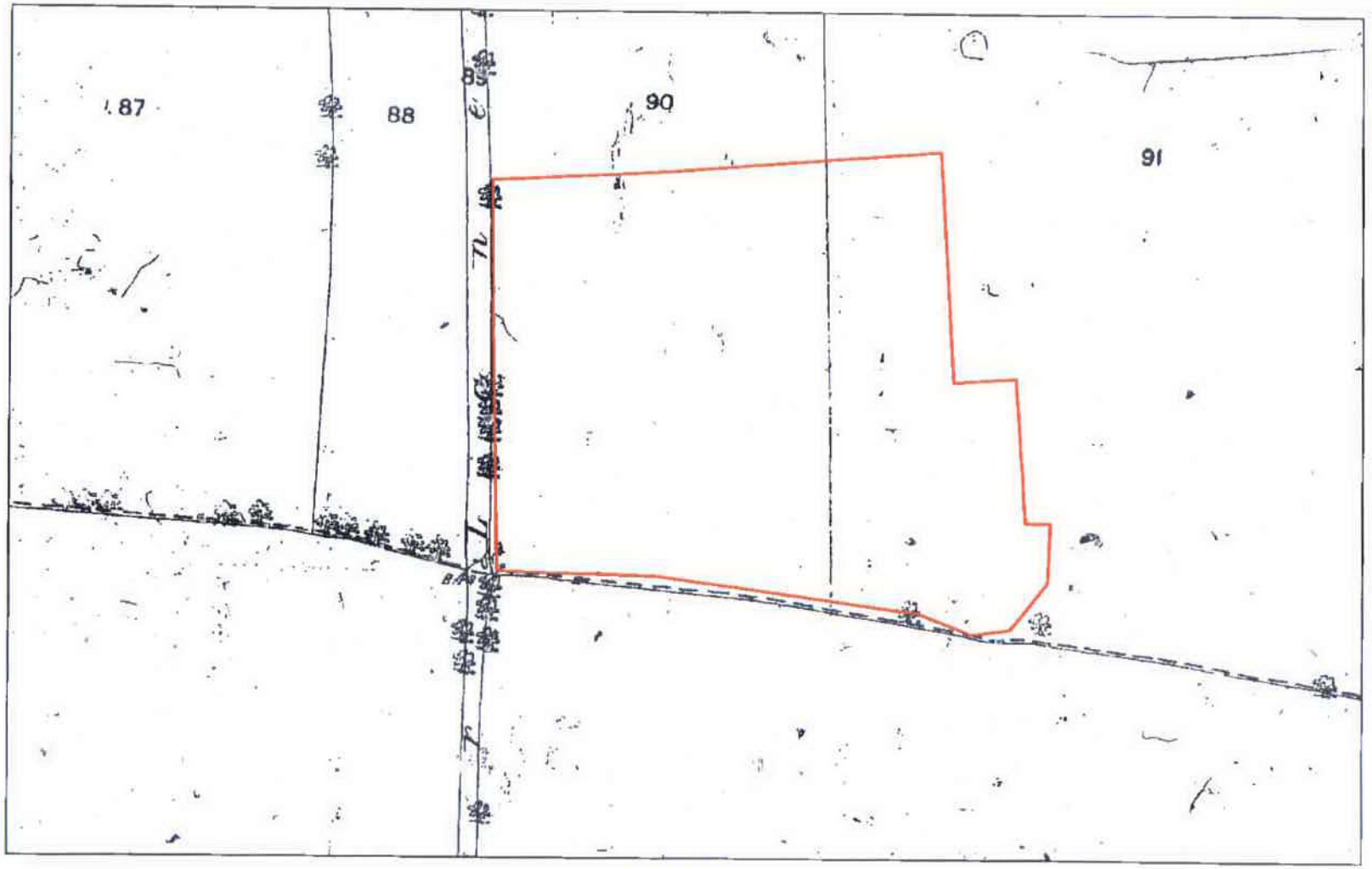
APPENDIX 1

HISTORICAL MAPS

Site History

Figure A

Reproduced from the **1873** Ordnance Survey, **Essex LXXIX.5 1:2500 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

Peterborough Tel: 01733 566566

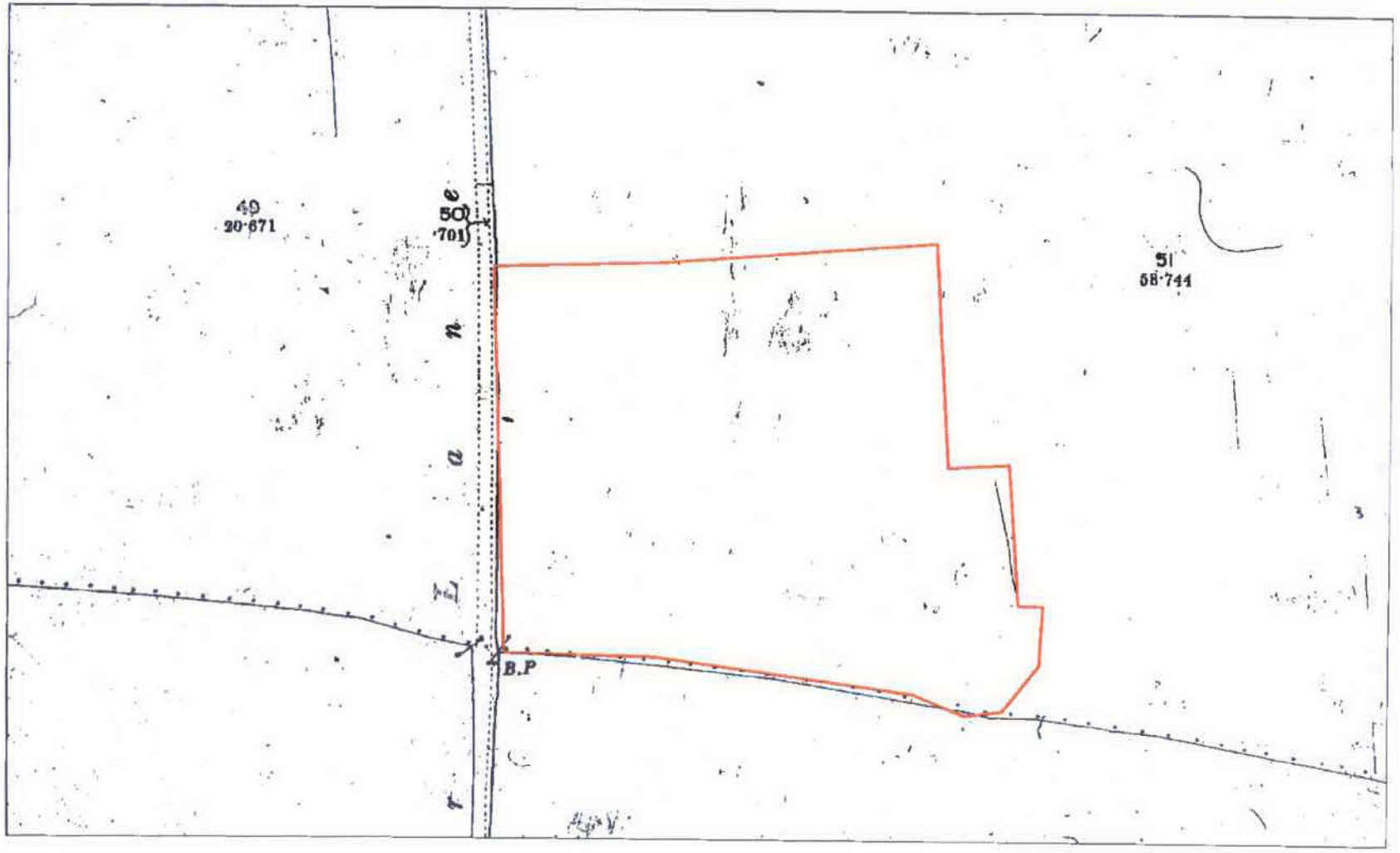
Project No.

C12519

Site History

Figure B

Reproduced from the **1897** Ordnance Survey, **Essex LXXXIII.5 1:2500 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

Peterborough Tel: 01733 566566

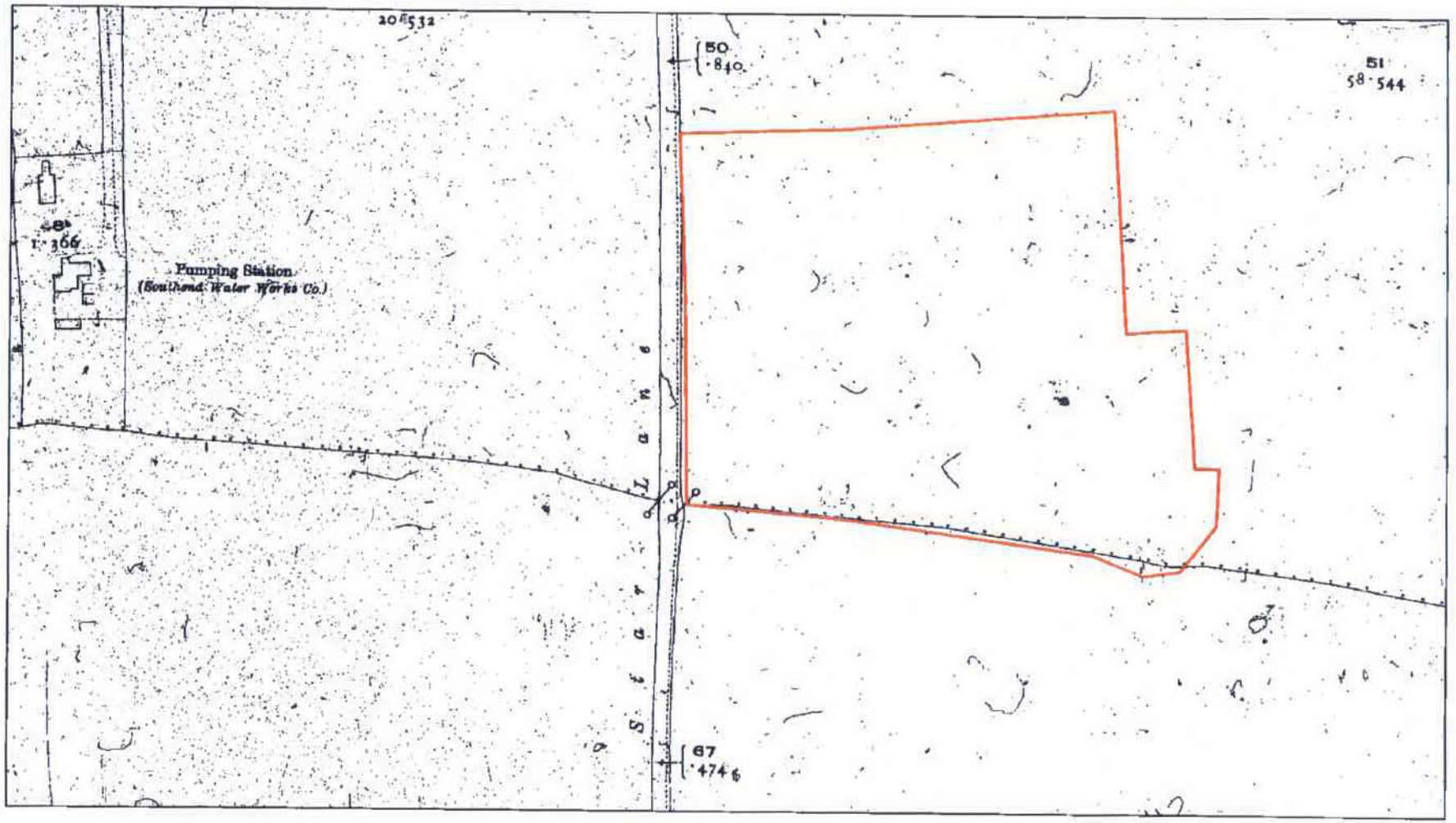
Project No.

C12519

Site History

Figure C

Reproduced from the **1923** Ordnance Survey, **Essex LXXXIII.16 1:2500 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

Peterborough Tel: 01733 566566

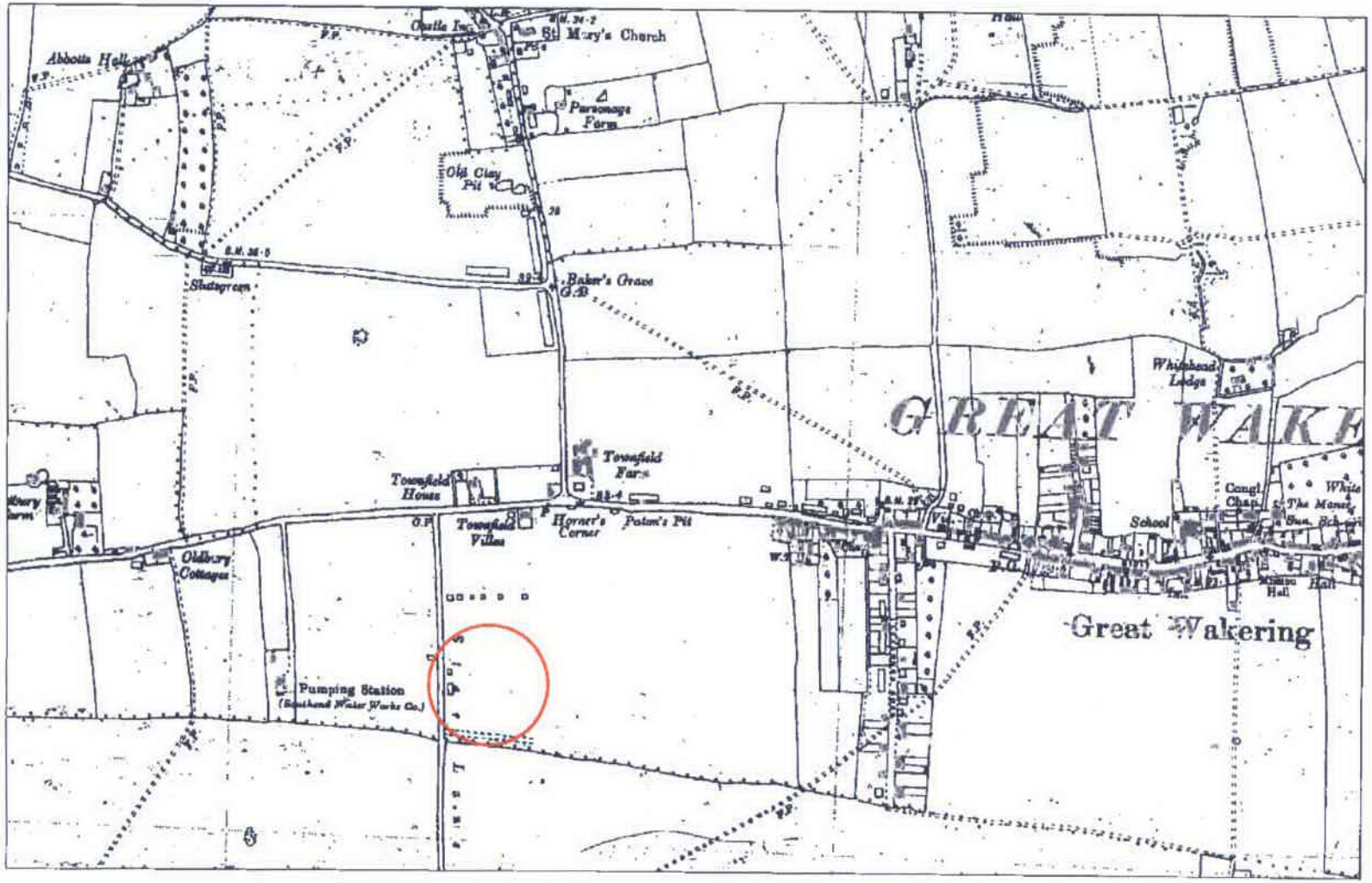
Project No.

C12519

Site History

Figure D

Reproduced from the **1938** Ordnance Survey, **Essex LXXXIIISE 1:10,560 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

Peterborough Tel: 01733 566566

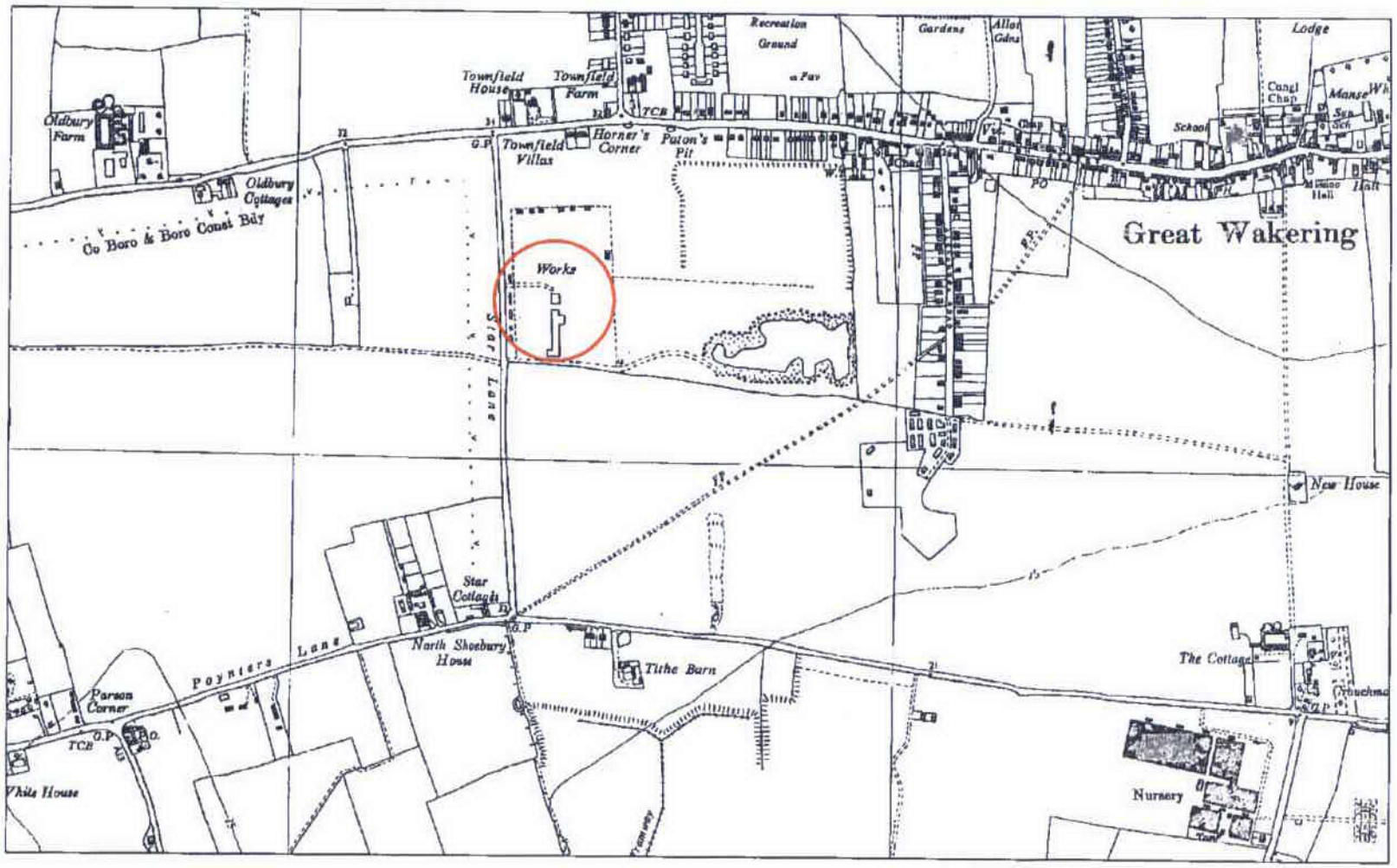
Project No.

C12519

Site History

Figure E

Reproduced from the **1961** Ordnance Survey, **TQ98NW 1:10,560 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

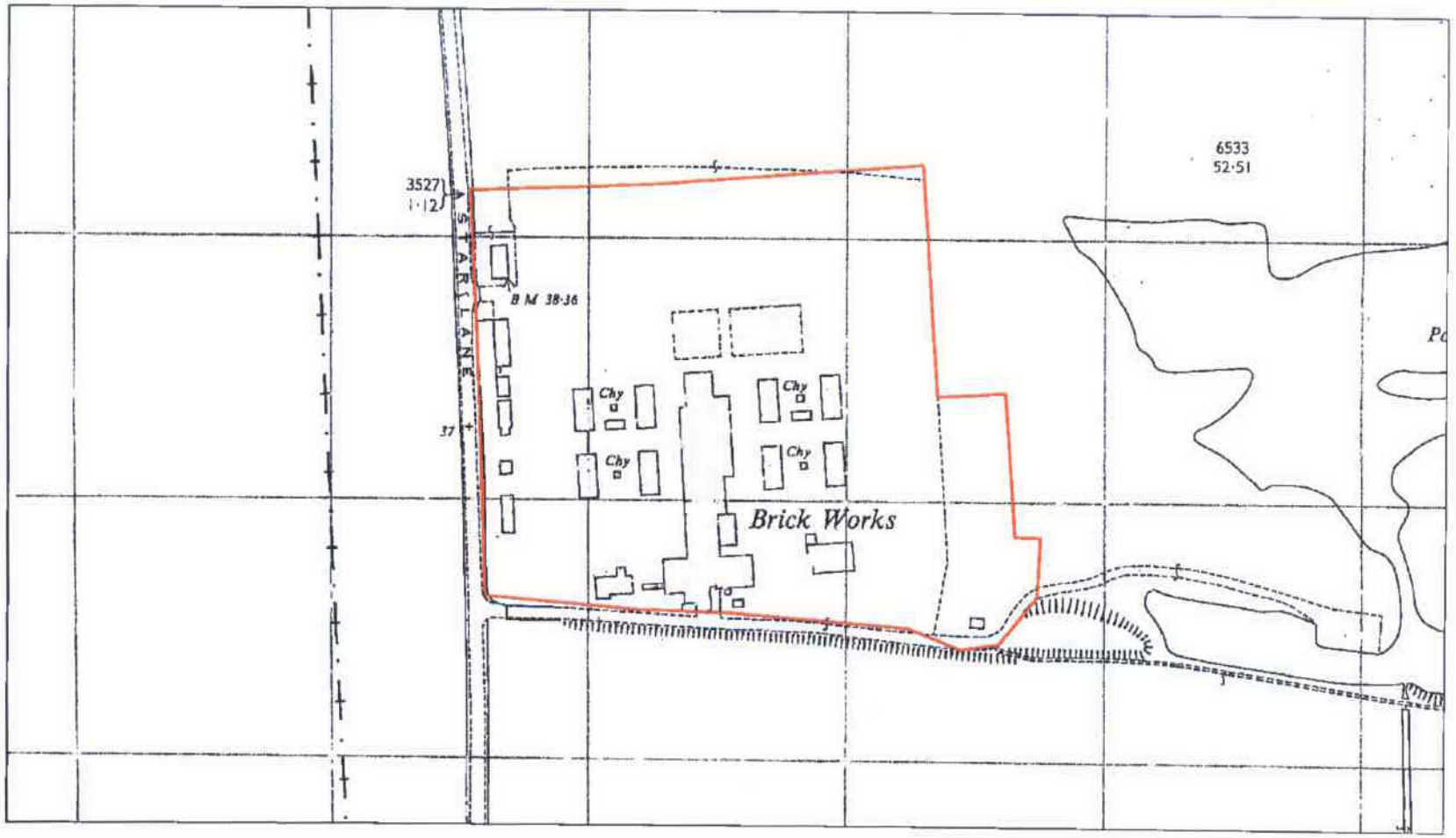
Peterborough Tel: 01733 566566

Project No.

C12519

Site History

Figure F



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

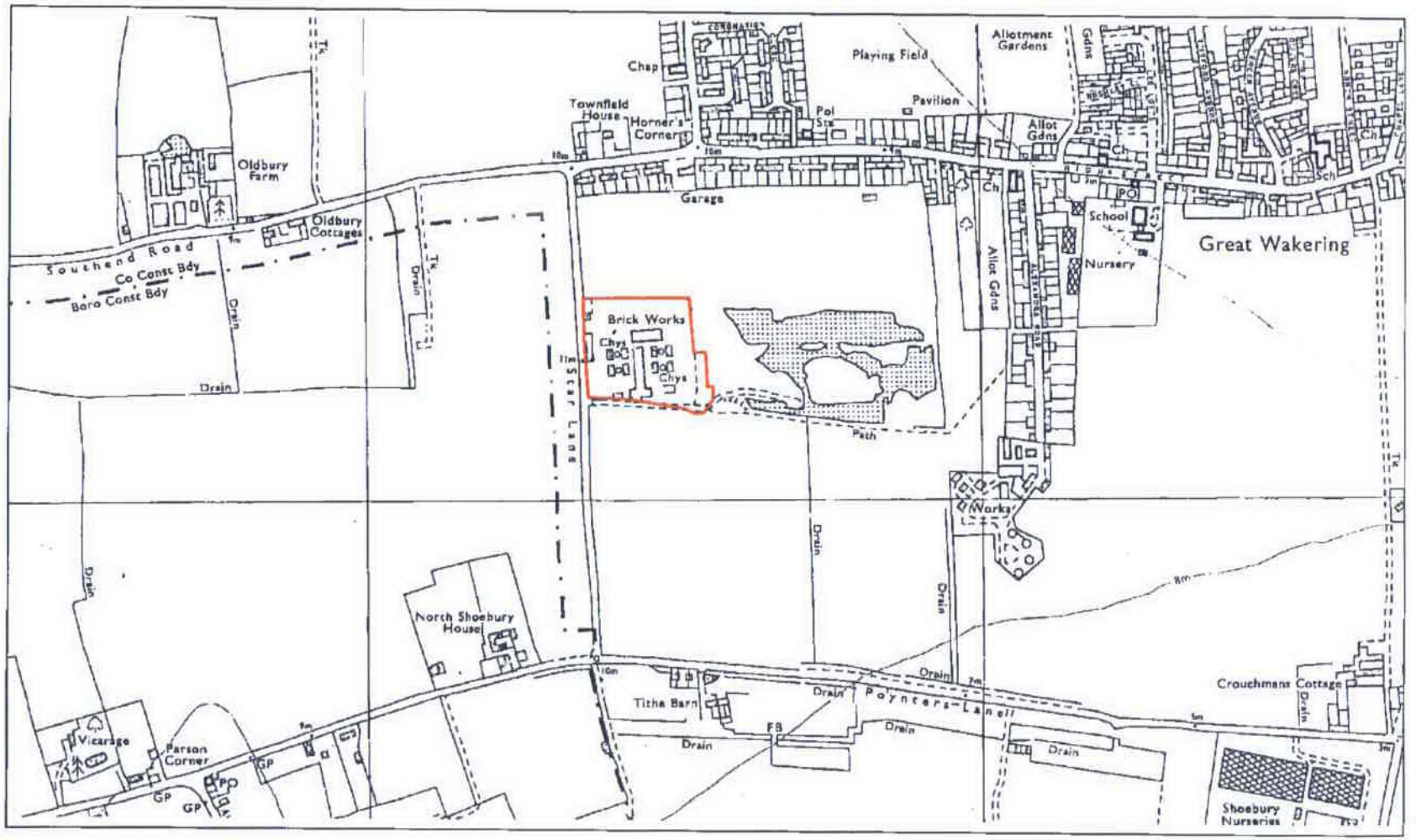
GROUND ENGINEERING LIMITED
Peterborough Tel: 01733 566566

Project No.
C12519

Site History

Figure G

Reproduced from the **1971** Ordnance Survey, **TQ98NW 1:10,000 scale** map

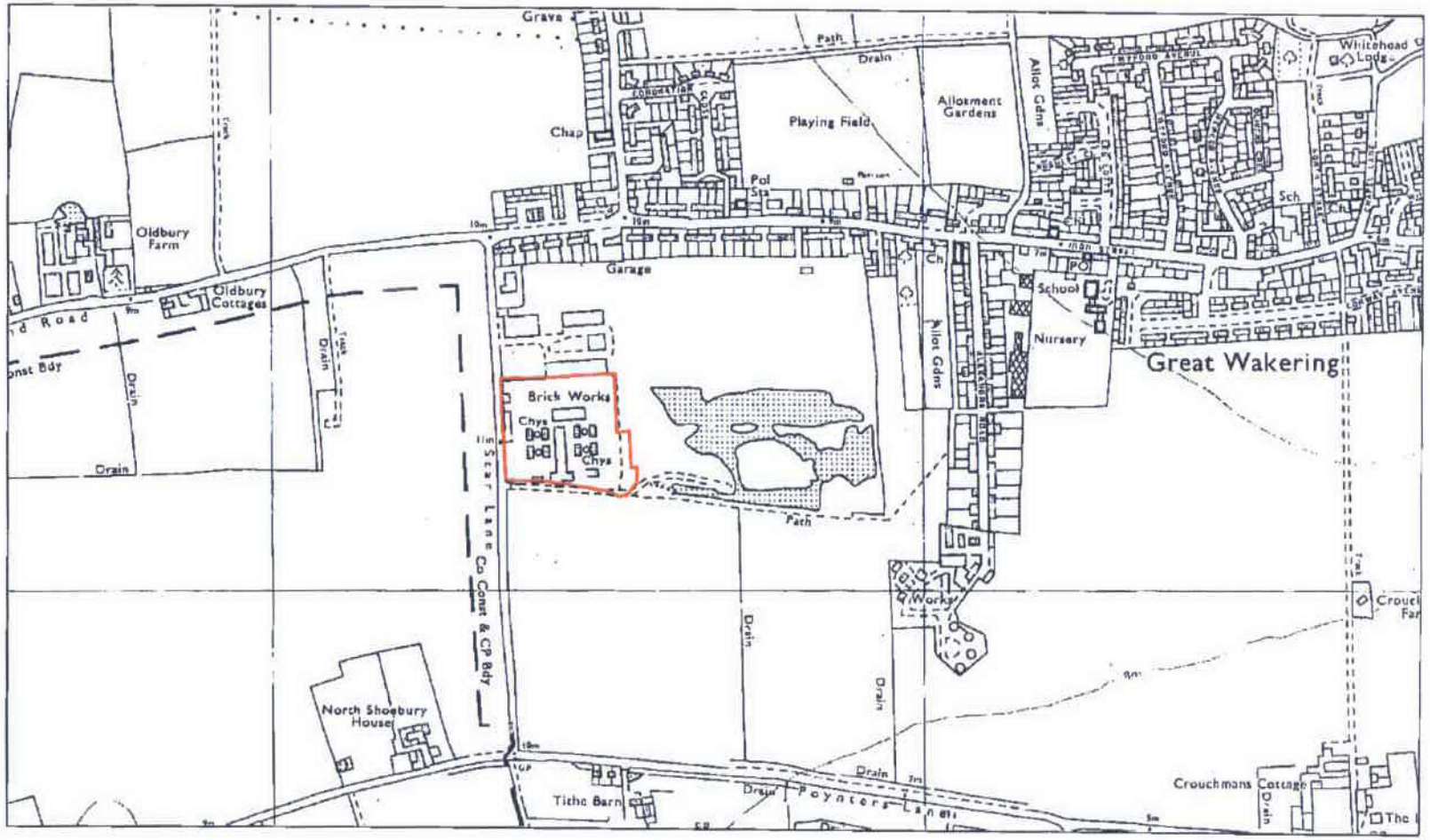


Project : Star Lane, Great Wakering **Client : Taylor Wimpey**	**GROUND ENGINEERING LIMITED** Peterborough Tel: 01733 566566	**Project No.** **C12519**

Site History

Figure H

Reproduced from the **1976** Ordnance Survey, **TQ98NW 1:10,000 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

Peterborough Tel: 01733 566566

Project No.

C12519

Site History

Figure I

Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

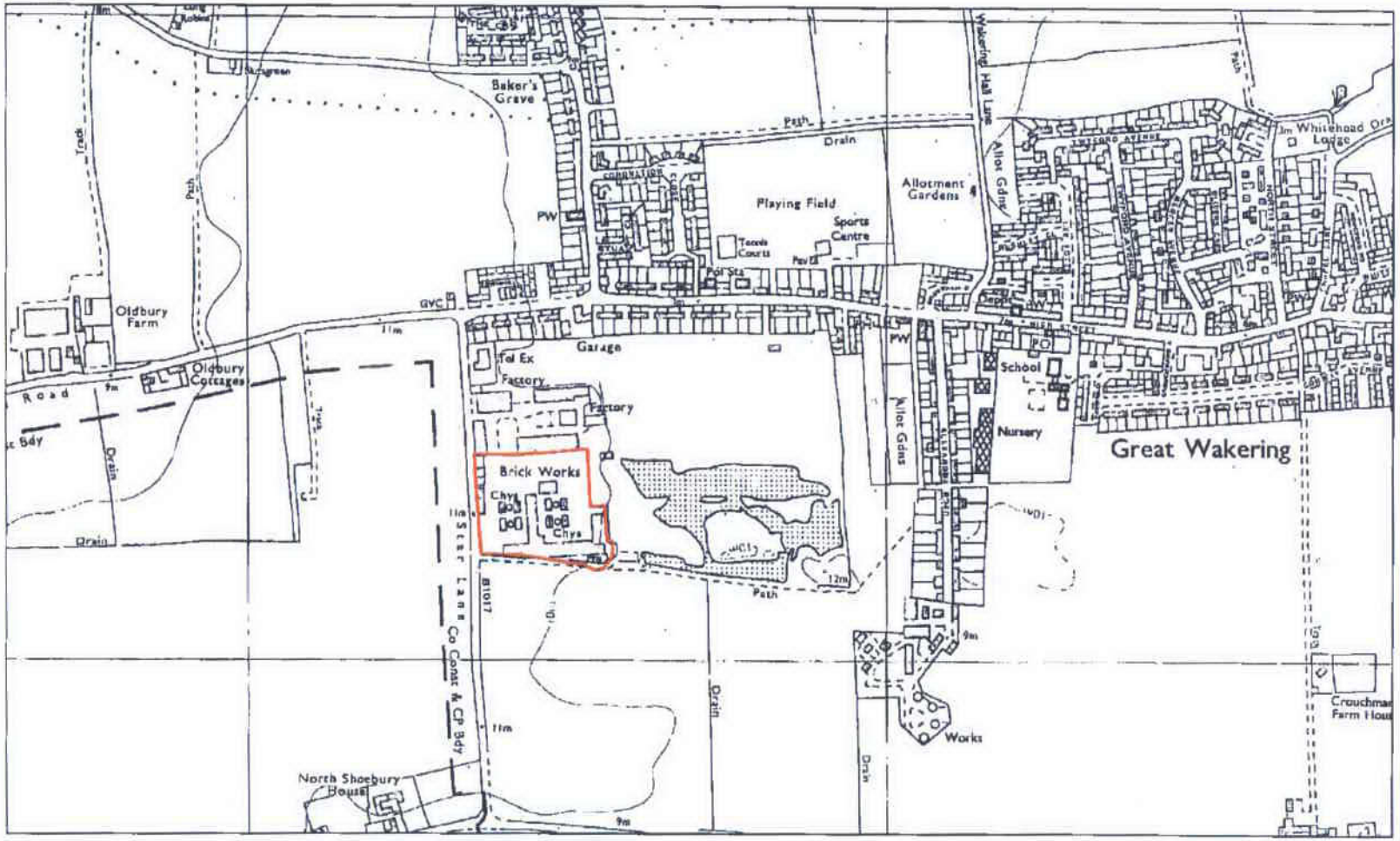
Peterborough Tel: 01733 566566

Project No.

C12519

Site History

Figure J

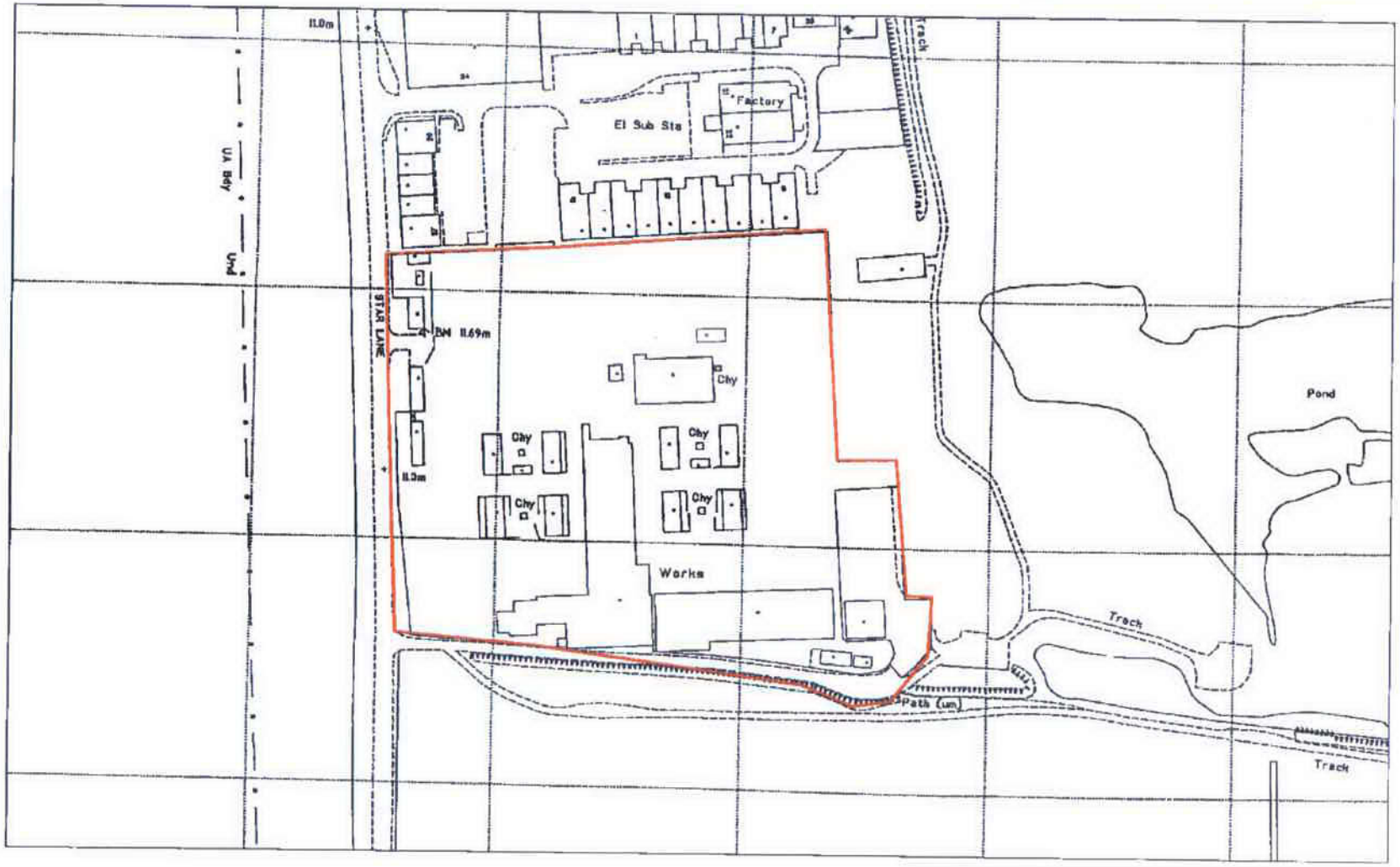


Project : Star Lane, Great Wakering **Client : Taylor Wimpey**	**GROUND ENGINEERING LIMITED** Peterborough Tel: 01733 566566	**Project No.** **C12519**

Site History

Figure K

Reproduced from the **1998** Ordnance Survey, **TQ9387 1:2500 scale** map



Project : Star Lane, Great Wakering

Client : Taylor Wimpey

GROUND ENGINEERING LIMITED

Peterborough Tel: 01733 566566

Project No.

C12519

APPENDIX 2

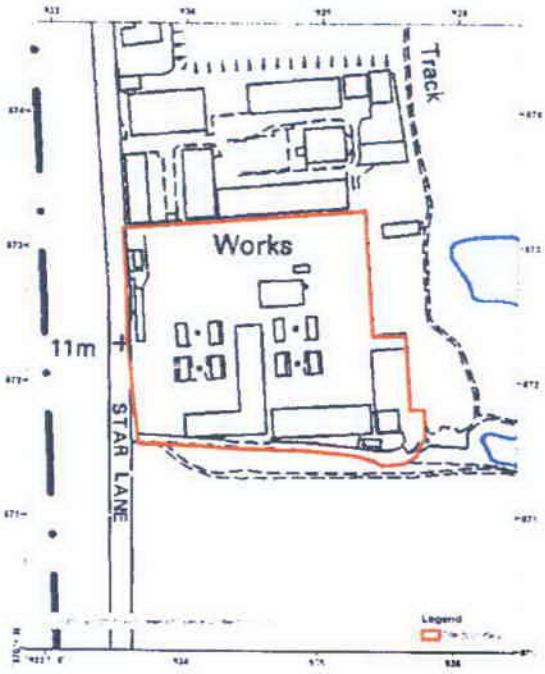
PRELIMINARY UNEXPLODED ORDNANCE (UXO) ASSESSMENT

6 Alpha Associates Limited
Quatro House, Frimley Road
Camberley, Surrey
GU16 7ER

T: +44(0) 203 371 3904
F: +44(0) 1276 804 676
W: www.6alpha.com

Preliminary Unexploded Ordnance (UXO) Risk Assessment

Meeting the requirements of Phase 1 of CIRIA C681 "Unexploded Ordnance (UXO) – A guide for the Construction Industry" Risk Management Framework



6 Alpha Project Number: P2331
Landmark Order Number: 33373290_1
Client Reference: SJF/L8250
Site: Star Lane, Great Wakering, Essex SS3 0PJ

Originator: Gary Hubbard (14th December 2010)
Quality Review: Lee Godderham (14th December 2010)
Released by: Simon Cooke (14th December 2010)

Delivered by

Envirocheck

6 alpha
special risks consultancy

Data Analysis

Site Address

The site address (as defined by the Client) as Star Lane, Great Wakering, Southend-on-Sea, Essex SS3 0PJ. Site centred on National Grid Reference 593460, 187230.

Using This Report

This Preliminary Assessment is designed to inform environmental and construction professionals of the potential threat of military related explosives and/or ordnance on, or in the vicinity of their study site.

This assessment should be employed as an initial site-screening tool to meet the requirement of Phase One of the CIRIA UXO Risk Management Framework, subject to the outcome further detailed research (under Phase 2 of the same Framework), may then be required to confirm the final risk level. 6 Alpha can provide this service and any additional interpretation, if required.

6 Alpha will provide two figures in the report, the Second World War (WWII) High Explosive Bomb Density and the final UXO Probability Assessment. The purpose of this approach is to demonstrate that whilst bomb density statistics set the scene for WWII bombing, they should not be relied upon solely to generate a holistic assessment.

Data Findings

The UXO database has been searched to 1,000m from the centre point of the site. The data has been presented in both geospatial mapping software and tabulated format. Please note that only data for the search centre area has been provided on the attached map (see Figure Two). For further information, please contact 6 Alpha.

Threat Source	Database Searched	Records Found	Detail
Records of current military facility	Yes	No	Not Applicable
Records of historic airfield / military training facilities	Yes	No	Not Applicable
Records of historic decoy bombing sites	Yes	No	Not Applicable
Records of military training / range areas	Yes	Yes	Shoeburyness (artillery test range) is located 1.2km east
Records of former weapons / explosives manufacturing site	Yes	No	Not Applicable
Twentieth Century military defensive feature	Yes	Yes	Heavy Anti Aircraft Gun located 300m to the southeast
Second World War bombing targets	Yes	No	No primary Luftwaffe bombing targets located in proximity to the site
Second World War bombing density	Yes	Yes	This site falls within two administrative districts Rochford Rural District – 9 High Explosive HE Bombs per 1,000 acres, Southend-on-Sea – 22 HE Bombs per 1,000 acres
Abandoned Bomb Register	Yes	No	None recorded on site

Unexploded Ordnance Probability Assessment

Threat Potential

UXO PROBABILITY ASSESSMENT = 4 RATING INDICATING A LOW/MODERATE POSSIBILITY OF UXO ENCOUNTER

The rating scale can be seen on the final UXO Probability Assessment Map. The data may indicate that there is a varying probability rating across the defined search area. Therefore, the percentage of each category has been calculated and assessed, and whilst lower risk zones have been identified within the locality the highest risk rating has been determined at the specific site for UXO risk consideration. Therefore, the highest risk rating has been used for the final assessment and recommendations.

Summary and Recommendations

The *Bomb Search* database indicates that there is a Low/Moderate possibility of encountering UXO on site. Luftwaffe bombing activities conducted during WWII generates the primary threat. The site is located directly under Luftwaffe flight paths on route to London. However, there is a low bombing density for the local area with no evidence of bomb strikes within the site boundary.

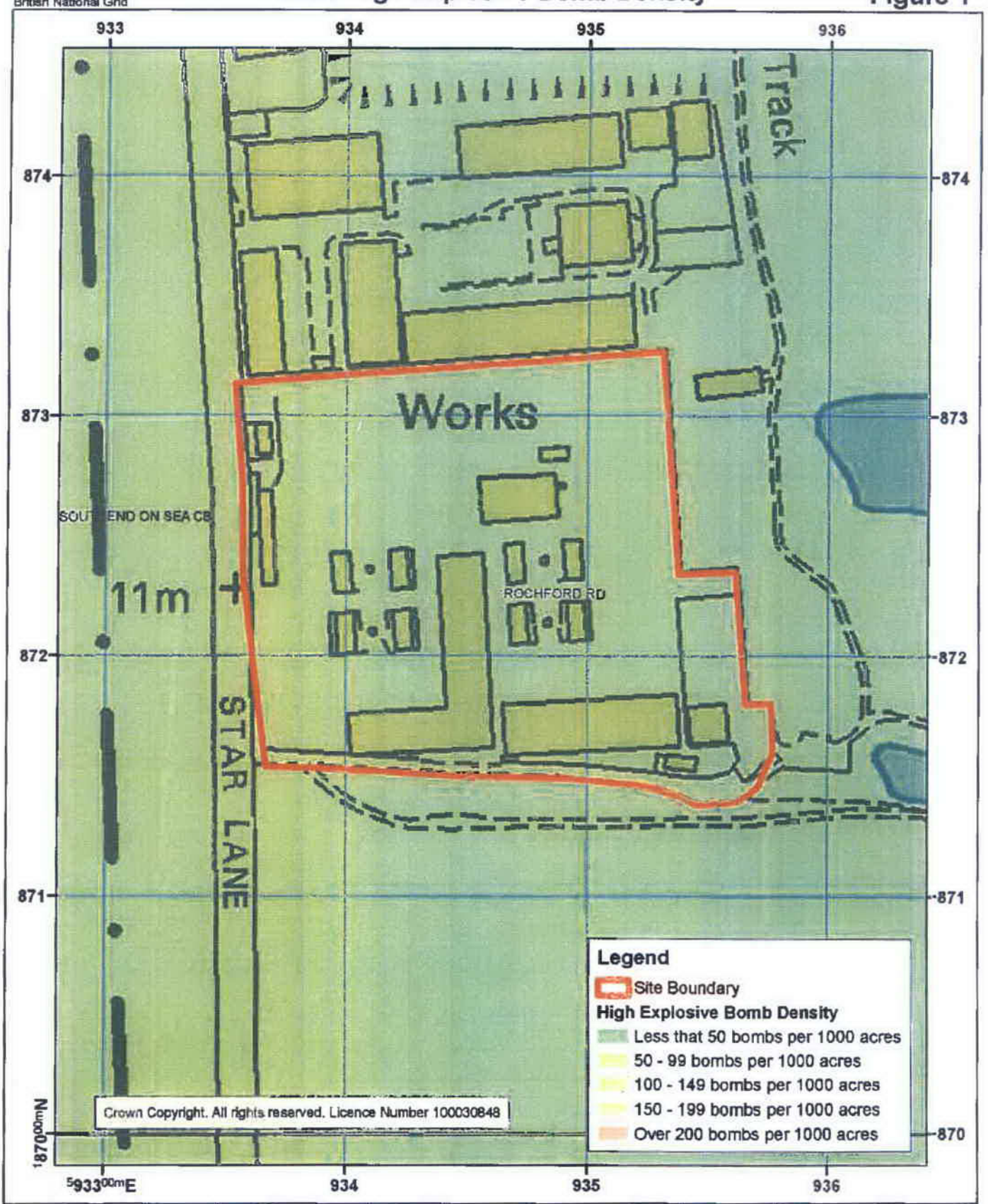
In light of these findings and according to the CIRIA publication 6 Alpha does not recommend a "phase two" detailed desk study. Although, it would be prudent for the site management to hold documentary procedures in the event that a suspicious item is found during subsequent works.

Important Notes

- The term "Preliminary UXO Risk Assessment" has been used to describe this report, to fall inline with the CIRIA publication. Whilst the term "Risk" can be justifiably used at this stage, the reader should note that the "Consequence" function of "Risk" is not considered. Should it be required, this would be addressed in the "Detailed UXO Risk Assessment" (Phase 2).
- This report is accurate and up to date at the time of writing.
- The assessment levels have been generated from historical data and third party sources. Where possible 6 Alpha have sought to verify the accuracy of such data, but cannot be held accountable for inherent errors that may be in third party data sets (e.g. National Archive or library sources).
- 6 Alpha have exercised all reasonable care, skill and due diligence in producing this service.
- Empirical units may be used in the assessment given the era of the source data.

Star Lane, Great Wakering, Southend-on-Sea SS3 0PJ
WWII High Explosive Bomb Density

Figure 1



BOMB SEARCH

6 Alpha Associates Ltd.
Quatro House
Frimley Road
Camberley
Surrey GU16 7ER
United Kingdom
www.6alpha.com
0203 371 3900

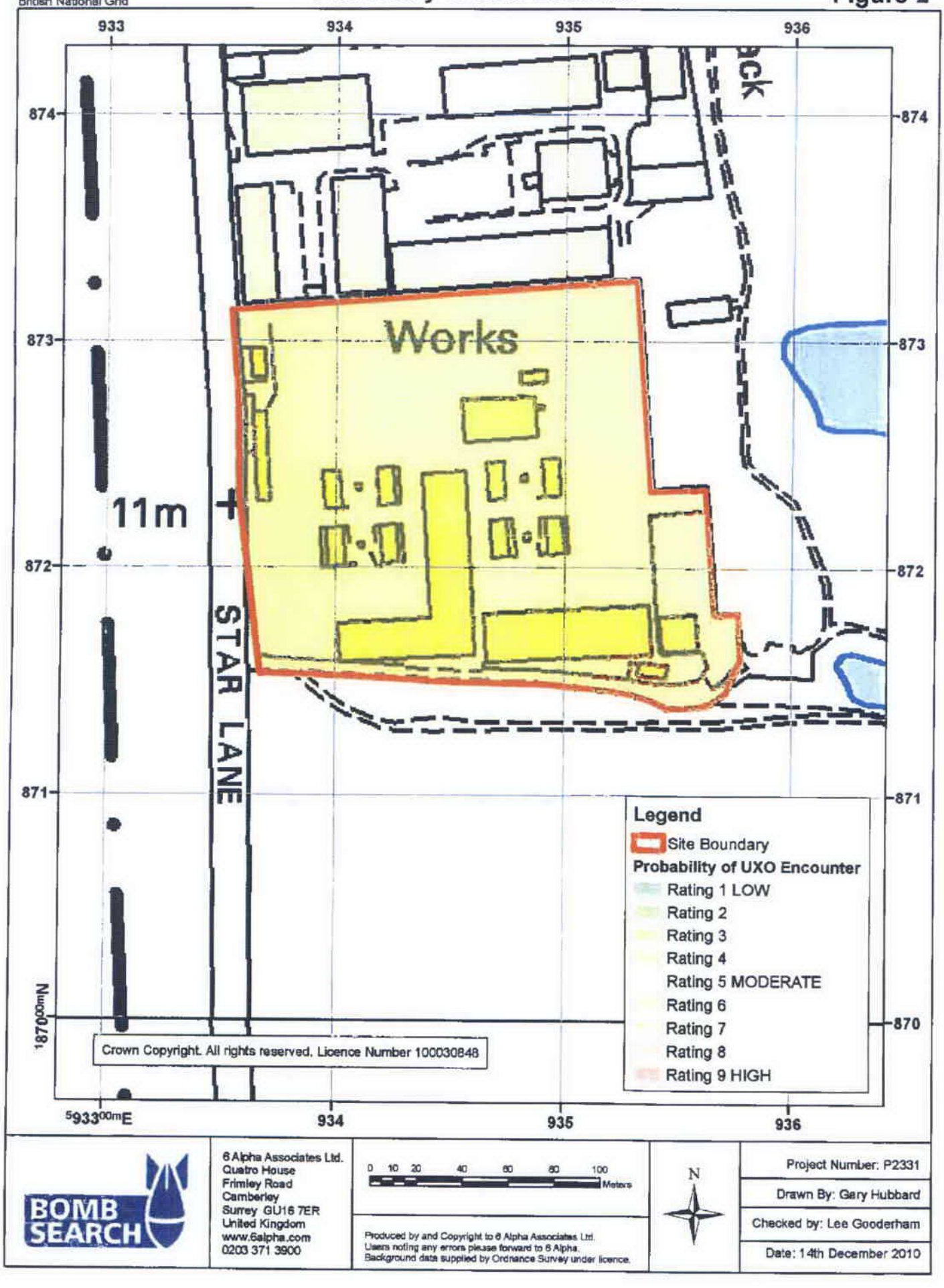
0 10 20 40 60 80 100 Meters

N

Project Number: P2331
Drawn By: Gary Hubbard
Checked by: Lee Gooderham
Date: 14th December 2010

Star Lane, Great Wakering, Southend-on-Sea SS3 0PJ
Probability of UXO Ecounter

Figure 2



BOMB SEARCH

6 Alpha Associates Ltd.
Quatro House
Frimley Road
Camberley
Surrey GU16 7ER
United Kingdom
www.6alpha.com
0203 371 3900

0 10 20 40 60 80 100 Meters

N

Project Number: P2331

Drawn By: Gary Hubbard

Checked by: Lee Gooderham

Date: 14th December 2010

APPENDIX 3

ENVIRONMENTAL SEARCHES

GroundSure EnviroInsight

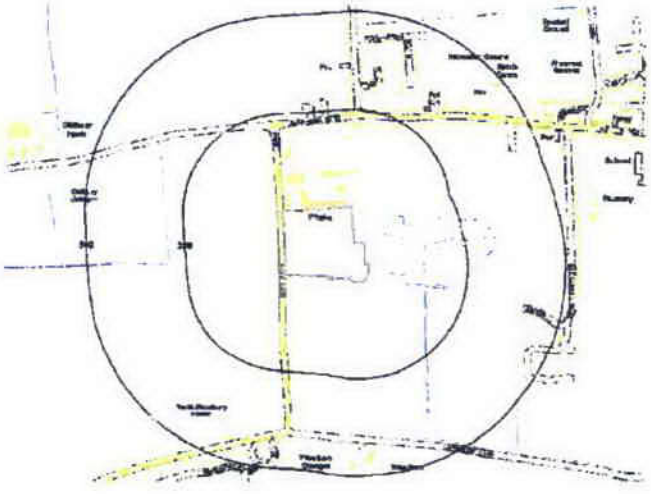
Address: STAR LANE, GREAT WAKERING, SOUTHEND-ON-SEA, SS3 0PJ

Date: Oct 11, 2011

GroundSure Reference: GS-173303

Your Reference: C12519

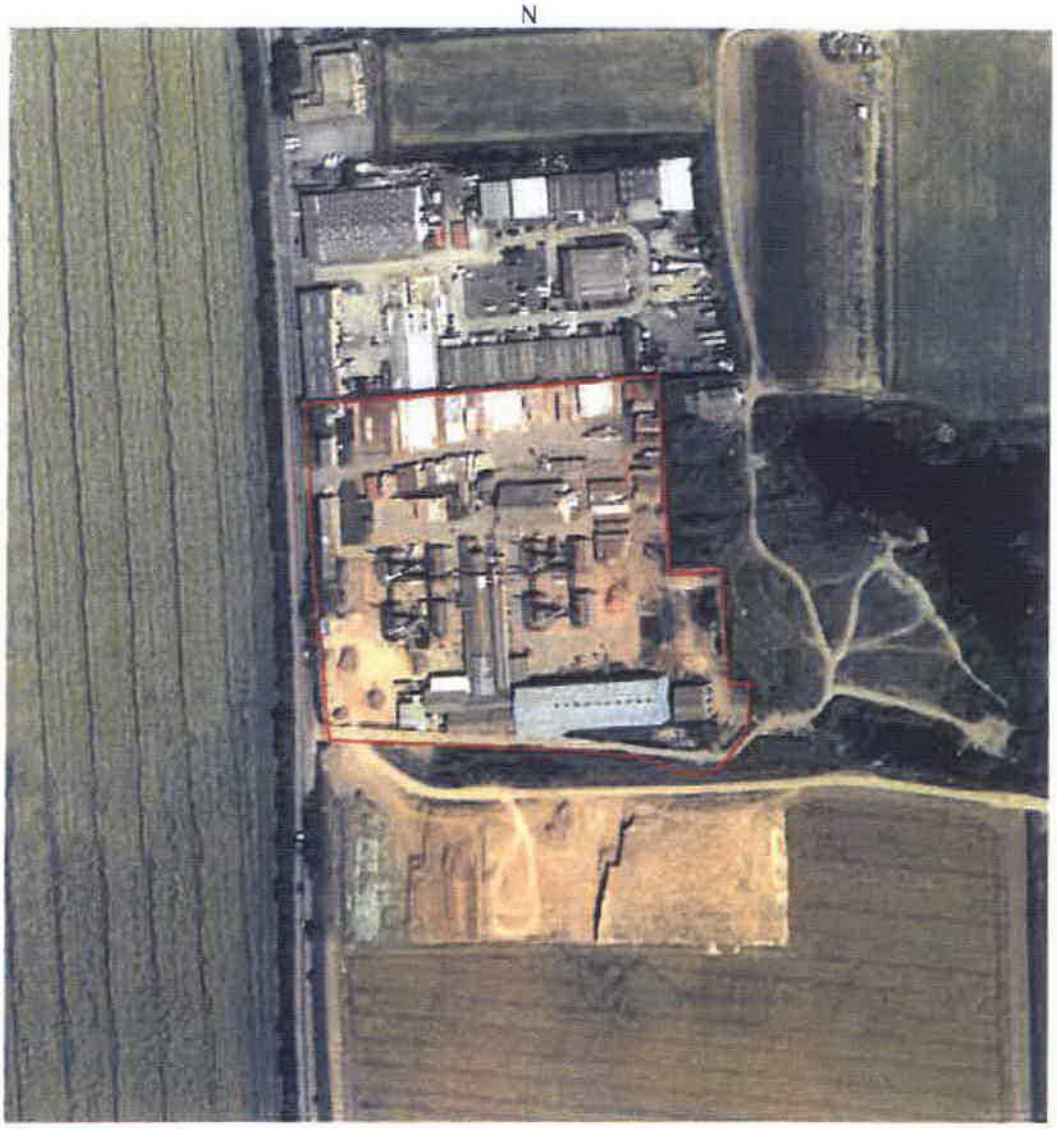
Client: Ground Engineering Limited



Brought to you by GroundSure

Aerial Photograph of Study Site

NW N NE



◄W E►

SW S SE

Site Name: STAR LANE, GREAT WAKERING, SOUTHEND-ON-SEA, SS3 0PJ
Grid Reference: 593451,187419
Size of Site: 3.31 ha

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	Number of records found within (X) m of the study site boundary					
1. Environmental Permits, Incidents and Registers	on-site	0-50	51-250	251-500	501-1000	1000-1500
1.1 Industrial Sites Holding Environmental Permits and/or Authorisations						
Records of historic IPC Authorisations	0	0	0	0	-	-
Records of Part A(1) and IPPC Authorised Activities	0	0	0	0	-	-
Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0	-	-
Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0	-	-
Records of List 1 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of List 2 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of Part A(2) and Part B Activities and Enforcements	0	0	2	0	-	-
Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0	-	-
Records of Licensed Discharge Consents	0	0	1	3	-	-
Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0		
1.2 Records of COMAH and NIHHS sites	0	0	0	0	-	-
1.3 Environment Agency Recorded Pollution Incidents						
National Incidents Recording System, List 2	0	1	2	-	-	-
National Incidents Recording System, List 1	0	0	0	-	-	-
1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0	0	-	-

2. Landfill and Other Waste Sites	on-site	0-50	51-250	251-500	501-1000	1000-1500
2.1 Landfill Sites						
Environment Agency Registered Landfill Sites	0	0	0	0	0	-
Landfill Data - Operational Landfill Sites	0	0	0	0	0	-
Environment Agency Historic Landfill Sites	0	0	0	0	1	1
Landfill Data - Non-Operational Landfill Sites	0	0	0	0	0	-
BGS/DoE Landfill Site Survey	0	0	0	0	0	0
GroundSure Local Authority Landfill Sites Data	0	0	0	0	0	0
2.2 Landfill and Other Waste Sites Findings						
Operational Waste Treatment, Transfer and Disposal Sites	1	0	0	0	-	-
Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	-	-
Environment Agency Licensed Waste Sites	0	5	0	0	0	2

3. Current Land Uses	on-site	0-50	51-250	251-500	501-1000	1000-1500
3.1 Current Industrial Sites Data	0	9	13	-	-	-
3.2 Records of Petrol and Fuel Sites	0	0	1	0	-	-
3.3 Underground High Pressure Oil and Gas Pipelines	0	0	0	0	-	-

4. Geology	Description
4.1 Are there any records of Artificial Ground and Made Ground present beneath the study site? *	Yes
4.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site? *	Yes
4.3 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
Source: Scale: 1:50,000 BGS Sheet 258	

* This includes an automatically generated 50m buffer zone around the site.

5. Hydrogeology and Hydrology	on-site	0-50	51-250	251-500	501-1000	1001-2000
5.1 Are there any records of Productive Strata in the Superficial Geology within 500m of the study site?				Yes		
5.2 Are there any records of Productive Strata in the Bedrock Geology within 500m of the study site?				Yes		
5.3 Groundwater Abstraction Licences (within 1000m of the study site).	0	0	2	5	1	-
5.4 Surface Water Abstraction Licences (within 1000m of the study site).	0	0	0	0	1	-
5.5 Potable Water Abstraction Licences (within 2000m of the study site).	0	0	0	0	0	0
5.6 Are there any Source Protection Zones within 500m of the study site?					No	

5.7 River Quality	on-site	0-50	51-250	251-500	501-1000	1001-1500
Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	No	No
5.8 Detailed River Network entries within 500m of the site	0	0	0	1	-	-
5.9 Surface water features within 250m of the study site	No	Yes	Yes	-	-	-

6. Flooding	
6.1 Are there any Environment Agency indicative Zone 2 floodplains within 250m of the study site?	No
6.2 Are there any Environment Agency indicative Zone 3 floodplains within 250m of the study site?	No
6.3 Are there any Flood Defences within 250m of the study site?	No
6.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
6.5 Are there any areas used for Flood Storage within 250m of the study site?	No
6.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Very High
6.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Moderate

7. Designated Environmentally Sensitive Sites	on-site	0-50	51-250	251-500	501-1000	1001-1500
7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	-	-
7.2 Records of National Nature Reserves (NNR)	0	0	0	0	-	-

7.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	-	-
7.3 Records of Local Nature Reserves (LNR)	0	0	0	0	-	-
7.4 Records of Special Areas of Conservation (SAC)	0	0	0	0	-	-
7.5 Records of Special Protection Areas (SPA)	0	0	0	0	-	-
7.6 Records of Ramsar sites	0	0	0	0	-	-
7.7 Records of World Heritage Sites	0	0	0	0	-	-
7.8 Records of Environmentally Sensitive Areas	0	0	0	0	-	-
7.9 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	-	-
7.10 Records of National Parks	0	0	0	0	-	-
7.11 Records of Nitrate Sensitive Areas	0	0	0	0	-	-
7.12 Records of Nitrate Vulnerable Zones	0	0	0	0	-	-

8. Natural Hazards

8.1 What is the maximum risk of natural ground subsidence?	Moderate

9. Mining

9.1 Are there any coal mining areas within 75m of the study site?	No
9.2 What is the risk of subsidence relating to shallow mining within 150m of the study site?	Negligible
9.3 Are there any brine affected areas within 75m of the study site?	No

Using this Report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between GroundSure and the Client. The document contains the following sections:

1. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

2. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

3. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure underground oil and gas pipelines.

4. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

5. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

6. Flooding

Provides information on surface water flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

7. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites. These searches are conducted using radii of up to 500m.

8. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence.

9. Mining

Provides information on areas of coal and shallow mining.

10. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, GroundSure provide a free Technical Helpline (08444 159000) for further information and guidance.

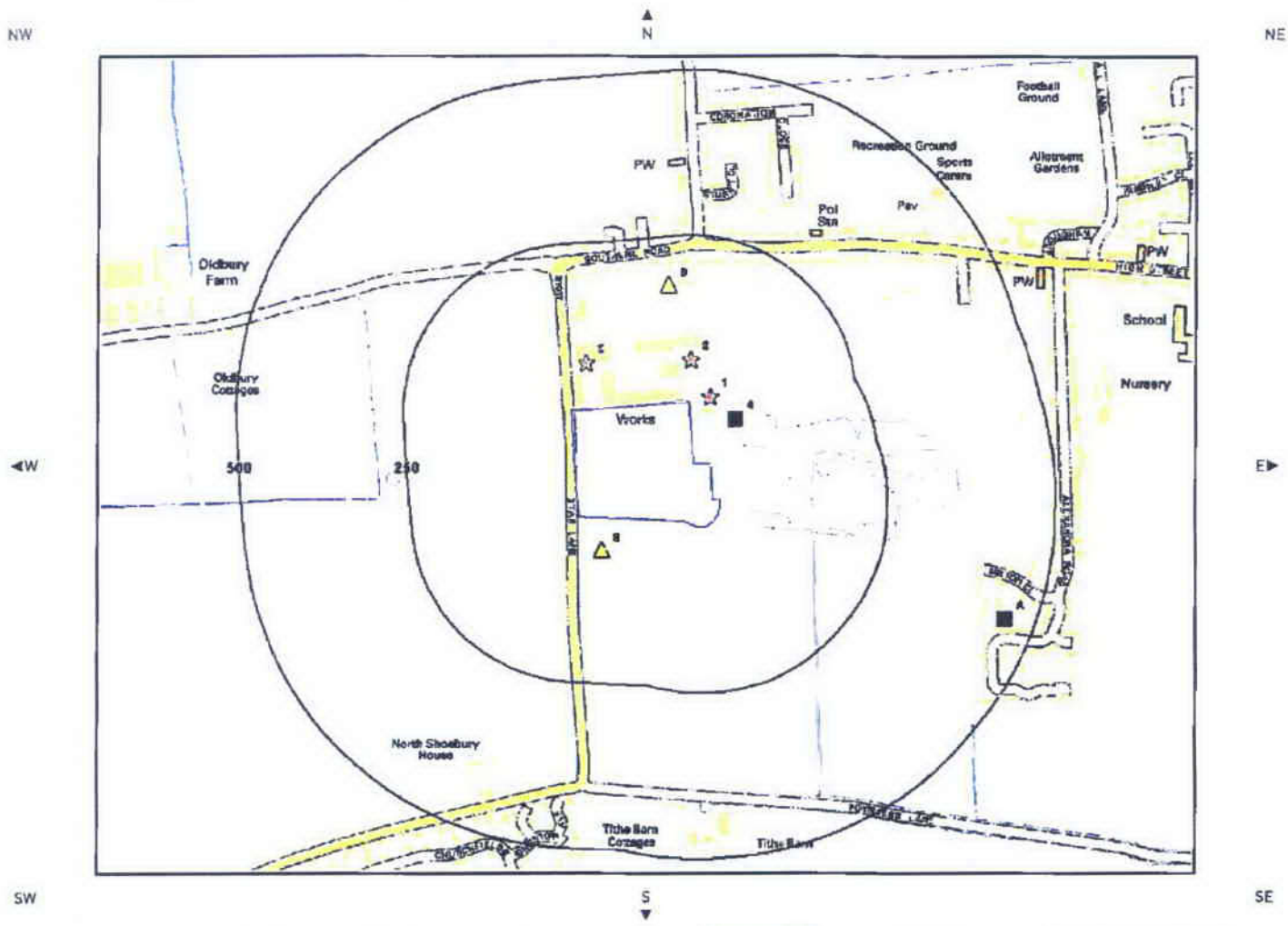
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Environmental Permits, Incidents and Registers Map



Authorisations, Incidents and Registers Legend

- Site Outline
- Search Buffers (m) — 250 — 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

1.Environmental Permits, Incidents and Registers

1.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

Records of historic IPC Authorisations within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(1) and IPPC Authorised Activities within 500m of the study site: **0**

Database searched and no data found.

Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: **0**

Database searched and no data found.

Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site: **0**

Database searched and no data found.

Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site: **0**

Database searched and no data found.

Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: **2**

The following Part A(2) and Part B Activities are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
8	51.0	S	593400, 187100	Address: Hanson Bricks Star Lane, Gt Wakering,ss6 0pp Process: Ceramics/clay/plaster/brick Process Status: Unknown Permit Type: Part B	Enforcement: Data requested, not received. Date of Enforcement: Data requested, not received. Comment: Data requested, not received.

9	175.0	N	593500, 187500	Address: Service Gge Gt Wakering Process: Petrol Vapour Recovery Process Status: Revoked Permit Type: Part B	Enforcement: Data requested, not received. Date of Enforcement: Data requested, not received. Comment: Data requested, not received.

Records of Category 3 or 4 Radioactive Substance Licences within 500m of the study site: **0**

Database searched and no data found.

Records of Licensed Discharge Consents within 500m of the study site: **4**

The following Licensed Discharge Consents records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance	Direction	NGR	Details	
4	67.0	E	593600, 187300	Address: Star Lane - Gt Wakering, Essex Effluent Type: Miscellaneous Discharges - Surface Water Permit Number: PR2NFE26566 Permit Version: 1	Receiving Water: Trib River Thames Status: Surrendered Under Epr 2010 Issue date: 16/8/1966 Effective Date: 16/8/1966 Revocation Date: 28/2/2011
5A	452.0	E	594000, 187000	Address: St.gilgen, Rebels Lane, Gt Wakering, Southend On Sea, Essex, SS3 0QE Effluent Type: Sewage Discharges - Final/treated Effluent - Not Water Company Permit Number: PR2LFS04878 Permit Version: 1	Receiving Water: Land Status: Pre Nra Legislation Where Issue Date < 01-sep-89 (historic Only) Issue date: 4/7/1978 Effective Date: 4/7/1978 Revocation Date: -
6A	452.0	E	594000, 187000	Address: Merrihaven, Rebels Lane, Gt Wakering, Southend On Sea, Essex, SS3 0QE Effluent Type: Sewage Discharges - Final/treated Effluent - Not Water Company Permit Number: PR2LFS23168 Permit Version: 1	Receiving Water: Land Status: Pre Nra Legislation Where Issue Date < 01-sep-89 (historic Only) Issue date: - Effective Date: - Revocation Date: -
7A	452.0	E	594000, 187000	Address: Millers Farm, New Road, Gt Wakering, Southend On Sea, Essex, SS3 0AW Effluent Type: Sewage Discharges - Final/treated Effluent - Not Water Company Permit Number: PR2LFS05883 Permit Version: 1	Receiving Water: Land Status: Pre Nra Legislation Where Issue Date < 01-sep-89 (historic Only) Issue date: 3/8/1983 Effective Date: 3/8/1983 Revocation Date: -

Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: **0**

Database searched and no data found.

1.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: **0**

Database searched and no data found.

1.3 Environment Agency Recorded Pollution Incidents

Records of National Incidents Recording System, List 2 within 250m of the study site: **3**

The following NIRS List 2 records are represented as points on the Authorisations, Incidents and Registers Map:

Report Reference: GS-173303

ID	Distance	Direction	NGR	Details	
1	32.0	E	593562, 187334	Incident Date: 19/9/2002 Incident Identification: 109059 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
2	63.0	N	593533, 187390	Incident Date: 10/1/2002 Incident Identification: 51616 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
3	69.0	N	593375, 187384	Incident Date: 17/4/2002 Incident Identification: 72413 Pollutant: Contaminated Water Pollutant Description: Other Contaminated Water	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

Records of National Incidents Recording System, List 1 within 250m of the study site: **0**

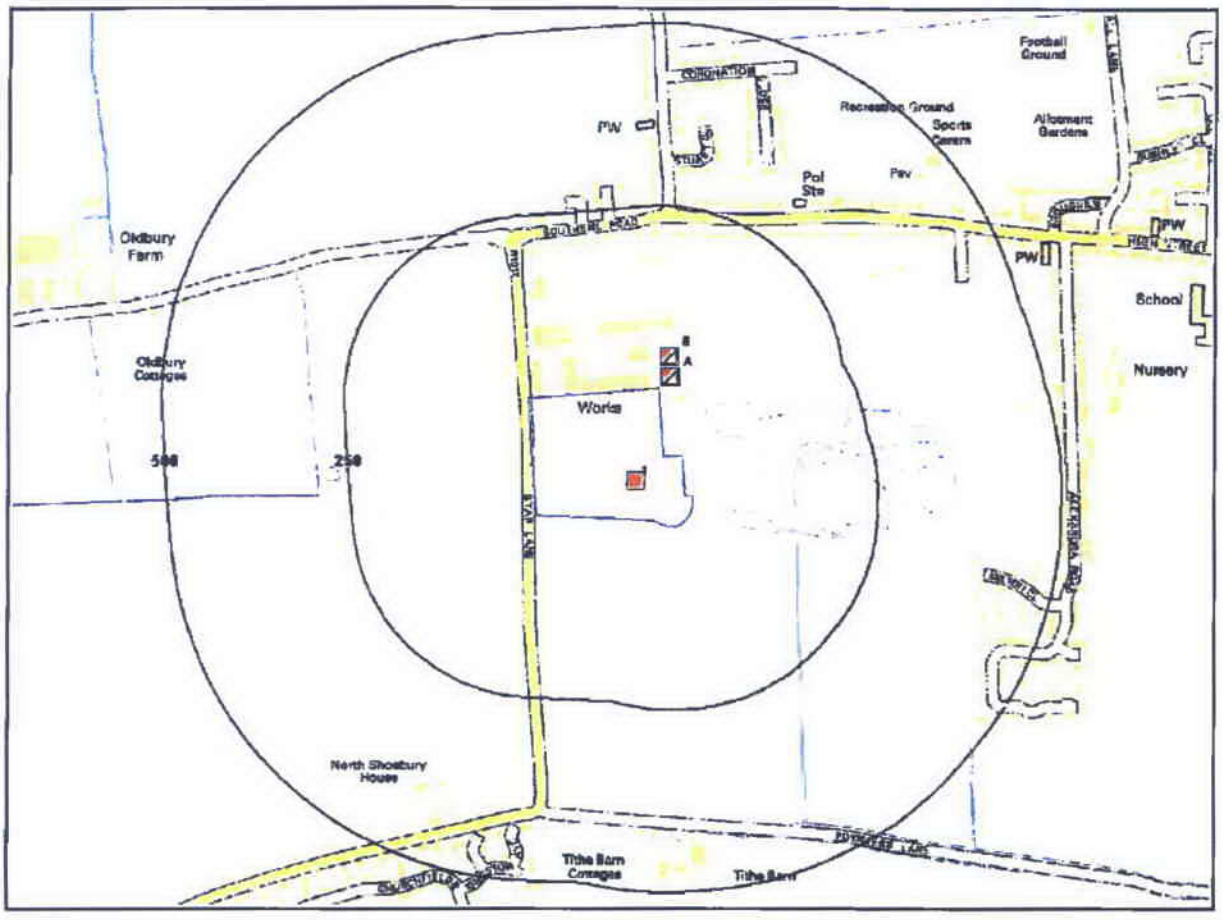
Database searched and no data found.

1.4 Sites Determined as Contaminated Land under Part IIA EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? **0**

Database searched and no data found.

2. Landfill and Other Waste Sites Map



Landfill & Other Waste Sites Legend

Enabled by Ordnance Survey

- Site Outline
- Search Buffers (m) — 250 — 500
- E.A. Active Landfill
- E.A. Historic Landfill (Area Data)
- E.A. Historic Landfill (Point Data)
- BGS / DoE Survey Landfill
- Local Authority Landfill (Area Data)
- Local Authority Landfill (Point Data)
- Operational Waste Treatment Licence
- Closed Waste Treatment Licence
- REGIS Waste Licence
- Operational Landfill
- Closed Landfill

2. Landfill and Other Waste Sites

2.1 Landfill Sites

Records from Environment Agency landfill data within 1000m of the study site: **0**

Database searched and no data found.

Records of operational landfill sites sourced from Landmark within 1000m of the study site: **0**

Database searched and no data found.

Records of Environment Agency historic landfill sites within 1500m of the study site: **2**

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details	
Not shown	681.0	N	593300, 188000	Site Address: Little Wakering, Havenside, Little Wakering, Rochford Waste Licence: - Site Reference: ROC011 Waste Type: Commercial, Household Regis Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: Southend On Sea County Borough
Not shown	1427.0	S	593900, 185600	Site Address: Elm Road, Elm Road, Shoeburyness, Southend Waste Licence: - Site Reference: SOS002 Waste Type: Industrial, Commercial, Household Regis Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: Southend On Sea County Borough

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Records of non-operational landfill sites sourced from Landmark within 1000m of the study site: **0**

Database searched and no data found.

Records of BGS/DoE non-operational landfill sites within 1500m of the study site: **0**

Database searched and no data found.

Records of Local Authority landfill sites within 1500m of the study site: **0**

Database searched and no data found.

2.2 Other Waste Sites

Records of operational waste treatment, transfer or disposal sites within 500m of the study site: **1**

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details

1	0.0	On Site	593500, 187200	Site Address: Plot 36 Star Lane Industrial Estate, Great Wakering, SOUTHEND ON SEA, Essex, Landfill Licence: 150APYAL EA Reference: EAWML70275 Waste Type: Non-Hazardous Rating: Non-Hazardous Transfer Known Restrictions: Waste produced/controlled by licence holder	Record Date: 01-Sep-1987 Transfer Date: 01-Aug-1993 Modification Date: 01-Mar-1997 Status: Operational as far as is known Category: TRANSFER Regulator: EA - Anglian Region - Eastern Area (Kelvedon) Size: Very Small (<10,000 tonnes/year)

Records of non-operational waste treatment, transfer or disposal sites within 500m of the study site: 0

Database searched and no data found.

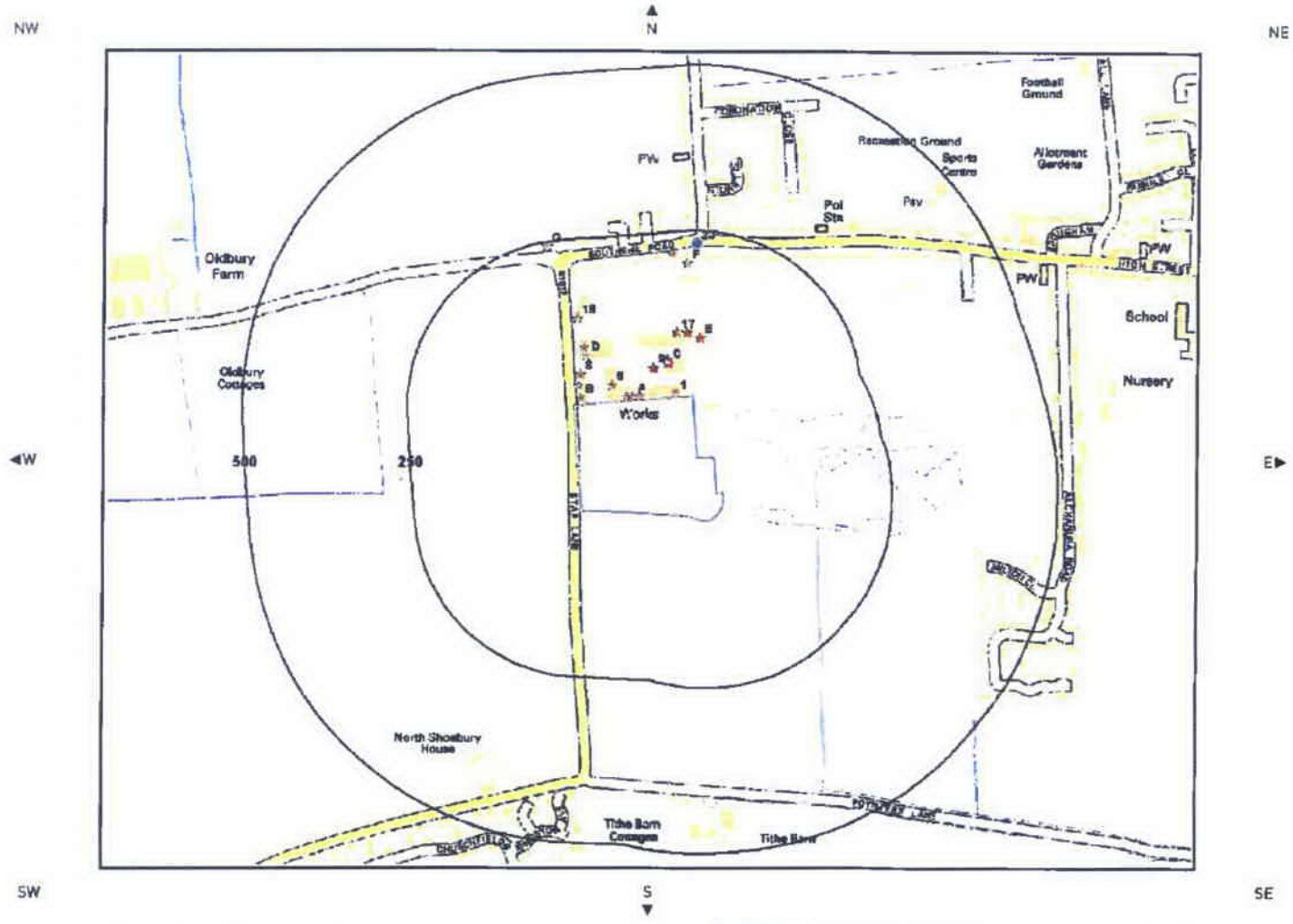
Records of Environment Agency licensed waste sites within 1500m of the study site: 7

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance	Direction	NGR	Details	
4A	22.0	NE	593547, 187342	Site Address: 37, Star Lane Industrial Estate, Great Wakering, Essex, SS3 0PG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Regis Licence Number: CHU002 EPR reference: - Operator: Churn Gary Waste Management licence No: 71285 Annual Tonnage: 0.0	Issue Date: 04/11/2002 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: - Correspondence Address: 1, Townfield Villas, Southend Road, Great Wakering, Essex, SS3 0PG
5A	22.0	NE	593547, 187342	Site Address: 37, Star Lane Industrial Estate, Great Wakering, Essex, SS3 0PG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Regis Licence Number: CHU002 EPR reference: - Operator: Churn Waste Management Ltd Waste Management licence No: 71285 Annual Tonnage: 24999.0	Issue Date: 11/4/2002 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Churn Waste Correspondence Address: 103, High Street, Waltham Cross, Hertfordshire, EN8 7AN
6A	22.0	NE	593547, 187342	Site Address: 37, Star Lane Industrial Estate, Great Wakering, Essex, SS3 0PG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Regis Licence Number: CHU025 EPR reference: EA/EPR/BP3394NA/A001 Operator: Churn Waste Management Ltd Waste Management licence No: 71285 Annual Tonnage: 24999.0	Issue Date: 04/11/2002 Effective Date: 19/03/2008 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Churn Waste Correspondence Address: -
7A	22.0	NE	593547, 187342	Site Address: 37, Star Lane Industrial Estate, Great Wakering, Essex, SS3 0PG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Regis Licence Number: CHU002 EPR reference: - Operator: Churn Gary Waste Management licence No: 71285 Annual Tonnage: 0.0	Issue Date: 04/11/2002 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: - Correspondence Address: 1, Townfield Villas, Southend Road, Great Wakering, Essex, SS3 0PG

8	45.0	N	593545, 187370	Site Address: Plot 36, Star Lane Industrial Estate, Great Wakering, Southend On Sea, Essex, SS3 0PG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Regis Licence Number: GOO001 EPR reference: EA/EPR/SP3399NY/S002 Operator: Goodwin A J Waste Management licence No: 70275 Annual Tonnage: 18559.0	Issue Date: 08/09/1987 Effective Date: - Modified: - Surrendered Date: 31/03/2004 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Churn Waste Correspondence Address: -
Not shown	1228.0	SE	594600, 186480	Site Address: Wakering Road, Shoeburyness, Essex, SS3 9TR Type: Composting Facility Size: < 25000 tonnes Regis Licence Number: TRE002 EPR reference: - Operator: Tree Fella Plc Waste Management licence No: 71098 Annual Tonnage: 0.0	Issue Date: 26/05/1998 Effective Date: 24/01/2002 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Stewards Yard Correspondence Address: Stewards Yard, Wakering Road, Shoeburyness, Essex, SS3 9TR
Not shown	1228.0	SE	594600, 186480	Site Address: Land / Premises At, Wakering Road, Showburyness, Southend On Sea, Essex, SS3 9TR Type: Composting Facility Size: < 25000 tonnes Regis Licence Number: TRE002 EPR reference: EA/EPR/NP3198NH/V003 Operator: Tree Fella Limited Waste Management licence No: 71098 Annual Tonnage: 15000.0	Issue Date: 26/05/1998 Effective Date: 24/01/2002 Modified: 24/04/2009 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Stewards Yard Correspondence Address: -

3. Current Land Use Map



Current Land Use Legend

Enabled by Ordnance Survey

- Site Outline
- Search Buffers (m) — 250 / 500
- Current Industrial Sites
- Petrol & Fuel Sites
- Underground High Pressure Oil & Fuel Pipelines

3. Current Land Uses

3.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: **22**

The following records are represented as points on the Current Land Uses map.

ID	Distance	Direction	Company	Address	Activity	Category
1	6.0	N	Wiggle Wiggle Ltd	9-10 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Clothing, Components and Accessories	Consumer Products
2A	7.0	N	Two A's Coachworks	16 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
3A	7.0	N	A & P Motors Ltd	17 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
4A	7.0	N	Clark Campion Engineering Co Ltd	13-15 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Industrial Engineers	Engineering Services
5B	11.0	N	M Wheeler Plastics	27 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Rubber, Silicones and Plastics	Industrial Products
6	27.0	N	Vimpex Ltd	38 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Electronic Equipment	Industrial Products
7B	28.0	N	Colin Cutler	25 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
8	46.0	N	Renik Solutions	23 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend On Sea, Essex, SS3 0PJ	Industrial Engineers	Engineering Services
9	48.0	N	Electricity Sub Station	SS3	Electrical Features	Infrastructure and Facilities
10 C	54.0	N	Factory	SS3	Unspecified Works Or Factories	Industrial Features
11 C	58.0	N	Sportwagen Car Body Repairs	21 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
12 C	58.0	N	Southchurch Refinishers	21 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Vehicle Repair, Testing and Servicing	Repair and Servicing
13 D	73.0	N	Eurolube Ltd	Unit 8 34 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0FF	Vehicle Repair, Testing and Servicing	Repair and Servicing
14 D	87.0	N	Marchetti Stone Ltd	Unit 1-2 34 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0FF	Stone Quarrying and Preparation	Extractive Industries
15E	90.0	N	Ellis Transport	35 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Distribution and Haulage	Transport, Storage and Delivery
16E	96.0	N	Quantech Environmental Ltd	Quantech House 33 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Cooling and Refrigeration	Industrial Products
17	97.0	N	Specializes Welding & Fabrication Ltd	7 Star Lane Industrial Estate, Star Lane, Great Wakering, Southend-on-Sea, SS3 0PJ	Cutting, Drilling and Welding Services	Construction Services
18	130.0	N	Telephone Exchange	SS3	Telecommunications Features	Infrastructure and Facilities
19F	201.0	N	Just Fiestas	Southend Road, Great Wakering, Southend-on-Sea, SS3 0PF	Secondhand Vehicles	Motoring
20F	217.0	N	Electricity Sub Station	SS3	Electrical Features	Infrastructure and Facilities
21 G	243.0	N	Gas Valve Compound	SS3	Gas Features	Infrastructure and Facilities
22 G	244.0	N	Gas Valve Compound	SS3	Gas Features	Infrastructure and Facilities

3.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: **1**

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance	Direction	NGR	Company	Address	LPG	Status
23	230.0	N	593535, 187557	Total	Service Garage, Southend Road, Southend Road, Great Wakering, Southend-on-sea, Essex, SS3 0PF	Not Applicable	Obsolete

3.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site: **0**

Database searched and no data found.

4. Geology

4.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

LEX Code	Description	Rock Type
WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

4.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
RTD1-CLSI	RIVER TERRACE DEPOSITS, 1	CLAY AND SILT
RTD1-SAGR	RIVER TERRACE DEPOSITS, 1	SAND AND GRAVEL

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

4.3 Bedrock and Solid Geology

The database has been searched on site, including a 50m buffer.

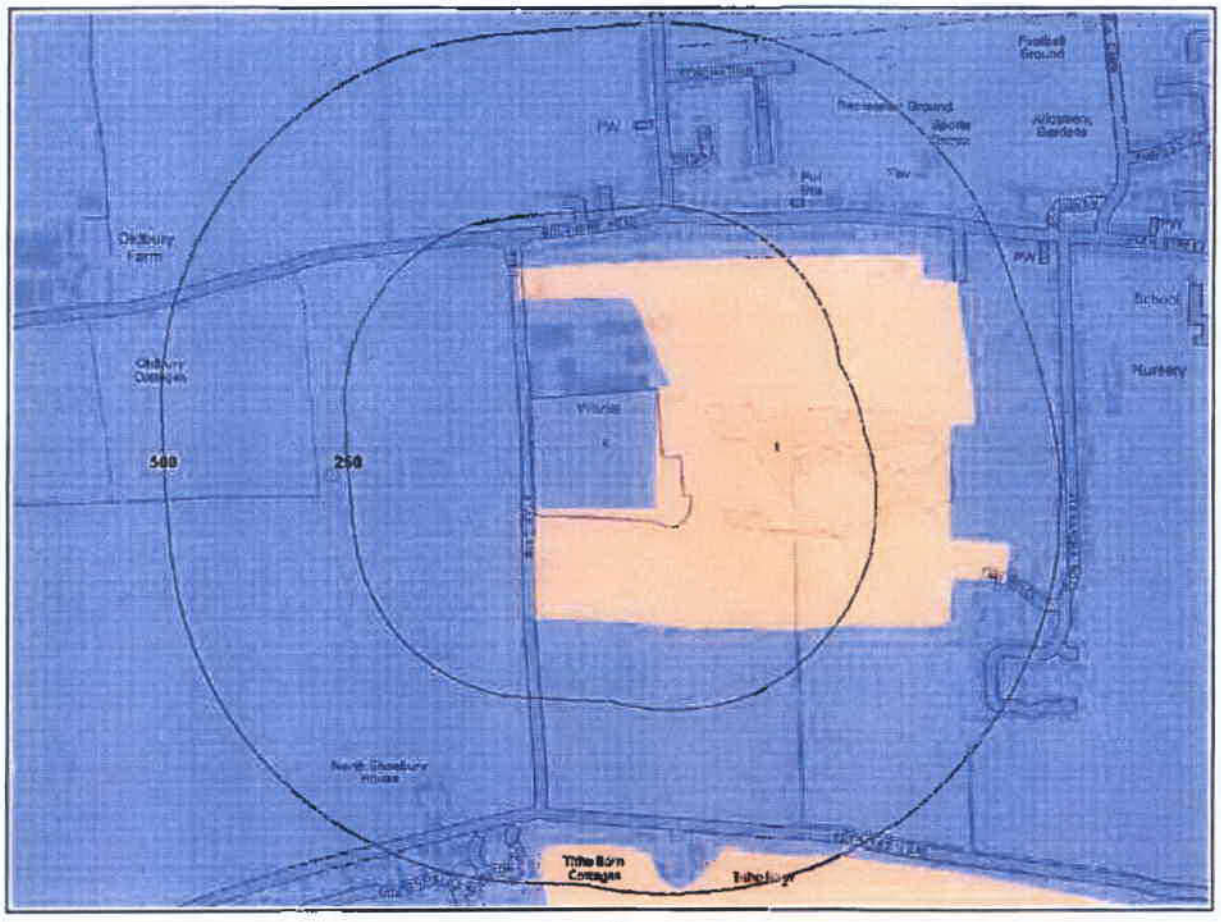
LEX Code	Description	Rock Type
LC-CLSS	LONDON CLAY FORMATION	CLAY, SILT AND SAND

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

For more detailed geological and ground stability data please refer to the "GroundSure GeoInsight". Available from our website.

5a. Hydrogeology - Aquifer Within Superficial Geology

NW N NE



W E

SW S SE

Aquifer Within **Superficial Geology** Legend

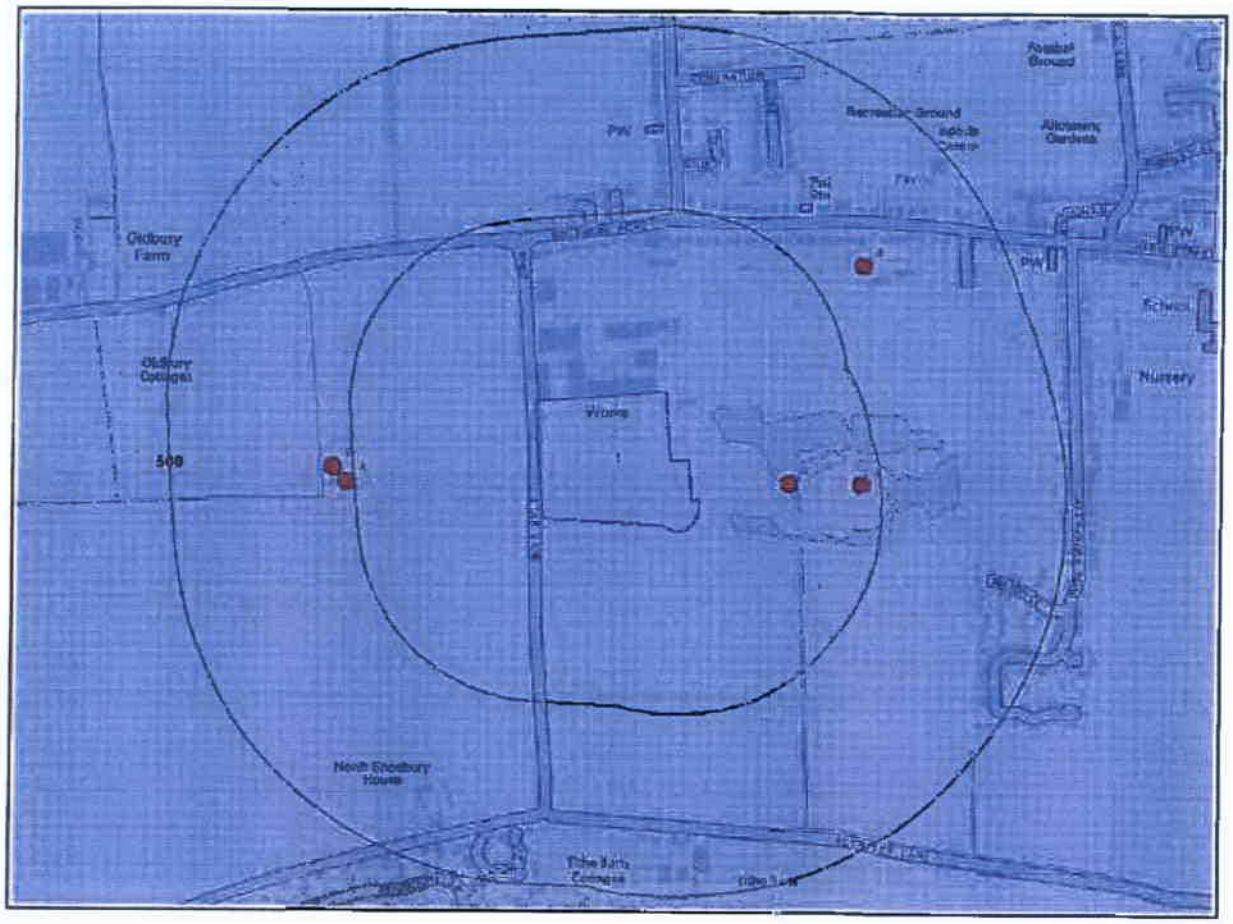
- Site Outline
- Search Buffers (m) — 250 — 500
- Principal Aquifer
- Secondary (A) Aquifer - Permeable Layers
- Secondary (B) Aquifer - Lower Permeability Layers
- Secondary Aquifer - Undifferentiated Layers
- Unproductive
- Unknown (lakes and landslip)

5b. Hydrogeology - Aquifer Within Bedrock Geology and Abstraction Licenses

NW N NE

W E

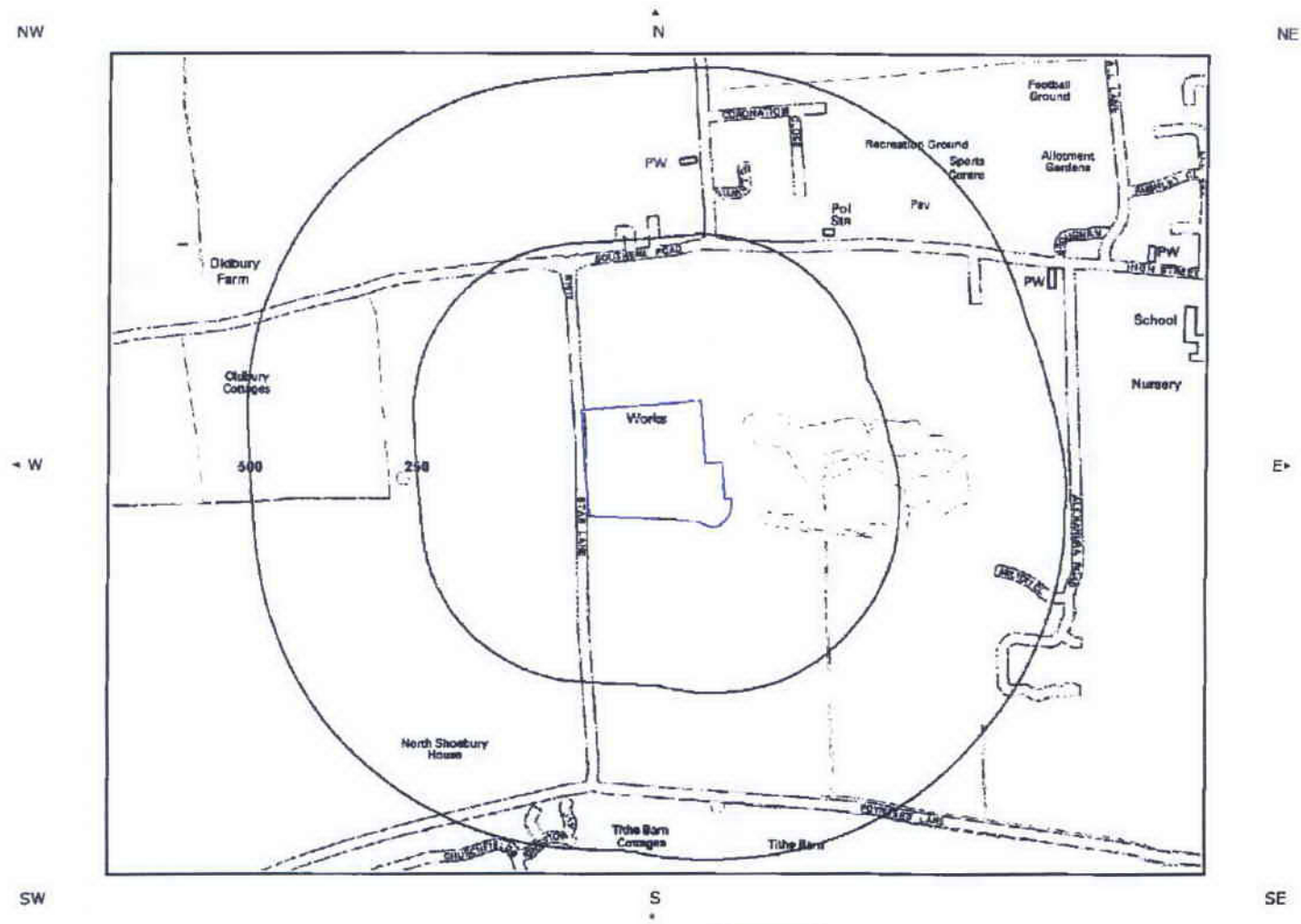
SW S SE



Aquifer Within **Bedrock Geology Legend**

- Site Outline
- Search Buffers (m): 250, 500
- Principal Aquifer
- Secondary (A) Aquifer - Permeable Layers
- Secondary (B) Aquifer - Lower Permeability Layers
- Groundwater Abstraction Licence
- Secondary Aquifer - Undifferentiated Layers
- Unproductive
- Unknown (lakes and landslip)
- Surface Water Abstraction Licence

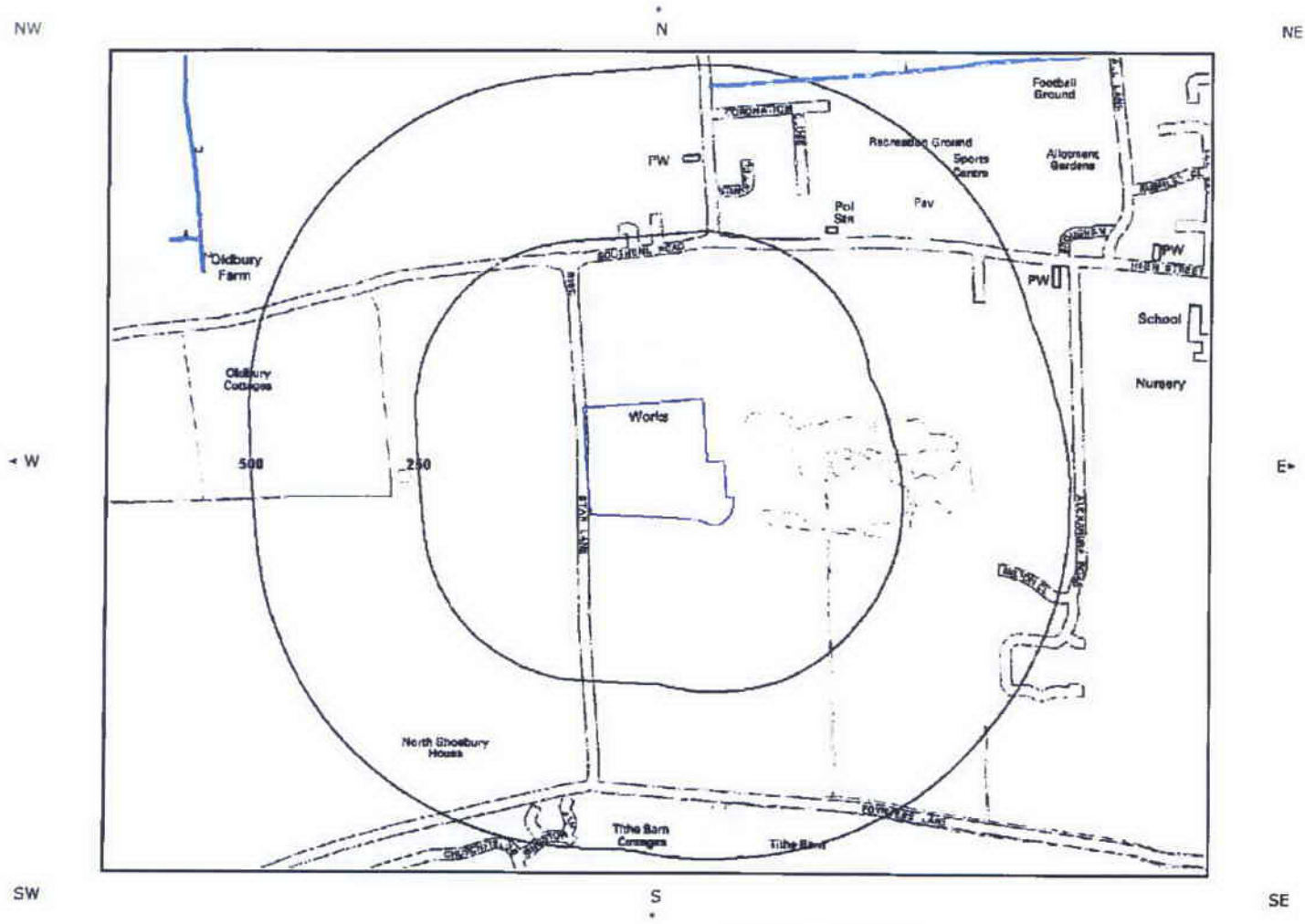
5c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



SPZ and Potable Water Abstraction Licenses
Legend

- Site Outline
- 250 / 500 — Search Buffers (m)
- Source Protection Zone 1 - Inner Catchment
- Source Protection Zone 2 - Outer Catchment
- Source Protection Zone 3 - Total Catchment
- Source Protection Zone 4 - Zone of Special Interest
- Potable Water Abstraction Licence

5d. Hydrology – Detailed River Network and River Quality



Hydrology Legend

- Site Outline
- 250 / 500 — Search Buffers (m)
- Primary River
- Secondary River
- Tertiary River
- Lake/Reservoir
- Underground River (inferred)
- General Quality Assessment: Chemistry
- Canal
- Canal Tunnel
- Extended Culvert (greater than 50m)
- D/S of High Water Mark
- D/S seaward extension
- General Quality Assessment: Biology

5.Hydrogeology and Hydrology

5.1 Aquifer within Superficial Deposits

Are there records of productive strata within the superficial geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (5a):

ID	Distance [m]	Direction	Designation	Description
1	0.0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
6	0.0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	440.0	S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

5.2 Aquifer within Bedrock Deposits

Are there records of productive strata within the bedrock geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (5b):

ID	Distance [m]	Direction	Designation	Description
1	0.0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

5.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 1000m of the study site? **Yes**

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (5b):

ID	Distance	Direction	NGR	Details	
2	125.0	E	593700, 187200	Licence No: 8/37/44/*G/0048 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Ground Water Source Of Supply Point: Star Lane, Great Wakering Data Type: Point	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 1/2/1967 Expiry Date: - Issue No: 100 Version Start Date: 1/9/1996 Version End Date:

3	224.0	E	593800, 187200	Licence No: 8/37/44/*G/0059 Details: Spray Irrigation - Direct Direct Source: Ground Water Source Of Supply Point: Star Lane, Great Wakering Data Type: Point	Annual Volume (m³): 5000 Max Daily Volume (m³): 164 Original Application No: - Original Start Date: 1/11/1976 Expiry Date: - Issue No: 100 Version Start Date: 1/11/1976 Version End Date:
4A	260.0	W	593100, 187200	Licence No: 8/37/44/*G/0076 Details: Spray Irrigation - Storage Direct Source: Ground Water Source Of Supply Point: Borehole At Great Wakering Data Type: Point	Annual Volume (m³): 45750 Max Daily Volume (m³): 520 Original Application No: - Original Start Date: 1/9/1998 Expiry Date: 31/3/2008 Issue No: 100 Version Start Date: 1/9/1998 Version End Date:
5A	260.0	W	593100, 187200	Licence No: 8/37/44/*G/0076 Details: Spray Irrigation - Direct Direct Source: Ground Water Source Of Supply Point: Borehole At Great Wakering Data Type: Point	Annual Volume (m³): 45750 Max Daily Volume (m³): 520 Original Application No: - Original Start Date: 1/9/1998 Expiry Date: 31/3/2008 Issue No: 100 Version Start Date: 1/9/1998 Version End Date:
6B	279.0	W	593080, 187220	Licence No: 8/37/44/*G/0076A Details: Spray Irrigation - Direct Direct Source: Ground Water Source Of Supply Point: Bore At Oldbury Farm Gt Wakering Data Type: Point	Annual Volume (m³): 45750 Max Daily Volume (m³): 520 Original Application No: NPS/WR/002483 Original Start Date: 1/4/2008 Expiry Date: 31/3/2016 Issue No: 2 Version Start Date: 30/7/2009 Version End Date:
7B	279.0	W	593080, 187220	Licence No: 8/37/44/*G/0076A Details: Spray Irrigation - Storage Direct Source: Ground Water Source Of Supply Point: Bore At Oldbury Farm Gt Wakering Data Type: Point	Annual Volume (m³): 45750 Max Daily Volume (m³): 520 Original Application No: NPS/WR/002483 Original Start Date: 1/4/2008 Expiry Date: 31/3/2016 Issue No: 2 Version Start Date: 30/7/2009 Version End Date:
8	320.0	NE	593800, 187500	Licence No: 8/37/44/*G/0035 Details: General Farming & Domestic Direct Source: Ground Water Source Of Supply Point: Star Lane, Gt. Wakering Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 1/5/1967 Expiry Date: - Issue No: 100 Version Start Date: 1/5/1967 Version End Date:
Not shown	777.0	W	592600, 187500	Licence No: 8/37/44/*G/0042 Details: Spray Irrigation - Direct Direct Source: Ground Water Source Of Supply Point: Oldbury Farm, Southchurch Data Type: Point	Annual Volume (m³): 13650 Max Daily Volume (m³): 546 Original Application No: - Original Start Date: 1/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/5/1994 Version End Date:

5.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 1000m of the study site? **Yes**

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (5b):

ID	Distance	Direction	NGR	Details	
Not shown	874.0	N	593500, 188200	Licence No: 8/37/44/*S/0036 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: Knights Nurseries, Lt.wakering Data Type: Point	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 1/7/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/7/1966 Version End Date:

5.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? **No**

Database searched and no data found.

5.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? **No**

Database searched and no data found.

5.7 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site? **No**

Biological Quality:

Database searched and no data found.

Chemical Quality:

Database searched and no data found.

5.8 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? **Yes**

The following Detailed River Network records are represented on the Hydrology Map (5d):

ID	Distance	Direction		Details	
1	468.0	N	River Name: Drain Water Course Name: - Welsh River Name: - Alternative Name: -		River Type: Tertiary River Catchment: - Drain: YES Main River Status: Currently Undefined

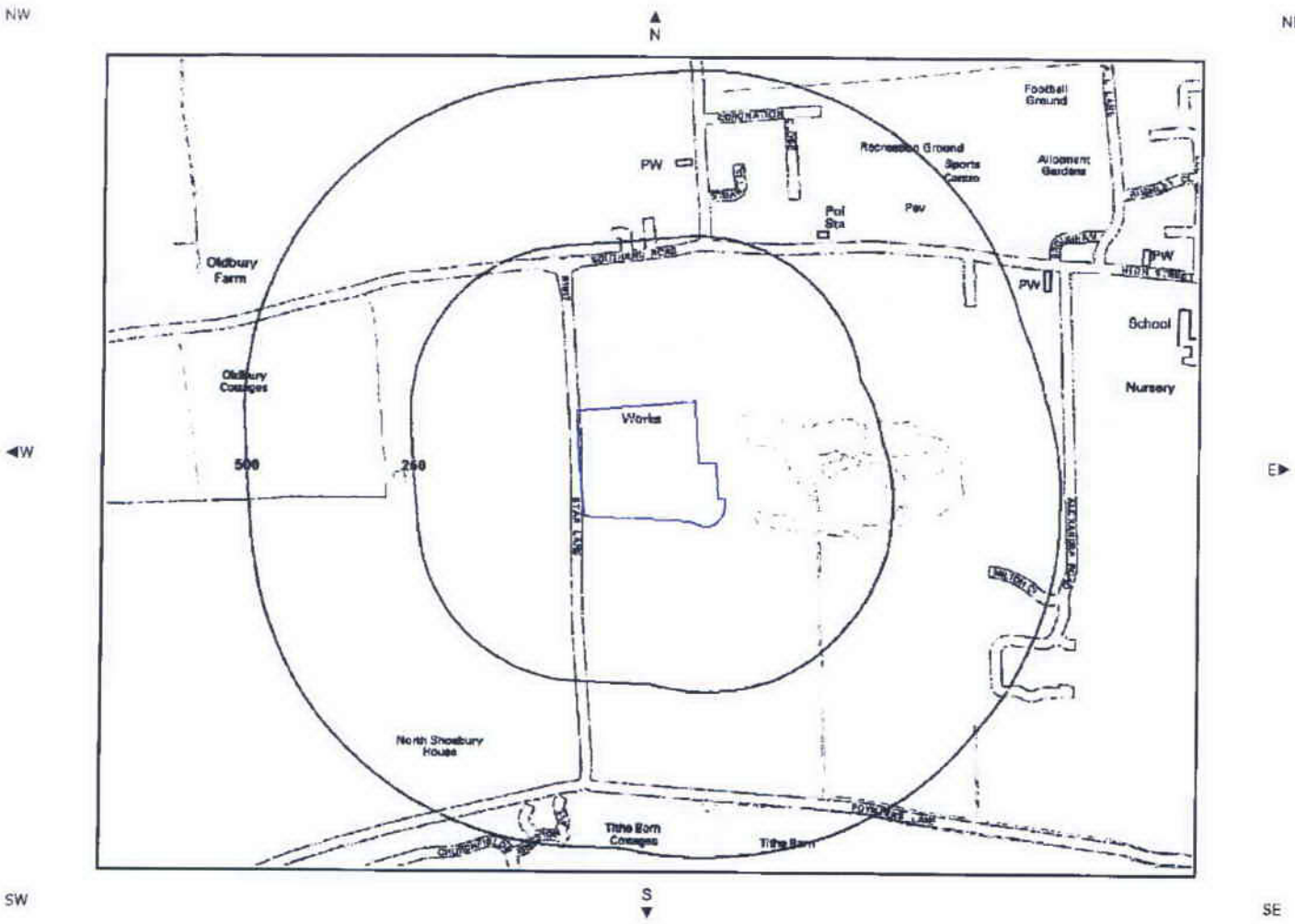
5.9 Surface Water Features

Are there any surface water features within 250m of the study site? **Yes**

The following surface water records are not represented on mapping:

Distance to Surface Water (m)	on-site	0-50	51-250
Surface water features within 250m of the study site	No	Yes	Yes

6. Environment Agency Flood Map



Environment Agency Flood Legend

Enabled by Ordnance Survey

- Site Outline
- 250 / 500 — Search Buffers (m)
- Zone 2 Floodplain
- Zone 3 Floodplain
- Flood Storage Area
- Area Benefiting from Flood Defences
- Flood Defences

6. Flooding

6.1 Zone 2 Flooding

Zone 2 floodplain estimates the annual probability of flooding as one in one thousand (0.1%) or greater from rivers and the sea but less than 1% from rivers or 0.5% from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 2 floodplain? **No**

Database searched and no data found.

6.2 Zone 3 Flooding

Zone 3 estimates the annual probability of flooding as one in one hundred (1%) or greater from rivers and a one in two hundred (0.5%) or greater from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 3 floodplain? **No**

Database searched and no data found.

6.3 Flood Defences

Are there any Flood Defences within 250m of the study site? **No**

6.4 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? **No**

6.5 Areas used for Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? **No**

6.6 Groundwater Flooding Susceptibility Areas

Are there any British Geological Survey groundwater flooding susceptibility flood areas within 50m of the boundary of the study site? **Yes**

What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions? **Very High**

6.7 Groundwater Flooding Confidence Areas

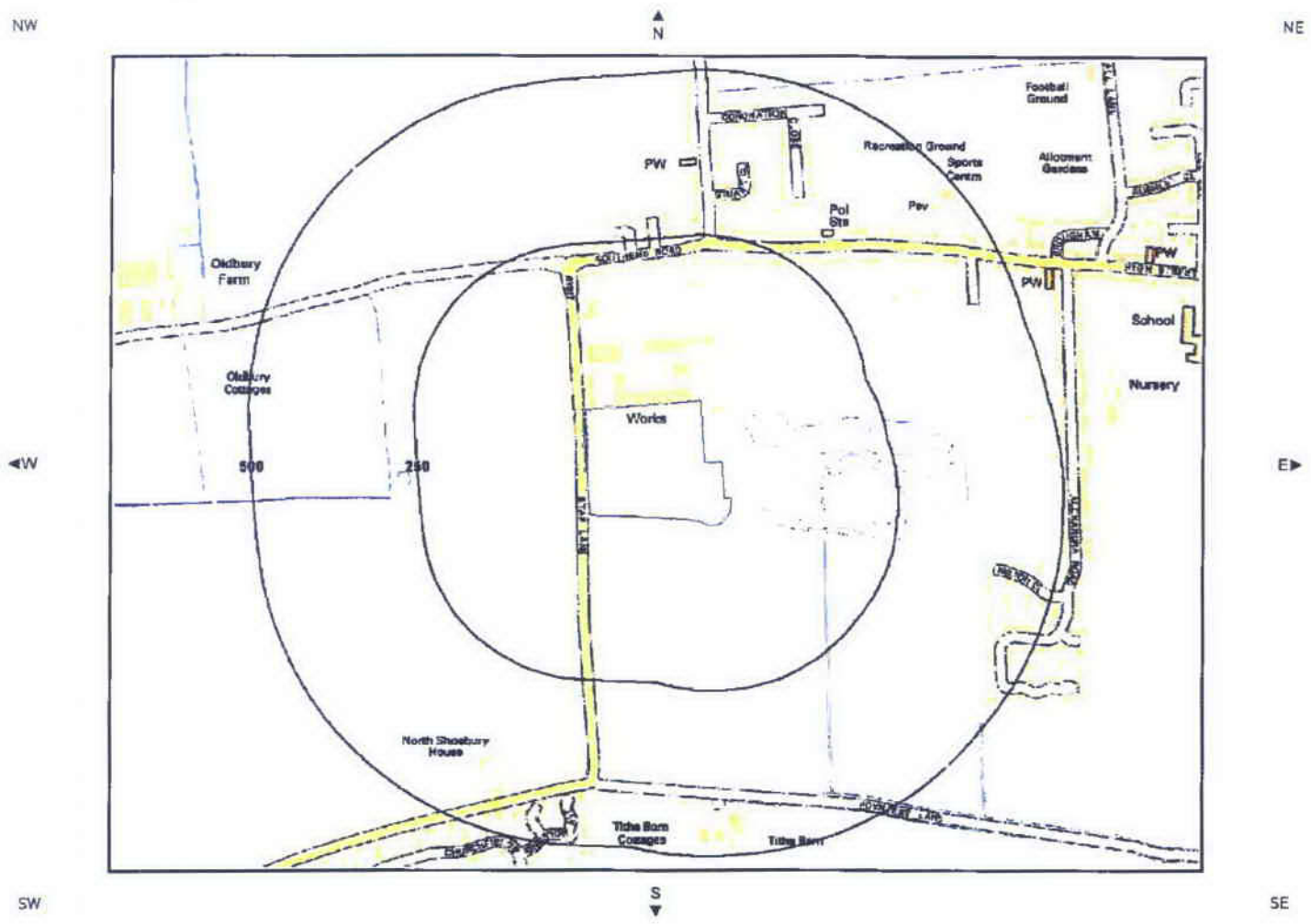
What is the British Geological Survey confidence rating in this result? **Moderate**

Notes:

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The **confidence rating** is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

7.Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Legend

- Site Outline
- Search Buffers (m)
- SAC
- SSSI
- NNR
- World Heritage Sites
- SPA
- Ramsar
- LNR
- Environmentally Sensitive Areas
- Areas of Outstanding Natural Beauty
- Nitrate Sensitive Areas
- National Parks

7.Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 500m of the study site? **No**

Records of Sites of Special Scientific Interest (SSSI) within 500m of the study site: **0**

Database searched and no data found.

Records of National Nature Reserves (NNR) within 500m of the study site: **0**

Database searched and no data found.

Records of Special Areas of Conservation (SAC) within 500m of the study site: **0**

Database searched and no data found.

Records of Special Protection Areas (SPA) within 500m of the study site: **0**

Database searched and no data found.

Records of Ramsar sites within 500m of the study site: **0**

Database searched and no data found.

Records of Local Nature Reserves (LNR) within 500m of the study site: **0**

Database searched and no data found.

Records of World Heritage Sites within 500m of the study site: **0**

Database searched and no data found.

Records of Environmentally Sensitive Areas within 500m of the study site: **0**

Database searched and no data found.

Records of Areas of Outstanding Natural Beauty (AONB) within 500m of the study site: **0**

Database searched and no data found.

Records of National Parks (NP) within 500m of the study site: **0**

Database searched and no data found.

Records of Nitrate Sensitive Areas within 500m of the study site: 0

Database searched and no data found.

Records of Nitrate Vulnerable Zones within 500m of the study site: 0

Database searched and no data found.

8. Natural Hazards Findings

8.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a GroundSure GeoInsight, available from our website. The following information has been found:

8.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? **Moderate**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

8.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

8.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? **Null - Negligible**

Soluble rocks are not present in the search area. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

8.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? **Negligible**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

8.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? **Moderate**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Potential for collapsible deposit problems after relatively small changes in loading or groundwater conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not increase loading on existing foundations without technical advice. For new build, assess the possibility of collapsible (loessic) deposits in ground investigation. If present do not exceed safe bearing capacity during or after construction and maintain site drainage, or carry out ground stabilisation. For existing property, possible increase in insurance risk from collapsible deposits may be present if the load on the ground is increased or saturated by leakage or localised flooding.

8.1.6Running Sand

What is the maximum Running Sand* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9.Mining

9.1 Coal Mining

Are there any coal mining areas within 75m of the study site? **No**

Database searched and no data found.

9.2 Shallow Mining

What is the subsidence hazard relating to shallow mining on-site*? **Negligible**

*Please note this data is searched with a 150m buffer.

9.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? **No**

Database searched and no data found.

10.Contacts

GroundSure Helpline
Telephone: 08444 159 000
info @ groundsure.com

British Geological Survey (England & Wales)
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143. Fax: 0115 936 3276. Email: enquiries@bgs.ac.uk
Web: www.bgs.ac.uk
BGS Geological Hazards Reports and general geological enquiries

Environment Agency
National Customer Contact Centre
PO Box 544
Rotherham
S60 1BY
Tel: 08708 506 506
Web: www.environment-agency.gov.uk
Email: enquiries@environment-agency.gov.uk

Health Protection Agency
Chilton, Didcot, Oxon, OX11 0RQ
Tel: 01235 822622 www.hpa.org.uk/radiation
Radon measures and general radon information and guidance

The Coal Authority
200 Lichfield Lane, Mansfield, Notts NG18 4RG
Tel: 0845 762 6848. DX 716176 Mansfield 5
www.coal-authority.co.uk
Coal mining reports and related enquiries

Ordnance Survey
Romsey Road
Southampton SO16 4GU
Tel: 08456 050505

Local Authority
Authority: Rochford District Council
Phone: 01702 546 366
Web: www.rochford.gov.uk
Address: Council Offices, South Street, Rochford, Essex, SS4 1BW

Get Mapping PLC
Virginia Villas, High Street, Hartley Witney, Hampshire RG27 8NW
Tel: 01252 845444

Acknowledgements
This product includes map data licensed from Landmark Information Group Limited®.

Report Reference: GS-173303

GroundSure RadonCheck

Address: STAR LANE, GREAT WAKERING, SOUTHEND-ON-SEA, SS3 0PJ

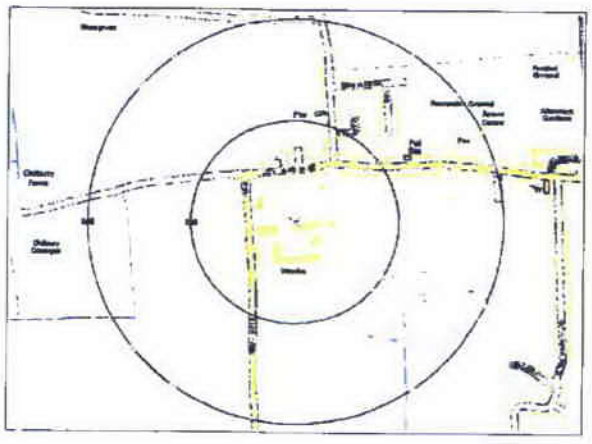
Date: Oct 11, 2011

GroundSure Reference: GS-173304

Your Reference: C12519

Grid Reference: 593451,187419

Client: Ground Engineering Limited



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1. Residential Radon Potential Result

1.1 Is the property in a Radon Affected Area?

The information in this section provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as CON29 standard Enquiry of Local Authority; 3.13 Radon Gas: Location of the Property in a Radon Affected Area.

Question: Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

Answer: The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

1.2 Are Radon Protective Measures required?

The information in this section will detail the level of protection required for new dwellings under as described in the latest Building Research Establishment guidance on radon protective measures for new dwellings. This may include extensions to the property.

Question: Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?

Answer: No Radon Protective Measures are necessary.

1.3 Combined Radon Guidance

Radon is a colourless, odourless radioactive gas which is present in all areas of the United Kingdom, usually at levels that pose a negligible risk to homebuyers. However, in some areas levels of radon are much higher than in others, and in these cases it can pose a health risk. The data supplied by the Health Protection Agency (HPA) and the British Geological Survey (BGS)is not able to determine exact Radon levels, as this information can only be obtained through site-specific, in-situ testing. As less than 1% of properties in the area may be radon affected, the HPA do not consider that further action is necessary.

The responses given on the level of Radon Protective Measures required are based on a joint radon potential dataset from the Health Protection Agency (HPA) and the British Geological Survey (BGS). No Radon Protective Measures are required for new builds or extensions.

1.4 Further details on Radon

Radon is a naturally occuring radioactive gas, which enters buildings from the ground. Outdoors, it is diluted to very low levels. However, in some cases the radon level indoors can build up to high concentrations. In such cases, it does pose a serious risk to health. Exposure to high concentrations increases the risk of lung

cancer. The Health Protection Agency recommends that radon levels should be reduced in homes where the annual average is at or above 200 becquerels per cubic metre (200 Bq m^{-3}). This is termed the Action Level. The Health Protection Agency defines Radon Affected Areas as those with 1% chance or more of a house having a radon concentration at or above the Action Level of 200 Bq m^{-3}.

The joint HPA-BGS digital Radon Potential Dataset used in this report provides the current definitive map of Radon Affected Areas in England and Wales.

Indoor radon levels can usually be substantially reduced at a cost comparable to many home improvements, such as replacing carpets. Details of methods of reducing radon levels are given on the Building Research Establishment Website. http://www.bre.co.uk/radon/index.html

2. Contact Details

GroundSure
ENVIRONMENTAL INSIGHT

GroundSure Helpline
Telephone: 08444 159 000
info @ groundsure.com

Local Authority - Rochford District Council. Address: Council Offices, South Street, Rochford, Essex, SS4 1BW. Web: www.rochford.gov.uk. Tel: 01702 546 366

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143. Fax: 0115 936 3276. Email: enquiries@bgs.ac.uk
Web: www.bgs.ac.uk
BGS Geological Hazards Reports and general geological enquiries

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Health Protection Agency
CRCE, RPD
Chilton, Didcot, Oxon, OX11 0RQ
Tel: 01235 822622 (www.hpa.org.uk/radiation)

Health Protection Agency

Ordnance Survey
Romsey Road, Southampton SO16 4GU
Tel: 08456 050505

Enabled by Ordnance Survey

CoPSO
29 Harley Street, London W1G 9QR
Tel: 020 7927 6836
(www.copso.org.uk)

COPSO

APPENDIX 4

MONITORING RESULTS

Groundwater/Gas Monitoring Record

GROUND ENGINEERING LIMITED

Site: Star Lane, Great Wakering

Report Ref: C12519

Date	Borehole No.	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (m bgl)	Depth to Groundwater (m bgl)	Comments
		Peak	Steady	Peak	Steady	Min.	Max.					
11/10/11	BH 1	<0.1	<0.1	<0.1	<0.1	20.8	20.9	<0.1	1015	7.00	3.78	
	BH 2A	<0.1	<0.1	0.5	0.5	18.7	18.7	0.4	1015	7.00	3.93	
	BH 3	<0.1	<0.1	1.9	1.8	17.6	17.6	<0.1	1015	7.00	3.82	

Notes: Equipment: GasLog GFM 430, 30m tape dipmeter

Groundwater/Gas Monitoring Record

GROUND ENGINEERING LIMITED

Site: **Star Lane, Great Wakering**

Report Ref: **C12519**

Date	Borehole No.	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (m bgl)	Depth to Groundwater (m bgl)	Comments
		Peak	Steady	Peak	Steady	Min.	Max.					
10/11/11	BH 1	<0.1	<0.1	0.7	0.7	19.1	19.1	<0.1	1023	7.00	4.03	
	BH 2A	<0.1	<0.1	0.6	0.5	18.7	18.7	<0.1	1023	7.00	3.83	
	BH 3	<0.1	<0.1	5.1	5.1	14.1	14.1	<0.1	1023	7.00	3.85	

Notes: Equipment: GasLog GFM 430 – Serial No. 10075, 30m tape dipmeter

Groundwater/Gas Monitoring Record

GROUND ENGINEERING LIMITED

Site: **Star Lane, Great Wakering**

Report Ref: **C12519**

Date	Borehole No.	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Flow Rate (l/hr)	Atmosph. Pressure (mb)	Depth of Well (m bgl)	Depth to Groundwater (m bgl)	Comments
		Peak	Steady	Peak	Steady	Min.	Max.					
18/11/11	BH 1	<0.1	<0.1	0.4	0.4	20.1	20.1	<0.1	1023	7.00	3.85	
	BH 2A	<0.1	<0.1	0.6	0.6	19.7	19.7	<0.1	1022	7.00	4.05	
	BH 3	<0.1	<0.1	6.6	6.6	12.1	12.1	<0.1	1021	7.00	3.87	

Notes: Equipment: GasLog GFM 430 – Serial No. 10075, 30m tape dipmeter

APPENDIX 5 – CHEMICAL TEST RESULTS

Chemtest

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming
06 October 2011

Dear Steve Fleming

Test Report Number **119863**
Your Project Reference **C12519 - Star Lane, Great Wakering**

Please find enclosed the results of analysis for the samples received 30 September 2011.

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 the Customer Services team.

Yours sincerely

Authorised Signatory

- ☑ Darrell Hall — Director
- ☐ Phil Hellier — Director
- ☐ Keith Jones — Technical Manager
- ☐ John Crawford — Quality Manager
- ☐ Malcolm Avis — Director

UKAS TESTING
2183

ISO 14001
sira
UKAS ENVIRONMENTAL MANAGEMENT

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'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 21 samples received 30 September 2011

C12519 - Star Lane, Great Wakering

Chemtest
The right chemistry to deliver results

Report Date
06 October 2011

Login Batch No					119863							
Chemtest LIMS ID					AG53242	AG53243	AG53244	AG53245	AG53246	AG53247	AG53248	AG53249
Sample ID					TP1	TP1	TP2	TP3	TP4	TP5	TP6	TP14
Sample No					D2	D3	D1	D2	D2	D2	D1	D1
Sampling Date					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
Depth					0.6m	0.9m	0.2m	0.5m	0.5m	0.3m	0.3m	0.2m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*								
2010	pH			M	7.9	7.9	7.6	8.0	8.3	7.7	9.0	8.3
2186	Asbestos Containing Material			U	not found	not found	not found	not found	not found	not found	not found	not found
2300	Cyanide (free)	57125	mg kg^{-1}	M	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Cyanide (total)	57125	mg kg^{-1}	M	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2325	Sulfide	18496258	mg kg^{-1}	M	0.64	0.86	0.85	<0.50	<0.50	1.8	<0.50	1.0
2625	Organic matter		%	M	0.98	0.50	1.2	0.83	3.1	2.4	< 0.40	52
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M	1.7	1.7	1.6	0.5	0.8	4.6	0.4	2.4
	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.03	0.05	1.3	0.05	0.06	0.59	0.05	0.10
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2450	Arsenic	7440382	mg kg^{-1}	M	5.8	7.3	57	8.1	32	18	7.3	17
	Cadmium	7440439	mg kg^{-1}	M	<0.10	<0.10	0.38	0.25	0.23	0.19	0.14	0.19
	Chromium	7440473	mg kg^{-1}	M	18	22	32	12	16	17	18	18
	Copper	7440508	mg kg^{-1}	M	10	13	300	22	330	200	18	230
	Mercury	7439976	mg kg^{-1}	M	<0.10	<0.10	<0.10	<0.10	<0.10	0.56	<0.10	0.36
	Nickel	7440020	mg kg^{-1}	M	15	21	39	12	22	20	17	28
	Lead	7439921	mg kg^{-1}	M	15	13	680	77	690	380	29	900
	Selenium	7782492	mg kg^{-1}	M	<0.20	<0.20	<0.20	<0.20	<0.20	0.28	0.25	<0.20
	Zinc	7440666	mg kg^{-1}	M	35	42	230	86	300	170	48	250
2670	Total Petroleum Hydrocarbons		mg kg^{-1}	M	< 10			< 10		< 10		
2700	Naphthalene	91203	mg kg^{-1}	M	< 0.1	< 0.1	< 0.1	< 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	0.21	< 0.1	0.3
	Acenaphthene	83329	mg kg^{-1}	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.28	0.13	0.36
	Fluorene	86737	mg kg^{-1}	M	0.17	0.21	< 0.1	< 0.1	< 0.1	0.51	0.26	0.52
	Phenanthrene	85018	mg kg^{-1}	M	0.52	0.6	0.29	0.4	0.2	4.5	0.73	1.7
	Anthracene	120127	mg kg^{-1}	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.74	< 0.1	0.1
	Fluoranthene	206440	mg kg^{-1}	M	0.33	0.12	0.14	< 0.1	< 0.1	5.1	< 0.1	0.65
	Pyrene	129000	mg kg^{-1}	M	0.18	< 0.1	0.14	< 0.1	< 0.1	3.9	< 0.1	0.54

All tests undertaken between 03/10/2011 and 06/10/2011

* Accreditation status

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Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 21 samples received 30 September 2011

C12519 - Star Lane, Great Wakering

Report Date 06 October 2011

					119863							
					AG53242	AG53243	AG53244	AG53245	AG53246	AG53247	AG53248	AG53249
					TP1 D2 29/09/2011 0.6m SOIL	TP1 D3 29/09/2011 0.9m SOIL	TP2 D1 29/09/2011 0.2m SOIL	TP3 D2 29/09/2011 0.5m SOIL	TP4 D2 29/09/2011 0.5m SOIL	TP5 D2 29/09/2011 0.3m SOIL	TP6 D1 29/09/2011 0.3m SOIL	TP14 D1 29/09/2011 0.2m SOIL
2700	Benzo[a]anthracene	56553	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.4	< 0.1	0.11
	Chrysene	218019	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.8	< 0.1	0.11
	Benzo[b]fluoranthene	205992	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	3.1	< 0.1	0.26
	Benzo[k]fluoranthene	207089	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.3	< 0.1	< 0.1
	Benzo[a]pyrene	50328	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	2.4	< 0.1	0.24
	Dibenzo[a,h]anthracene	53703	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.4	< 0.1	0.12
	Benzo[g,h,i]perylene	191242	mg kg-1	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.3	< 0.1	0.11
	Total (of 16) PAHs		mg kg-1	M	< 2	< 2	< 2	< 2	< 2	30	< 2	5.1
2760	Methyl tert-butyl ether	1634044	µg kg-1	N								
	Dichlorodifluoromethane	75718	µg kg-1	U								
	Chloromethane	74873	µg kg-1	M								
	Vinyl chloride	75014	µg kg-1	M								
	Bromomethane	74839	µg kg-1	U								
	Chloroethane	75003	µg kg-1	U								
	Trichlorofluoromethane	75694	µg kg-1	U								
	1,1-Dichloroethene	75354	µg kg-1	U								
	Dichloromethane	75092	µg kg-1	N								
	trans-1,2-Dichloroethene	156605	µg kg-1	U								
	1,1-Dichloroethane	75343	µg kg-1	M								
	cis-1,2-Dichloroethene	156592	µg kg-1	M								
	Bromochloromethane	74975	µg kg-1	U								
	Trichloromethane	67663	µg kg-1	M								
	1,1,1-Trichloroethane	71556	µg kg-1	M								
	Tetrachloromethane	56235	µg kg-1	M								
	1,1-Dichloropropene	563586	µg kg-1	U								
	Benzene	71432	µg kg-1	M								
	1,2-Dichloroethane	107062	µg kg-1	U								

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Report Date
06 October 2011

119863

	AG53242	AG53243	AG53244	AG53245	AG53246	AG53247	AG53248	AG53249
	TP1	TP1	TP2	TP3	TP4	TP5	TP6	TP14
	D2	D3	D1	D2	D2	D2	D1	D1
	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
	0.6m	0.9m	0.2m	0.5m	0.5m	0.3m	0.3m	0.2m
	SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*

2760	Trichloroethene	79016	µg kg^{-1}	U
	1,2-Dichloropropane	78875	µg kg^{-1}	U
	Dibromomethane	74953	µg kg^{-1}	U
	Bromodichloromethane	75274	µg kg^{-1}	U
	cis-1,3-Dichloropropene	10061015	µg kg^{-1}	N
	Toluene	108883	µg kg^{-1}	M
	trans-1,3-Dichloropropene	10061026	µg kg^{-1}	N
	1,1,2-Trichloroethane	79005	µg kg^{-1}	U
	Tetrachloroethene	127184	µg kg^{-1}	M
	1,3-Dichloropropane	142289	µg kg^{-1}	U
	Dibromochloromethane	124481	µg kg^{-1}	U
	1,2-Dibromoethane	106934	µg kg^{-1}	U
	Chlorobenzene	108907	µg kg^{-1}	M
	1,1,1,2-Tetrachloroethane	630206	µg kg^{-1}	M
	Ethylbenzene	100414	µg kg^{-1}	M
	m- & p-Xylene	1330207	µg kg^{-1}	U
	o-Xylene	95476	µg kg^{-1}	U
	Styrene	100425	µg kg^{-1}	U
	Tribromomethane	75252	µg kg^{-1}	U
	Isopropylbenzene	98828	µg kg^{-1}	U
	Bromobenzene	108861	µg kg^{-1}	U
	1,2,3-Trichloropropane	96184	µg kg^{-1}	N
	n-Propylbenzene	103651	µg kg^{-1}	U
	2-Chlorotoluene	95498	µg kg^{-1}	M
	1,2,4-Trimethylbenzene	95636	µg kg^{-1}	U
	4-Chlorotoluene	106434	µg kg^{-1}	U
	tert-Butylbenzene	98066	µg kg^{-1}	U
	1,3,5-Trimethylbenzene	108678	µg kg^{-1}	U

All tests undertaken between 03/10/2011 and 06/10/2011

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Newark Road
Peterborough

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LABORATORY TEST REPORT

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119863

			AG53242	AG53243	AG53244	AG53245	AG53246	AG53247	AG53248	AG53249
			TP1	TP1	TP2	TP3	TP4	TP5	TP6	TP14
			D2	D3	D1	D2	D2	D2	D1	D1
			29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
			0.6m	0.9m	0.2m	0.5m	0.5m	0.3m	0.3m	0.2m
			SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	sec-Butylbenzene	135988	µg kg-1	U						
	1,3-Dichlorobenzene	541731	µg kg-1	U						
	4-Isopropyltoluene	99876	µg kg-1	U						
	1,4-Dichlorobenzene	106467	µg kg-1	U						
	n-Butylbenzene	104518	µg kg-1	U						
	1,2-Dichlorobenzene	95501	µg kg-1	U						
	1,2-Dibromo-3-chloropropane	96128	µg kg-1	U						
	1,2,4-Trichlorobenzene	120821	µg kg-1	U						
	Hexachlorobutadiene	87683	µg kg-1	U						
	1,2,3-Trichlorobenzene	87616	µg kg-1	U						
2790	Acenaphthene	83329	mg kg-1	N						
	Acenaphthylene	208968	mg kg-1	N						
	Azobenzene	103333	mg kg-1	N						
	Benzo[a]anthracene	56553	mg kg-1	N						
	Benzo[a]pyrene	50328	mg kg-1	N						
	Benzo[b]fluoranthene	205992	mg kg-1	N						
	Benzo[g,h,i]perylene	191242	mg kg-1	N						
	Benzo[k]fluoranthene	207089	mg kg-1	N						
	bis(2-Chloroethoxy)methane	111911	mg kg-1	N						
	bis(2-Chloroethyl)ether	111444	mg kg-1	N						
	bis(2-Chloroisopropyl)ether	108601	mg kg-1	N						
	bis(2-Ethylhexyl)phthalate	117817	mg kg-1	N						
	Butylbenzylphthalate	85687	mg kg-1	N						
	Chrysene	218019	mg kg-1	N						
	Di-n-butylphthalate	84742	mg kg-1	N						
	Di-n-octylphthalate	117840	mg kg-1	N						
	Dibenzo[a,h]anthracene	53703	mg kg-1	N						
	Dibenzofuran	132649	mg kg-1	N						

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PE1 5UA

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				119863				
		AG53242	AG53243	AG53244	AG53245	AG53246	AG53247	AG53248	AG53249
		TP1	TP1	TP2	TP3	TP4	TP5	TP6	TP14
		D2	D3	D1	D2	D2	D2	D1	D1
		29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
		0.6m	0.9m	0.2m	0.5m	0.5m	0.3m	0.3m	0.2m
		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2790	Diethylphthalate	84662	mg kg-1	N					
	Dimethylphthalate	131113	mg kg-1	N					
	Fluoranthene	206440	mg kg-1	N					
	Fluorene	86737	mg kg-1	N					
	Hexachlorobenzene	118741	mg kg-1	N					
	Hexachlorobutadiene	87683	mg kg-1	N					
	Hexachlorocyclopentadiene	77474	mg kg-1	N					
	Hexachloroethane	67721	mg kg-1	N					
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	N					
	Isophorone	78591	mg kg-1	N					
	N-Nitrosodi-n-propylamine	621647	mg kg-1	N					
	N-Nitrosodimethylamine	62759	mg kg-1	N					
	Naphthalene	91203	mg kg-1	N					
	Nitrobenzene	98953	mg kg-1	N					
	Pentachlorophenol	87865	mg kg-1	N					
	Phenanthrene	85018	mg kg-1	N					
	Phenol	108952	mg kg-1	N					
	Pyrene	129000	mg kg-1	N					
	1,2-Dichlorobenzene	95501	mg kg-1	N					
	1,2,4-Trichlorobenzene	120821	mg kg-1	N					
	1,3-Dichlorobenzene	541731	mg kg-1	N					
	1,4-Dichlorobenzene	106467	mg kg-1	N					
	2-Chloronaphthalene	91587	mg kg-1	N					
	2-Chlorophenol	95578	mg kg-1	N					
	2-Methyl-4,6-dinitrophenol	534521	mg kg-1	N					
	2-Methylnaphthalene	91576	mg kg-1	N					
	2-Nitroaniline	88744	mg kg-1	N					
	2-Nitrophenol	88755	mg kg-1	N					

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					119863							
					AG53242	AG53243	AG53244	AG53245	AG53246	AG53247	AG53248	AG53249
					TP1	TP1	TP2	TP3	TP4	TP5	TP6	TP14
					D2	D3	D1	D2	D2	D2	D1	D1
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.6m	0.9m	0.2m	0.5m	0.5m	0.3m	0.3m	0.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	2,4-Dimethylphenol	105679	mg kg-1	N								
	2,4-Dinitrotoluene	121142	mg kg-1	N								
	2,4,5-Trichlorophenol	95954	mg kg-1	N								
	2,4,6-Trichlorophenol	88062	mg kg-1	N								
	2,6-Dinitrotoluene	606202	mg kg-1	N								
	3-Nitroaniline	99092	mg kg-1	N								
	4-Bromophenylphenylether	101553	mg kg-1	N								
	4-Chloro-3-methylphenol	59507	mg kg-1	N								
	4-Chloroaniline	106478	mg kg-1	N								
	4-Chlorophenylphenylether	7005724	mg kg-1	N								
	4-Nitroaniline	100016	mg kg-1	N								
2920	Phenols (total)		mg kg-1	N	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

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Login Batch No					119863							
Chemtest LIMS ID					AG53250	AG53251	AG53252	AG53253	AG53254	AG53255	AG53256	AG53257
Sample ID					TP8	TP9	TP9	TP10	TP10	TP11	TP12	TP13
Sample No					D2	B1	D2	D1	D2	D1	D1	D2
Sampling Date					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
Depth					0.3m	0.5m - 0.6m	2m	0.3m	0.6m	0.3m	0.3m	0.6m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓									
2010	pH			M	8.0			10.1		8.0	7.9	8.2
2186	Asbestos Containing Material			U	not found	not found	not found	not found		not found	not found	not found
2300	Cyanide (free)	57125	mg kg^{-1}	M	<0.50			<0.50		<0.50	<0.50	<0.50
	Cyanide (total)	57125	mg kg^{-1}	M	<0.50			<0.50		<0.50	<0.50	<0.50
2325	Sulfide	18496258	mg kg^{-1}	M	0.66			0.69		0.56	0.52	0.57
2625	Organic matter		%	M	4.5			1.3		1.3	3.3	1.5
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M	0.8			1.4		1.8	2.4	0.7
	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	1.0			0.59		0.24	0.06	0.02
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N	<0.5			0.8		<0.5	<0.5	<0.5
2450	Arsenic	7440382	mg kg^{-1}	M	73			12		7.2	9.7	7.5
	Cadmium	7440439	mg kg^{-1}	M	<0.10			0.21		<0.10	0.23	0.13
	Chromium	7440473	mg kg^{-1}	M	25			17		20	13	5.0
	Copper	7440508	mg kg^{-1}	M	4300			100		16	39	21
	Mercury	7439976	mg kg^{-1}	M	0.29			<0.10		<0.10	0.66	0.12
	Nickel	7440020	mg kg^{-1}	M	98			18		18	13	<5.0
	Lead	7439921	mg kg^{-1}	M	1200			63		16	110	36
	Selenium	7782492	mg kg^{-1}	M	0.56			<0.20		0.22	0.24	<0.20
	Zinc	7440666	mg kg^{-1}	M	1000			95		44	140	51
2670	Total Petroleum Hydrocarbons		mg kg^{-1}	M	< 10			< 10	< 10	< 10	< 10	
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			0.36		< 0.1	0.29	< 0.1
	Acenaphthene	83329	mg kg^{-1}	M	< 0.1			0.12		< 0.1	0.22	< 0.1
	Fluorene	86737	mg kg^{-1}	M	< 0.1			0.13		0.2	0.27	0.11
	Phenanthrene	85018	mg kg^{-1}	M	0.14			0.56		0.56	2.1	0.39
	Anthracene	120127	mg kg^{-1}	M	< 0.1			< 0.1		< 0.1	0.29	< 0.1
	Fluoranthene	206440	mg kg^{-1}	M	< 0.1			0.64		0.13	3.7	0.17
	Pyrene	129000	mg kg^{-1}	M	< 0.1			0.92		< 0.1	3	0.11

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Ground Engineering Limited
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PE1 5UA

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LABORATORY TEST REPORT

Results of analysis of 21 samples received 30 September 2011

C12519 - Star Lane, Great Wakering

Chemtest
The right chemistry to deliver results

Report Date
06 October 2011

					119863							
					AG53250	AG53251	AG53252	AG53253	AG53254	AG53255	AG53256	AG53257
					TP8	TP9	TP9	TP10	TP10	TP11	TP12	TP13
					D2	B1	D2	D1	D2	D1	D1	D2
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.3m	0.5m - 0.6m	2m	0.3m	0.6m	0.3m	0.3m	0.6m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2700	Benzo[a]anthracene	56553	mg kg-1	M	< 0.1			0.21		< 0.1	1.5	< 0.1
	Chrysene	218019	mg kg-1	M	< 0.1			< 0.1		< 0.1	2	< 0.1
	Benzo[b]fluoranthene	205992	mg kg-1	M	< 0.1			0.56		< 0.1	2.6	< 0.1
	Benzo[k]fluoranthene	207089	mg kg-1	M	< 0.1			0.14		< 0.1	1.1	< 0.1
	Benzo[a]pyrene	50328	mg kg-1	M	< 0.1			0.24		< 0.1	2.3	< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg-1	M	< 0.1			< 0.1		< 0.1	0.18	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	M	< 0.1			0.28		< 0.1	1.4	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg-1	M	< 0.1			0.24		< 0.1	1.5	< 0.1
	Total (of 16) PAHs		mg kg-1	M	< 2			4.4		< 2	22	< 2
2760	Methyl tert-butyl ether	1634044	µg kg-1	N				< 1	< 1			
	Dichlorodifluoromethane	75718	µg kg-1	U				< 1.0	< 1.0			
	Chloromethane	74873	µg kg-1	M				< 1.0	< 1.0			
	Vinyl chloride	75014	µg kg-1	M				< 1.0	< 1.0			
	Bromomethane	74839	µg kg-1	U				< 20	< 20			
	Chloroethane	75003	µg kg-1	U				< 2.0	< 2.0			
	Trichlorofluoromethane	75694	µg kg-1	U				< 1.0	< 1.0			
	1,1-Dichloroethene	75354	µg kg-1	U				< 1.0	< 1.0			
	Dichloromethane	75092	µg kg-1	N				ne	ne			
	trans-1,2-Dichloroethene	156605	µg kg-1	U				< 1.0	< 1.0			
	1,1-Dichloroethane	75343	µg kg-1	M				< 1.0	< 1.0			
	cis-1,2-Dichloroethene	156592	µg kg-1	M				< 1.0	< 1.0			
	Bromochloromethane	74975	µg kg-1	U				< 1.0	< 1.0			
	Trichloromethane	67663	µg kg-1	M				< 1.0	< 1.0			
	1,1,1-Trichloroethane	71556	µg kg-1	M				< 1.0	< 1.0			
	Tetrachloromethane	56235	µg kg-1	M				< 1.0	< 1.0			
	1,1-Dichloropropene	563586	µg kg-1	U				< 1.0	< 1.0			
	Benzene	71432	µg kg-1	M				< 1.0	< 1.0			
	1,2-Dichloroethane	107062	µg kg-1	U				< 2.0	< 2.0			

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LABORATORY TEST REPORT

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Report Date
06 October 2011

119863

					AG53250	AG53251	AG53252	AG53253	AG53254	AG53255	AG53256	AG53257
					TP8	TP9	TP9	TP10	TP10	TP11	TP12	TP13
					D2	B1	D2	D1	D2	D1	D1	D2
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.3m	0.5m - 0.6m	2m	0.3m	0.6m	0.3m	0.3m	0.6m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	Trichloroethene	79016	µg kg⁻¹	U				< 1.0	< 1.0			
	1,2-Dichloropropane	78875	µg kg⁻¹	U				< 1.0	< 1.0			
	Dibromomethane	74953	µg kg⁻¹	U				< 10	< 10			
	Bromodichloromethane	75274	µg kg⁻¹	U				< 5.0	< 5.0			
	cis-1,3-Dichloropropene	10061015	µg kg⁻¹	N				< 10	< 10			
	Toluene	108883	µg kg⁻¹	M				< 1.0	< 1.0			
	trans-1,3-Dichloropropene	10061026	µg kg⁻¹	N				< 10	< 10			
	1,1,2-Trichloroethane	79005	µg kg⁻¹	U				< 10	< 10			
	Tetrachloroethene	127184	µg kg⁻¹	M				< 1.0	< 1.0			
	1,3-Dichloropropane	142289	µg kg⁻¹	U				< 2.0	< 2.0			
	Dibromochloromethane	124481	µg kg⁻¹	U				< 10	< 10			
	1,2-Dibromoethane	106934	µg kg⁻¹	U				< 5.0	< 5.0			
	Chlorobenzene	108907	µg kg⁻¹	M				< 1.0	< 1.0			
	1,1,1,2-Tetrachloroethane	630206	µg kg⁻¹	M				< 2.0	< 2.0			
	Ethylbenzene	100414	µg kg⁻¹	M				< 1.0	< 1.0			
	m- & p-Xylene	1330207	µg kg⁻¹	U				< 1.0	< 1.0			
	o-Xylene	95476	µg kg⁻¹	U				< 1.0	< 1.0			
	Styrene	100425	µg kg⁻¹	U				< 1.0	< 1.0			
	Tribromomethane	75252	µg kg⁻¹	U				< 10	< 10			
	Isopropylbenzene	98828	µg kg⁻¹	U				< 1.0	< 1.0			
	Bromobenzene	108861	µg kg⁻¹	U				< 1.0	< 1.0			
	1,2,3-Trichloropropane	96184	µg kg⁻¹	N				< 50	< 50			
	n-Propylbenzene	103651	µg kg⁻¹	U				< 1.0	< 1.0			
	2-Chlorotoluene	95498	µg kg⁻¹	M				< 1.0	< 1.0			
	1,2,4-Trimethylbenzene	95636	µg kg⁻¹	U				< 1.0	< 1.0			
	4-Chlorotoluene	106434	µg kg⁻¹	U				< 1.0	< 1.0			
	tert-Butylbenzene	98066	µg kg⁻¹	U				< 1.0	< 1.0			
	1,3,5-Trimethylbenzene	108678	µg kg⁻¹	U				< 1.0	< 1.0			

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					TP8	TP9	TP9	TP10	TP10	TP11	TP12	TP13
					D2	B1	D2	D1	D2	D1	D1	D2
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.3m	0.5m - 0.6m	2m	0.3m	0.6m	0.3m	0.3m	0.6m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	sec-Butylbenzene	135988	µg kg-1	U				< 1.0	< 1.0			
	1,3-Dichlorobenzene	541731	µg kg-1	U				< 1.0	< 1.0			
	4-Isopropyltoluene	99876	µg kg-1	U				< 1.0	< 1.0			
	1,4-Dichlorobenzene	106467	µg kg-1	U				< 1.0	< 1.0			
	n-Butylbenzene	104518	µg kg-1	U				< 1.0	< 1.0			
	1,2-Dichlorobenzene	95501	µg kg-1	U				< 1.0	< 1.0			
	1,2-Dibromo-3-chloropropane	96128	µg kg-1	U				< 50	< 50			
	1,2,4-Trichlorobenzene	120821	µg kg-1	U				< 1.0	< 1.0			
	Hexachlorobutadiene	87683	µg kg-1	U				< 1.0	< 1.0			
	1,2,3-Trichlorobenzene	87616	µg kg-1	U				< 2.0	< 2.0			
2790	Acenaphthene	83329	mg kg-1	N				<0.50	<0.50			
	Acenaphthylene	208968	mg kg-1	N				<0.50	<0.50			
	Azobenzene	103333	mg kg-1	N				<0.50	<0.50			
	Benzo[a]anthracene	56553	mg kg-1	N				<0.50	<0.50			
	Benzo[a]pyrene	50328	mg kg-1	N				<0.50	<0.50			
	Benzo[b]fluoranthene	205992	mg kg-1	N				<0.50	<0.50			
	Benzo[g,h,i]perylene	191242	mg kg-1	N				<0.50	<0.50			
	Benzo[k]fluoranthene	207089	mg kg-1	N				<0.50	<0.50			
	bis(2-Chloroethoxy)methane	111911	mg kg-1	N				<0.50	<0.50			
	bis(2-Chloroethyl)ether	111444	mg kg-1	N				<0.50	<0.50			
	bis(2-Chloroisopropyl)ether	108601	mg kg-1	N				<0.50	<0.50			
	bis(2-Ethylhexyl)phthalate	117817	mg kg-1	N				<0.50	<0.50			
	Butylbenzylphthalate	85687	mg kg-1	N				<0.50	<0.50			
	Chrysene	218019	mg kg-1	N				<0.50	<0.50			
	Di-n-butylphthalate	84742	mg kg-1	N				<0.50	<0.50			
	Di-n-octylphthalate	117840	mg kg-1	N				<0.50	<0.50			
	Dibenzo[a,h]anthracene	53703	mg kg-1	N				<0.50	<0.50			
	Dibenzofuran	132649	mg kg-1	N				<0.50	<0.50			

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					TP8	TP9	TP9	TP10	TP10	TP11	TP12	TP13
					D2	B1	D2	D1	D2	D1	D1	D2
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.3m	0.5m - 0.6m	2m	0.3m	0.6m	0.3m	0.3m	0.6m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	Diethylphthalate	84662	mg kg-1	N				<0.50	<0.50			
	Dimethylphthalate	131113	mg kg-1	N				<0.50	<0.50			
	Fluoranthene	206440	mg kg-1	N				<0.50	<0.50			
	Fluorene	86737	mg kg-1	N				<0.50	<0.50			
	Hexachlorobenzene	118741	mg kg-1	N				<0.50	<0.50			
	Hexachlorobutadiene	87683	mg kg-1	N				<0.50	<0.50			
	Hexachlorocyclopentadiene	77474	mg kg-1	N				<0.50	<0.50			
	Hexachloroethane	67721	mg kg-1	N				<0.50	<0.50			
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	N				<0.50	<0.50			
	Isophorone	78591	mg kg-1	N				<0.50	<0.50			
	N-Nitrosodi-n-propylamine	621647	mg kg-1	N				<0.50	<0.50			
	N-Nitrosodimethylamine	62759	mg kg-1	N				<0.50	<0.50			
	Naphthalene	91203	mg kg-1	N				<0.50	<0.50			
	Nitrobenzene	98953	mg kg-1	N				<0.50	<0.50			
	Pentachlorophenol	87865	mg kg-1	N				<0.50	<0.50			
	Phenanthrene	85018	mg kg-1	N				<0.50	<0.50			
	Phenol	108952	mg kg-1	N				<0.50	<0.50			
	Pyrene	129000	mg kg-1	N				<0.50	<0.50			
	1,2-Dichlorobenzene	95501	mg kg-1	N				<0.50	<0.50			
	1,2,4-Trichlorobenzene	120821	mg kg-1	N				<0.50	<0.50			
	1,3-Dichlorobenzene	541731	mg kg-1	N				<0.50	<0.50			
	1,4-Dichlorobenzene	106467	mg kg-1	N				<0.50	<0.50			
	2-Chloronaphthalene	91587	mg kg-1	N				<0.50	<0.50			
	2-Chlorophenol	95578	mg kg-1	N				<0.50	<0.50			
	2-Methyl-4,6-dinitrophenol	534521	mg kg-1	N				<0.50	<0.50			
	2-Methylnaphthalene	91576	mg kg-1	N				<0.50	<0.50			
	2-Nitroaniline	88744	mg kg-1	N				<0.50	<0.50			
	2-Nitrophenol	88755	mg kg-1	N				<0.50	<0.50			

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					TP8	TP9	TP9	TP10	TP10	TP11	TP12	TP13
					D2	B1	D2	D1	D2	D1	D1	D2
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.3m	0.5m - 0.6m	2m	0.3m	0.6m	0.3m	0.3m	0.6m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	2,4-Dimethylphenol	105679	mg kg^{-1}	N				<0.50	<0.50			
	2,4-Dinitrotoluene	121142	mg kg^{-1}	N				<0.50	<0.50			
	2,4,5-Trichlorophenol	95954	mg kg^{-1}	N				<0.50	<0.50			
	2,4,6-Trichlorophenol	88062	mg kg^{-1}	N				<0.50	<0.50			
	2,6-Dinitrotoluene	606202	mg kg^{-1}	N				<0.50	<0.50			
	3-Nitroaniline	99092	mg kg^{-1}	N				<0.50	<0.50			
	4-Bromophenylphenylether	101553	mg kg^{-1}	N				<0.50	<0.50			
	4-Chloro-3-methylphenol	59507	mg kg^{-1}	N				<0.50	<0.50			
	4-Chloroaniline	106478	mg kg^{-1}	N				<0.50	<0.50			
	4-Chlorophenylphenylether	7005724	mg kg^{-1}	N				<0.50	<0.50			
	4-Nitroaniline	100016	mg kg^{-1}	N				<0.50	<0.50			
2920	Phenols (total)		mg kg^{-1}	N	<0.3			<0.3		<0.3	<0.3	<0.3

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Login Batch No					119863				
[illegible] LIMS ID					AG53258	AG53259	AG53260	AG53261	AG53262
Sample ID					TP15	TP15	TP16	TP17	TP18
Sample No					D1	D3	D2	B1	B1
Sampling Date					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
Depth					0.3m	0.9m	0.6m	0.4m - 0.5m	0.5m - 0.6m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓						
2010	pH			M	8.3	8.4	8.1		8.7
2186	Asbestos Containing Material			U	not found	not found	not found	not found	not found
2300	Cyanide (free)	57125	mg kg^{-1}	M	<0.50	<0.50	<0.50		<0.50
	Cyanide (total)	57125	mg kg^{-1}	M	<0.50	<0.50	<0.50		<0.50
2325	Sulfide	18496258	mg kg^{-1}	M	0.56	0.66	<0.50		<0.50
2625	Organic matter		%	M	2.1	0.53	1.9		< 0.40
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M	1.1	<0.4	4.2		2.2
	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.01	0.08	0.23		0.05
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N	<0.5	<0.5	<0.5		<0.5
2450	Arsenic	7440382	mg kg^{-1}	M	6.5	2.6	7.3		4.7
	Cadmium	7440439	mg kg^{-1}	M	0.26	<0.10	0.36		<0.10
	Chromium	7440473	mg kg^{-1}	M	14	15	12		7.1
	Copper	7440508	mg kg^{-1}	M	17	7.8	54		<5.0
	Mercury	7439976	mg kg^{-1}	M	<0.10	<0.10	0.23		<0.10
	Nickel	7440020	mg kg^{-1}	M	15	17	12		5.7
	Lead	7439921	mg kg^{-1}	M	33	7.0	600		5.4
	Selenium	7782492	mg kg^{-1}	M	<0.20	<0.20	<0.20		<0.20
	Zinc	7440666	mg kg^{-1}	M	53	36	130		20
2670	Total Petroleum Hydrocarbons		mg kg^{-1}	M		< 10	3900		
2700	Naphthalene	91203	mg kg^{-1}	M	< 0.1	< 0.1	< 0.1		< 0.1
	Acenaphthylene	208968	mg kg^{-1}	M	0.19	< 0.1	0.22		< 0.1
	Acenaphthene	83329	mg kg^{-1}	M	0.2	< 0.1	< 0.1		< 0.1
	Fluorene	86737	mg kg^{-1}	M	0.35	0.12	0.13		< 0.1
	Phenanthrene	85018	mg kg^{-1}	M	1.7	0.28	1.2		< 0.1
	Anthracene	120127	mg kg^{-1}	M	0.35	< 0.1	< 0.1		< 0.1
	Fluoranthene	206440	mg kg^{-1}	M	1.7	< 0.1	2.1		< 0.1
	Pyrene	129000	mg kg^{-1}	M	1.6	< 0.1	1.8		< 0.1

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					119863				
					AG53258	AG53259	AG53260	AG53261	AG53262
					TP15 D1 29/09/2011 0.3m *SOIL*	TP15 D3 29/09/2011 0.9m *SOIL*	TP16 D2 29/09/2011 0.6m *SOIL*	TP17 B1 29/09/2011 0.4m - 0.5m *SOIL*	TP18 B1 29/09/2011 0.5m - 0.6m *SOIL*
2700	Benzo[a]anthracene	56553	mg kg-1	M	1	< 0.1	0.83		< 0.1
	Chrysene	218019	mg kg-1	M	1.1	< 0.1	1.1		< 0.1
	Benzo[b]fluoranthene	205992	mg kg-1	M	0.61	< 0.1	1.5		< 0.1
	Benzo[k]fluoranthene	207089	mg kg-1	M	0.39	< 0.1	0.53		< 0.1
	Benzo[a]pyrene	50328	mg kg-1	M	0.6	< 0.1	1.2		< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg-1	M	0.16	< 0.1	< 0.1		< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	M	0.54	< 0.1	0.73		< 0.1
	Benzo[g,h,i]perylene	191242	mg kg-1	M	0.71	< 0.1	0.77		< 0.1
	Total (of 16) PAHs		mg kg-1	M	11	< 2	12		< 2
2760	Methyl tert-butyl ether	1634044	µg kg-1	N					
	Dichlorodifluoromethane	75718	µg kg-1	U					
	Chloromethane	74873	µg kg-1	M					
	Vinyl chloride	75014	µg kg-1	M					
	Bromomethane	74839	µg kg-1	U					
	Chloroethane	75003	µg kg-1	U					
	Trichlorofluoromethane	75694	µg kg-1	U					
	1,1-Dichloroethene	75354	µg kg-1	U					
	Dichloromethane	75092	µg kg-1	N					
	trans-1,2-Dichloroethene	156605	µg kg-1	U					
	1,1-Dichloroethane	75343	µg kg-1	M					
	cis-1,2-Dichloroethene	156592	µg kg-1	M					
	Bromochloromethane	74975	µg kg-1	U					
	Trichloromethane	67663	µg kg-1	M					
	1,1,1-Trichloroethane	71556	µg kg-1	M					
	Tetrachloromethane	56235	µg kg-1	M					
	1,1-Dichloropropene	563586	µg kg-1	U					
	Benzene	71432	µg kg-1	M					
	1,2-Dichloroethane	107062	µg kg-1	U					

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 21 samples received 30 September 2011

C12519 - Star Lane, Great Wakering

Chemtest
The right chemistry to deliver results

Report Date
06 October 2011

119863

			AG53258	AG53259	AG53260	AG53261	AG53262
			TP15	TP15	TP16	TP17	TP18
			D1	D3	D2	B1	B1
			29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
			0.3m	0.9m	0.6m	0.4m - 0.5m	0.5m - 0.6m
			SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	Trichloroethene	79016	µg kg-¹	U			
	1,2-Dichloropropane	78875	µg kg-¹	U			
	Dibromomethane	74953	µg kg-¹	U			
	Bromodichloromethane	75274	µg kg-¹	U			
	cis-1,3-Dichloropropene	10061015	µg kg-¹	N			
	Toluene	108883	µg kg-¹	M			
	trans-1,3-Dichloropropene	10061026	µg kg-¹	N			
	1,1,2-Trichloroethane	79005	µg kg-¹	U			
	Tetrachloroethene	127184	µg kg-¹	M			
	1,3-Dichloropropane	142289	µg kg-¹	U			
	Dibromochloromethane	124481	µg kg-¹	U			
	1,2-Dibromoethane	106934	µg kg-¹	U			
	Chlorobenzene	108907	µg kg-¹	M			
	1,1,1,2-Tetrachloroethane	630206	µg kg-¹	M			
	Ethylbenzene	100414	µg kg-¹	M			
	m- & p-Xylene	1330207	µg kg-¹	U			
	o-Xylene	95476	µg kg-¹	U			
	Styrene	100425	µg kg-¹	U			
	Tribromomethane	75252	µg kg-¹	U			
	Isopropylbenzene	98828	µg kg-¹	U			
	Bromobenzene	108861	µg kg-¹	U			
	1,2,3-Trichloropropane	96184	µg kg-¹	N			
	n-Propylbenzene	103651	µg kg-¹	U			
	2-Chlorotoluene	95498	µg kg-¹	M			
	1,2,4-Trimethylbenzene	95636	µg kg-¹	U			
	4-Chlorotoluene	106434	µg kg-¹	U			
	tert-Butylbenzene	98066	µg kg-¹	U			
	1,3,5-Trimethylbenzene	108678	µg kg-¹	U			

* Accreditation status

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Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 21 samples
received 30 September 2011

C12519 - Star Lane, Great Wakering

Chemtest
The right chemistry to deliver results

Report Date
06 October 2011

				119863					
				AG53258	AG53259	AG53260	AG53261	AG53262	
				TP15	TP15	TP16	TP17	TP18	
				D1	D3	D2	B1	B1	
				29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011	
				0.3m	0.9m	0.6m	0.4m - 0.5m	0.5m - 0.6m	
				SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	
2760	sec-Butylbenzene	135988	µg kg-1	U					
	1,3-Dichlorobenzene	541731	µg kg-1	U					
	4-Isopropyltoluene	99876	µg kg-1	U					
	1,4-Dichlorobenzene	106467	µg kg-1	U					
	n-Butylbenzene	104518	µg kg-1	U					
	1,2-Dichlorobenzene	95501	µg kg-1	U					
	1,2-Dibromo-3-chloropropane	96128	µg kg-1	U					
	1,2,4-Trichlorobenzene	120821	µg kg-1	U					
	Hexachlorobutadiene	87683	µg kg-1	U					
	1,2,3-Trichlorobenzene	87616	µg kg-1	U					
2790	Acenaphthene	83329	mg kg-1	N					
	Acenaphthylene	208968	mg kg-1	N					
	Azobenzene	103333	mg kg-1	N					
	Benzo[a]anthracene	56553	mg kg-1	N					
	Benzo[a]pyrene	50328	mg kg-1	N					
	Benzo[b]fluoranthene	205992	mg kg-1	N					
	Benzo[g,h,i]perylene	191242	mg kg-1	N					
	Benzo[k]fluoranthene	207089	mg kg-1	N					
	bis(2-Chloroethoxy)methane	111911	mg kg-1	N					
	bis(2-Chloroethyl)ether	111444	mg kg-1	N					
	bis(2-Chloroisopropyl)ether	108601	mg kg-1	N					
	bis(2-Ethylhexyl)phthalate	117817	mg kg-1	N					
	Butylbenzylphthalate	85687	mg kg-1	N					
	Chrysene	218019	mg kg-1	N					
	Di-n-butylphthalate	84742	mg kg-1	N					
	Di-n-octylphthalate	117840	mg kg-1	N					
	Dibenzo[a,h]anthracene	53703	mg kg-1	N					
	Dibenzofuran	132649	mg kg-1	N					

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 21 samples
received 30 September 2011

C12519 - Star Lane, Great Wakering

Chemtest
The right chemistry to deliver results

Report Date
06 October 2011

				119863				
				AG53258	AG53259	AG53260	AG53261	AG53262
				TP15	TP15	TP16	TP17	TP18
				D1	D3	D2	B1	B1
				29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
				0.3m	0.9m	0.6m	0.4m - 0.5m	0.5m - 0.6m
				SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	Diethylphthalate	84662	mg kg-1	N				
	Dimethylphthalate	131113	mg kg-1	N				
	Fluoranthene	206440	mg kg-1	N				
	Fluorene	86737	mg kg-1	N				
	Hexachlorobenzene	118741	mg kg-1	N				
	Hexachlorobutadiene	87683	mg kg-1	N				
	Hexachlorocyclopentadiene	77474	mg kg-1	N				
	Hexachloroethane	67721	mg kg-1	N				
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	N				
	Isophorone	78591	mg kg-1	N				
	N-Nitrosodi-n-propylamine	621647	mg kg-1	N				
	N-Nitrosodimethylamine	62759	mg kg-1	N				
	Naphthalene	91203	mg kg-1	N				
	Nitrobenzene	98953	mg kg-1	N				
	Pentachlorophenol	87865	mg kg-1	N				
	Phenanthrene	85018	mg kg-1	N				
	Phenol	108952	mg kg-1	N				
	Pyrene	129000	mg kg-1	N				
	1,2-Dichlorobenzene	95501	mg kg-1	N				
	1,2,4-Trichlorobenzene	120821	mg kg-1	N				
	1,3-Dichlorobenzene	541731	mg kg-1	N				
	1,4-Dichlorobenzene	106467	mg kg-1	N				
	2-Chloronaphthalene	91587	mg kg-1	N				
	2-Chlorophenol	95578	mg kg-1	N				
	2-Methyl-4,6-dinitrophenol	534521	mg kg-1	N				
	2-Methylnaphthalene	91576	mg kg-1	N				
	2-Nitroaniline	88744	mg kg-1	N				
	2-Nitrophenol	88755	mg kg-1	N				

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 21 samples
received 30 September 2011

C12519 - Star Lane, Great Wakering

Chemtest
The right chemistry to deliver results

Report Date
06 October 2011

					119883				
					AG53258	AG53259	AG53260	AG53261	AG53262
					TP15	TP15	TP16	TP17	TP18
					D1	D3	D2	B1	B1
					29/09/2011	29/09/2011	29/09/2011	29/09/2011	29/09/2011
					0.3m	0.9m	0.6m	0.4m - 0.5m	0.5m - 0.6m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	2,4-Dimethylphenol	105679	mg kg-1	N					
	2,4-Dinitrotoluene	121142	mg kg-1	N					
	2,4,5-Trichlorophenol	95954	mg kg-1	N					
	2,4,6-Trichlorophenol	88062	mg kg-1	N					
	2,6-Dinitrotoluene	606202	mg kg-1	N					
	3-Nitroaniline	99092	mg kg-1	N					
	4-Bromophenylphenylether	101553	mg kg-1	N					
	4-Chloro-3-methylphenol	59507	mg kg-1	N					
	4-Chloroaniline	106478	mg kg-1	N					
	4-Chlorophenylphenylether	7005724	mg kg-1	N					
	4-Nitroaniline	100016	mg kg-1	N					
2920	Phenols (total)		mg kg-1	N	<0.3	<0.3	<0.3		<0.3

* Accreditation status

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

Chemtest
The right chemistry to deliver results

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming
21 October 2011

Dear Steve Fleming

Test Report Number **140434**
Your Project Reference **Star Lane, Great Wakering - C12519**

Please find enclosed the results of analysis for the samples received 13 October 2011.

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 the Customer Services team.

Yours sincerely,

Authorised Signatory

☒ Darrell Hall	Director
☐ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001
sira
UKAS ENVIRONMENTAL MANAGEMENT

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'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 13 October 2011

Star Lane, Great Wakering - C12519

Chemtest
The right chemistry to deliver results

Report Date
21 October 2011

Login Batch No					**140434**
Chemtest LIMS ID					AG58786
Sample ID					TP16
Sample No					D2
Sampling Date					12/10/2011
Depth					0.6m
Matrix					*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*	
2760	Methyl tert-butyl ether	1634044	µg kg⁻¹	N	< 1
	Dichlorodifluoromethane	75718	µg kg⁻¹	U	< 1.0
	Chloromethane	74873	µg kg⁻¹	M	< 1.0
	Vinyl chloride	75014	µg kg⁻¹	M	< 1.0
	Bromomethane	74839	µg kg⁻¹	U	< 20
	Chloroethane	75003	µg kg⁻¹	U	< 2.0
	Trichlorofluoromethane	75694	µg kg⁻¹	U	< 1.0
	1,1-Dichloroethene	75354	µg kg⁻¹	U	< 1.0
	Dichloromethane	75092	µg kg⁻¹	N	ne
	trans-1,2-Dichloroethene	156605	µg kg⁻¹	U	< 1.0
	1,1-Dichloroethane	75343	µg kg⁻¹	M	< 1.0
	cis-1,2-Dichloroethene	156592	µg kg⁻¹	M	< 1.0
	Bromochloromethane	74975	µg kg⁻¹	U	< 1.0
	Trichloromethane	67663	µg kg⁻¹	M	< 1.0
	1,1,1-Trichloroethane	71556	µg kg⁻¹	M	< 1.0
	Tetrachloromethane	56235	µg kg⁻¹	M	< 1.0
	1,1-Dichloropropene	563586	µg kg⁻¹	U	< 1.0
	Benzene	71432	µg kg⁻¹	M	< 1.0
	1,2-Dichloroethane	107062	µg kg⁻¹	U	< 2.0
	Trichloroethene	79016	µg kg⁻¹	U	< 1.0
	1,2-Dichloropropane	78875	µg kg⁻¹	U	< 1.0
	Dibromomethane	74953	µg kg⁻¹	U	< 10
	Bromodichloromethane	75274	µg kg⁻¹	U	< 5.0
	cis-1,3-Dichloropropene	10061015	µg kg⁻¹	N	< 10
	Toluene	108883	µg kg⁻¹	M	< 1.0
	trans-1,3-Dichloropropene	10061026	µg kg⁻¹	N	< 10
	1,1,2-Trichloroethane	79005	µg kg⁻¹	U	< 10

All tests undertaken between 19/10/2011 and 21/10/2011

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 13 October 2011

Star Lane, Great Wakering - C12519

Chemtest
The right chemistry to deliver results

Report Date
21 October 2011

					140434
					AG58786
					TP16
					D2
					12/10/2011
					0.6m
					SOIL
2760	Tetrachloroethene	127184	µg kg-1	M	< 1.0
	1,3-Dichloropropane	142289	µg kg-1	U	< 2.0
	Dibromochloromethane	124481	µg kg-1	U	< 10
	1,2-Dibromoethane	106934	µg kg-1	U	< 5.0
	Chlorobenzene	108907	µg kg-1	M	< 1.0
	1,1,1,2-Tetrachloroethane	630206	µg kg-1	M	< 2.0
	Ethylbenzene	100414	µg kg-1	M	< 1.0
	m- & p-Xylene	1330207	µg kg-1	U	< 1.0
	o-Xylene	95476	µg kg-1	U	< 1.0
	Styrene	100425	µg kg-1	U	< 1.0
	Tribromomethane	75252	µg kg-1	U	< 10
	Isopropylbenzene	98828	µg kg-1	U	< 1.0
	Bromobenzene	108861	µg kg-1	U	< 1.0
	1,2,3-Trichloropropane	96184	µg kg-1	N	< 50
	n-Propylbenzene	103651	µg kg-1	U	< 1.0
	2-Chlorotoluene	95498	µg kg-1	M	< 1.0
	1,2,4-Trimethylbenzene	95636	µg kg-1	U	< 1.0
	4-Chlorotoluene	106434	µg kg-1	U	< 1.0
	tert-Butylbenzene	98066	µg kg-1	U	< 1.0
	1,3,5-Trimethylbenzene	108678	µg kg-1	U	< 1.0
	sec-Butylbenzene	135988	µg kg-1	U	< 1.0
	1,3-Dichlorobenzene	541731	µg kg-1	U	< 1.0
	4-Isopropyltoluene	99876	µg kg-1	U	< 1.0
	1,4-Dichlorobenzene	106467	µg kg-1	U	< 1.0
	n-Butylbenzene	104518	µg kg-1	U	< 1.0
	1,2-Dichlorobenzene	95501	µg kg-1	U	< 1.0
	1,2-Dibromo-3-chloropropane	96128	µg kg-1	U	< 50
	1,2,4-Trichlorobenzene	120821	µg kg-1	U	< 1.0

All tests undertaken between 19/10/2011 and 21/10/2011

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 13 October 2011

Star Lane, Great Wakering - C12519

Chemtest
The right chemistry to deliver results

Report Date
21 October 2011

					140434
					AG58786
					TP16
					D2
					12/10/2011
					0.6m
					SOIL
2760	Hexachlorobutadiene	87683	µg kg-1	U	< 1.0
	1,2,3-Trichlorobenzene	87616	µg kg-1	U	< 2.0
2790	Acenaphthene	83329	mg kg-1	N	<0.50
	Acenaphthylene	208968	mg kg-1	N	<0.50
	Azobenzene	103333	mg kg-1	N	<0.50
	Benzo[a]anthracene	56553	mg kg-1	N	<0.50
	Benzo[a]pyrene	50328	mg kg-1	N	<0.50
	Benzo[b]fluoranthene	205992	mg kg-1	N	0.58
	Benzo[g,h,i]perylene	191242	mg kg-1	N	<0.50
	Benzo[k]fluoranthene	207089	mg kg-1	N	<0.50
	bis(2-Chloroethoxy)methane	111911	mg kg-1	N	<0.50
	bis(2-Chloroethyl)ether	111444	mg kg-1	N	<0.50
	bis(2-Chloroisopropyl)ether	108601	mg kg-1	N	<0.50
	bis(2-Ethylhexyl)phthalate	117817	mg kg-1	N	<0.50
	Butylbenzylphthalate	85687	mg kg-1	N	<0.50
	Chrysene	218019	mg kg-1	N	<0.50
	Di-n-butylphthalate	84742	mg kg-1	N	<0.50
	Di-n-octylphthalate	117840	mg kg-1	N	<0.50
	Dibenzo[a,h]anthracene	53703	mg kg-1	N	<0.50
	Dibenzofuran	132649	mg kg-1	N	<0.50
	Diethylphthalate	84662	mg kg-1	N	<0.50
	Dimethylphthalate	131113	mg kg-1	N	<0.50
	Fluoranthene	206440	mg kg-1	N	1.1
	Fluorene	86737	mg kg-1	N	<0.50
	Hexachlorobenzene	118741	mg kg-1	N	<0.50
	Hexachlorobutadiene	87683	mg kg-1	N	<0.50
	Hexachlorocyclopentadiene	77474	mg kg-1	N	<0.50
	Hexachloroethane	67721	mg kg-1	N	<0.50

All tests undertaken between 18/10/2011 and 21/10/2011

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 13 October 2011

Star Lane, Great Wakering - C12519

Chemtest
The right chemistry to deliver results

Report Date
21 October 2011

					140434
					AG58786
					TP16
					D2
					12/10/2011
					0.6m
					SOIL
2790	Indeno[1,2,3-cd]pyrene	193395	mg kg^{-1}	N	<0.50
	Isophorone	78591	mg kg^{-1}	N	<0.50
	N-Nitrosodi-n-propylamine	621647	mg kg^{-1}	N	<0.50
	N-Nitrosodimethylamine	62759	mg kg^{-1}	N	<0.50
	Naphthalene	91203	mg kg^{-1}	N	<0.50
	Nitrobenzene	98953	mg kg^{-1}	N	<0.50
	Pentachlorophenol	87865	mg kg^{-1}	N	<0.50
	Phenanthrene	85018	mg kg^{-1}	N	0.60
	Phenol	108952	mg kg^{-1}	N	<0.50
	Pyrene	129000	mg kg^{-1}	N	0.98
	1,2-Dichlorobenzene	95501	mg kg^{-1}	N	<0.50
	1,2,4-Trichlorobenzene	120821	mg kg^{-1}	N	<0.50
	1,3-Dichlorobenzene	541731	mg kg^{-1}	N	<0.50
	1,4-Dichlorobenzene	106467	mg kg^{-1}	N	<0.50
	2-Chloronaphthalene	91587	mg kg^{-1}	N	<0.50
	2-Chlorophenol	95578	mg kg^{-1}	N	<0.50
	2-Methyl-4,6-dinitrophenol	534521	mg kg^{-1}	N	<0.50
	2-Methylnaphthalene	91576	mg kg^{-1}	N	<0.50
	2-Nitroaniline	88744	mg kg^{-1}	N	<0.50
	2-Nitrophenol	88755	mg kg^{-1}	N	<0.50
	2,4-Dimethylphenol	105679	mg kg^{-1}	N	<0.50
	2,4-Dinitrotoluene	121142	mg kg^{-1}	N	<0.50
	2,4,5-Trichlorophenol	95954	mg kg^{-1}	N	<0.50
	2,4,6-Trichlorophenol	88062	mg kg^{-1}	N	<0.50
	2,6-Dinitrotoluene	606202	mg kg^{-1}	N	<0.50
	3-Nitroaniline	99092	mg kg^{-1}	N	<0.50
	4-Bromophenylphenylether	101553	mg kg^{-1}	N	<0.50
	4-Chloro-3-methylphenol	59507	mg kg^{-1}	N	<0.50

All tests undertaken between 19/10/2011 and 21/10/2011

* Accreditation status

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

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 13 October 2011

Star Lane, Great Wakering - C12519

Chemtest
The right chemistry to answer results

Report Date
21 October 2011

					140434
					AG58786
					TP16
					D2
					12/10/2011
					0.6m
					SOIL
2790	4-Chloroaniline	106478	mg kg-1	N	<0.50
	4-Chlorophenylphenylether	7005724	mg kg-1	N	<0.50
	4-Nitroaniline	100016	mg kg-1	N	<0.50

All tests undertaken between 19/10/2011 and 21/10/2011

* Accreditation status

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

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming
20 October 2011

Dear Steve Fleming

Test Report Number **150076**
Your Project Reference **Star Lane, Great Wakering - C12519**

Please find enclosed the results of analysis for the samples received 12 October 2011.

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 the Customer Services team.

Yours sincerely

Authorised Signatory

☑ Darrell Hall	Director
☐ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001
sira
UKAS ENVIRONMENTAL MANAGEMENT

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'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 12 October 2011

Star Lane, Great Wakering - C12519

Chemtest
The right chemistry to deliver results

Report Date
20 October 2011

Login Batch No					150076		
Chemtest LIMS ID					AG57938	AG57939	AG57940
Sample ID					BH1	BH2A	BH3
Sample No							
Sampling Date					11/10/2011	11/10/2011	11/10/2011
Depth					3.78m	3.93m	3.82m
Matrix					*WATER*	*WATER*	*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*			
1010	pH	PH		U	7.7	7.6	7.3
1300	Cyanide (total)	57125	mg l^{-1}	U	<0.050	<0.050	<0.050
	Cyanide (free)	57125	mg l^{-1}	U	<0.050	<0.050	<0.050
1325	Sulfide	18496258	mg l^{-1}	U	<0.050	<0.050	<0.050
1270	Hardness	HARD_TOT	mg CaCO3 l^{-1}	U	1000	740	960
1220	Sulfate	14808798	mg l^{-1}	U	920	470	22
1450	Arsenic	7440382	µg l^{-1}	U	<1.0	<1.0	1.8
	Boron	7440428	µg l^{-1}	U	240	190	660
	Cadmium	7440439	µg l^{-1}	U	<0.080	<0.080	<0.080
	Chromium (total)	7440473	µg l^{-1}	U	4.1	3.8	5.0
	Copper	7440508	µg l^{-1}	U	1.1	<1.0	1.6
	Mercury	7439976	µg l^{-1}	U	1.8	2.2	3.1
	Nickel	7440020	µg l^{-1}	U	3.4	2.8	6.7
	Lead	7439921	µg l^{-1}	U	<1.0	<1.0	<1.0
	Selenium	7782492	µg l^{-1}	U	26	12	36
	Zinc	7440666	µg l^{-1}	U	22	12	21
1675	TPH aliphatic >C5-C6		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C6-C8		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C8-C10		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C10-C12		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C12-C16		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C16-C21		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C21-C35		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C35-C44		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C5-C7		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C7-C8		µg l^{-1}	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C8-C10		µg l^{-1}	N	< 0.1	< 0.1	< 0.1

All tests undertaken between 13/10/2011 and 20/10/2011

* Accreditation status

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					150076		
					AG57938	AG57939	AG57940
					BH1	BH2A	BH3
					11/10/2011	11/10/2011	11/10/2011
					3.78m	3.93m	3.82m
					WATER	*WATER*	*WATER*
1675	TPH aromatic >C10-C12		µg l⁻¹	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C12-C16		µg l⁻¹	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C16-C21		µg l⁻¹	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C21-C35		µg l⁻¹	N	< 0.1	< 0.1	< 0.1
	TPH aromatic >C35-C44		µg l⁻¹	N	< 0.1	< 0.1	< 0.1
	Total Petroleum Hydrocarbons		µg l⁻¹	N	< 10	< 10	< 10
	Total Aliphatic Hydrocarbons		µg l⁻¹	N	< 5	< 5	< 5
	Total Aromatic Hydrocarbons		µg l⁻¹	N	< 5	< 5	< 5
1700	Naphthalene	91203	µg l⁻¹	N	<0.01	<0.01	<0.01
	Acenaphthylene	208968	µg l⁻¹	N	<0.01	<0.01	<0.01
	Acenaphthene	83329	µg l⁻¹	N	<0.01	<0.01	<0.01
	Fluorene	86737	µg l⁻¹	N	<0.01	<0.01	<0.01
	Phenanthrene	85018	µg l⁻¹	N	<0.01	0.3	<0.01
	Anthracene	120127	µg l⁻¹	N	<0.01	0.3	<0.01
	Fluoranthene	206440	µg l⁻¹	N	<0.01	<0.01	<0.01
	Pyrene	129000	µg l⁻¹	N	<0.01	0.4	<0.01
	Benzo[a]anthracene	56553	µg l⁻¹	N	<0.01	<0.01	<0.01
	Chrysene	218019	µg l⁻¹	N	<0.01	<0.01	<0.01
	Benzo[b]fluoranthene	205992	µg l⁻¹	N	<0.01	<0.01	<0.01
	Benzo[k]fluoranthene	207089	µg l⁻¹	N	<0.01	<0.01	<0.01
	Benzo[a]pyrene	50328	µg l⁻¹	N	<0.01	<0.01	<0.01
	Dibenzo[a,h]anthracene	53703	µg l⁻¹	N	<0.01	<0.01	<0.01
	Indeno[1,2,3-cd]pyrene	193395	µg l⁻¹	N	<0.01	<0.01	<0.01
	Benzo[g,h,i]perylene	191242	µg l⁻¹	N	<0.01	<0.01	<0.01
	Total (of 16) PAHs		µg l⁻¹	N	<0.2	1	<0.2
1760	Methyl tert-butylether	1634044	µg l⁻¹	N	<1.0	<1.0	<1.0
	Dichlorodifluoromethane	75718	µg l⁻¹	U	<1.0	<1.0	<1.0
	Chloromethane	74873	µg l⁻¹	U	<1.0	<1.0	<1.0

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					150076		
					AG57938	AG57939	AG57940
					BH1	BH2A	BH3
					11/10/2011	11/10/2011	11/10/2011
					3.78m	3.93m	3.82m
					WATER	*WATER*	*WATER*
1760	Vinyl chloride	75014	µg l⁻¹	U	<1.0	<1.0	<1.0
	Bromomethane	74839	µg l⁻¹	U	<20	<20	<20
	Chloroethane	75003	µg l⁻¹	U	<2.0	<2.0	<2.0
	Trichlorofluoromethane	75694	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,1-Dichloroethene	75354	µg l⁻¹	U	<1.0	<1.0	<1.0
	Dichloromethane	75092	µg l⁻¹	N	ne	ne	ne
	trans-1,2-Dichloroethene	156605	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,1-Dichloroethane	75343	µg l⁻¹	U	<1.0	<1.0	<1.0
	cis-1,2-Dichloroethene	156592	µg l⁻¹	U	<1.0	<1.0	<1.0
	Bromochloromethane	74975	µg l⁻¹	U	<1.0	<1.0	<1.0
	Trichloromethane	67663	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,1,1-Trichloroethane	71556	µg l⁻¹	U	<1.0	<1.0	<1.0
	Tetrachloromethane	56235	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,1-Dichloropropene	563586	µg l⁻¹	U	<1.0	<1.0	<1.0
	Benzene	71432	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,2-Dichloroethane	107062	µg l⁻¹	U	<2.0	<2.0	<2.0
	Trichloroethene	79016	µg l⁻¹	N	<1.0	<1.0	<1.0
	1,2-Dichloropropane	78875	µg l⁻¹	U	<1.0	<1.0	<1.0
	Dibromomethane	74953	µg l⁻¹	U	<10	<10	<10
	Bromodichloromethane	75274	µg l⁻¹	U	<5.0	<5.0	<5.0
	cis-1,3-Dichloropropene	10061015	µg l⁻¹	U	<10	<10	<10
	Toluene	108883	µg l⁻¹	U	<1.0	<1.0	<1.0
	trans-1,3-Dichloropropene	10061026	µg l⁻¹	U	<10	<10	<10
	1,1,2-Trichloroethane	79005	µg l⁻¹	U	<10	<10	<10
	Tetrachloroethene	127184	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,3-Dichloropropane	142289	µg l⁻¹	U	<2.0	<2.0	<2.0
	Dibromochloromethane	124481	µg l⁻¹	U	<10	<10	<10
	1,2-Dibromoethane	106934	µg l⁻¹	U	<5.0	<5.0	<5.0

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					150076		
					AG57938	AG57939	AG57940
					BH1	BH2A	BH3
					11/10/2011 3.78m *WATER*	11/10/2011 3.93m *WATER*	11/10/2011 3.82m *WATER*
1760	Chlorobenzene	108907	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,1,1,2-Tetrachloroethane	630206	µg l⁻¹	U	<2.0	<2.0	<2.0
	Ethylbenzene	100414	µg l⁻¹	U	<1.0	<1.0	<1.0
	m- & p-Xylene	1330207	µg l⁻¹	U	<1.0	<1.0	<1.0
	o-Xylene	95476	µg l⁻¹	U	<1.0	<1.0	<1.0
	Styrene	100425	µg l⁻¹	U	<1.0	<1.0	<1.0
	Tribromomethane	75252	µg l⁻¹	U	<10	<10	<10
	Isopropylbenzene	98828	µg l⁻¹	U	<1.0	<1.0	<1.0
	Bromobenzene	108861	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,2,3-Trichloropropane	96184	µg l⁻¹	U	<50	<50	<50
	n-Propylbenzene	103651	µg l⁻¹	U	<1.0	<1.0	<1.0
	2-Chlorotoluene	95498	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,2,4-Trimethylbenzene	95636	µg l⁻¹	U	<1.0	<1.0	<1.0
	4-Chlorotoluene	106434	µg l⁻¹	U	<1.0	<1.0	<1.0
	tert-Butylbenzene	98066	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,3,5-Trimethylbenzene	108678	µg l⁻¹	U	<1.0	<1.0	<1.0
	sec-Butylbenzene	135988	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,3-Dichlorobenzene	541731	µg l⁻¹	U	<1.0	<1.0	<1.0
	4-Isopropyltoluene	99876	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,4-Dichlorobenzene	106467	µg l⁻¹	U	<1.0	<1.0	<1.0
	n-Butylbenzene	104518	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,2-Dichlorobenzene	95501	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,2-Dibromo-3-chloropropane	96128	µg l⁻¹	U	<50	<50	<50
	1,2,4-Trichlorobenzene	120821	µg l⁻¹	U	<1.0	<1.0	<1.0
	Hexachlorobutadiene	87683	µg l⁻¹	U	<1.0	<1.0	<1.0
	1,2,3-Trichlorobenzene	87616	µg l⁻¹	U	<2.0	<2.0	<2.0
1790	Acenaphthene	83329	µg l⁻¹	N	<0.50	<0.50	<0.50
	Acenaphthylene	208968	µg l⁻¹	N	<0.50	<0.50	<0.50

All tests undertaken between 13/10/2011 and 20/10/2011

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					AG57938	AG57939	AG57940
					BH1	BH2A	BH3
					11/10/2011	11/10/2011	11/10/2011
					3.78m	3.93m	3.82m
					WATER	*WATER*	*WATER*
1790	Anthracene	120127	µg l⁻¹	N	<0.50	<0.50	<0.50
	Azobenzene	103333	µg l⁻¹	N	<0.50	<0.50	<0.50
	Benzo[a]anthracene	56553	µg l⁻¹	N	<0.50	<0.50	<0.50
	Benzo[a]pyrene	50328	µg l⁻¹	N	<0.50	<0.50	<0.50
	Benzo[b]fluoranthene	205992	µg l⁻¹	N	<0.50	<0.50	<0.50
	Benzo[g,h,i]perylene	191242	µg l⁻¹	N	<0.50	<0.50	<0.50
	Benzo[k]fluoranthene	207089	µg l⁻¹	N	<0.50	<0.50	<0.50
	bis(2-Chloroethoxy)methane	111911	µg l⁻¹	N	<0.50	<0.50	<0.50
	bis(2-Chloroethyl)ether	111444	µg l⁻¹	N	<0.50	<0.50	<0.50
	bis(2-Chloroisopropyl)ether	108601	µg l⁻¹	N	<0.50	<0.50	<0.50
	bis(2-Ethylhexyl)phthalate	117817	µg l⁻¹	N	<0.50	<0.50	<0.50
	Butylbenzylphthalate	85687	µg l⁻¹	N	<0.50	<0.50	<0.50
	Carbazole	86748	µg l⁻¹	N	<0.50	<0.50	<0.50
	Chrysene	218019	µg l⁻¹	N	<0.50	<0.50	<0.50
	Di-n-butylphthalate	84742	µg l⁻¹	N	<0.50	<0.50	<0.50
	Di-n-octylphthalate	117840	µg l⁻¹	N	<0.50	<0.50	<0.50
	Dibenzo[a,h]anthracene	53703	µg l⁻¹	N	<0.50	<0.50	<0.50
	Dibenzofuran	132649	µg l⁻¹	N	<0.50	<0.50	<0.50
	Diethylphthalate	84662	µg l⁻¹	N	<0.50	<0.50	<0.50
	Dimethylphthalate	131113	µg l⁻¹	N	<0.50	<0.50	<0.50
	Fluoranthene	206440	µg l⁻¹	N	<0.50	<0.50	<0.50
	Fluorene	86737	µg l⁻¹	N	<0.50	<0.50	<0.50
	Hexachlorobenzene	118741	µg l⁻¹	N	<0.50	<0.50	<0.50
	Hexachlorobutadiene	87683	µg l⁻¹	N	<0.50	<0.50	<0.50
	Hexachlorocyclopentadiene	77474	µg l⁻¹	N	<0.50	<0.50	<0.50
	Hexachloroethane	67721	µg l⁻¹	N	<0.50	<0.50	<0.50
	Indeno[1,2,3-cd]pyrene	193395	µg l⁻¹	N	<0.50	<0.50	<0.50
	Isophorone	78591	µg l⁻¹	N	<0.50	<0.50	<0.50

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Peterborough

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LABORATORY TEST REPORT

Results of analysis of 3 samples received 12 October 2011

Star Lane, Great Wakering - C12519

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					150076		
					AG57938	AG57939	AG57940
					BH1	BH2A	BH3
					11/10/2011	11/10/2011	11/10/2011
					3.78m	3.93m	3.82m
					WATER	*WATER*	*WATER*
1790	N-Nitrosodi-n-propylamine	621647	µg l-1	N	<0.50	<0.50	<0.50
	N-Nitrosodimethylamine	62759	µg l-1	N	<0.50	<0.50	<0.50
	Naphthalene	91203	µg l-1	N	<0.50	<0.50	<0.50
	Nitrobenzene	98953	µg l-1	N	<0.50	<0.50	<0.50
	Pentachlorophenol	87865	µg l-1	N	<0.50	<0.50	<0.50
	Phenanthrene	85018	µg l-1	N	<0.50	<0.50	<0.50
	Phenol	108952	µg l-1	N	<0.50	<0.50	<0.50
	Pyrene	129000	µg l-1	N	<0.50	<0.50	<0.50
	1,2-Dichlorobenzene	95501	µg l-1	N	<0.50	<0.50	<0.50
	1,2,4-Trichlorobenzene	120821	µg l-1	N	<0.50	<0.50	<0.50
	1,3-Dichlorobenzene	541731	µg l-1	N	<0.50	<0.50	<0.50
	1,4-Dichlorobenzene	106467	µg l-1	N	<0.50	<0.50	<0.50
	2-Chloronaphthalene	91587	µg l-1	N	<0.50	<0.50	<0.50
	2-Chlorophenol	95578	µg l-1	N	<0.50	<0.50	<0.50
	2-Methyl-4,6-dinitrophenol	534521	µg l-1	N	<0.50	<0.50	<0.50
	2-Methylnaphthalene	91576	µg l-1	N	<0.50	<0.50	<0.50
	2-Methylphenol	95487	µg l-1	N	<0.50	<0.50	<0.50
	2-Nitroaniline	88744	µg l-1	N	<0.50	<0.50	<0.50
	2-Nitrophenol	88755	µg l-1	N	<0.50	<0.50	<0.50
	2,4-Dichlorophenol	120832	µg l-1	N	<0.50	<0.50	<0.50
	2,4-Dimethylphenol	105679	µg l-1	N	<0.50	<0.50	<0.50
	2,4-Dinitrotoluene	121142	µg l-1	N	<0.50	<0.50	<0.50
	2,4,5-Trichlorophenol	95954	µg l-1	N	<0.50	<0.50	<0.50
	2,4,6-Trichlorophenol	88062	µg l-1	N	<0.50	<0.50	<0.50
	2,6-Dinitrotoluene	606202	µg l-1	N	<0.50	<0.50	<0.50
	3-Nitroaniline	99092	µg l-1	N	<0.50	<0.50	<0.50
	4-Bromophenylphenylether	101553	µg l-1	N	<0.50	<0.50	<0.50
	4-Chloro-3-methylphenol	59507	µg l-1	N	<0.50	<0.50	<0.50

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Peterborough

PE1 5UA

FAO Steve Fleming

LABORATORY TEST REPORT

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20 October 2011

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					AG57938	AG57939	AG57940
					BH1	BH2A	BH3
					11/10/2011	11/10/2011	11/10/2011
					3.78m	3.93m	3.82m
					WATER	*WATER*	*WATER*
1790	4-Chloroaniline	106478	µg l⁻¹	N	<0.50	<0.50	<0.50
	4-Chlorophenylphenylether	7005723	µg l⁻¹	N	<0.50	<0.50	<0.50
	4-Methylphenol	106445	µg l⁻¹	N	<0.50	<0.50	<0.50
	4-Nitroaniline	100016	µg l⁻¹	N	<0.50	<0.50	<0.50
	4-Nitrophenol	100027	µg l⁻¹	N	<0.50	<0.50	<0.50
1920	Phenols (total)		mg l⁻¹	N	< 0.03	< 0.03	< 0.03

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Chemtest
The right chemistry to deliver results

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming
24 October 2011

Dear Steve Fleming

Test Report Number **140433**
Your Project Reference **Star Lane, Great Wakering - C12519**

Please find enclosed the results of analysis for the samples received 13 October 2011.

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 the Customer Services team.

Yours sincerely,

Authorised Signatory

Darrell Hall	Director
Phil Hellier	Director
Keith Jones	Technical Manager
John Crawford	Quality Manager
Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001
sira
UKAS ENVIRONMENTAL MANAGEMENT

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'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Chemtest
LABORATORY TEST REPORT
CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

Result of analysis of 4 samples recieved 13 October 2011

Star Lane, Great Wakering - C12519

Report Date 24 October 2011

Log Batch No	**140433**
Chemtest LIMS ID	AG58784
Sample ID	TP2
Sample No	D1
Sampling Date	12/10/2011
Depth	0.2m

Solid Waste Analysis

Determinand	SOP		*		Landfill Waste Acceptance Criteria Limits: Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon	2625	%	M	1.1	3	5	6
Loss on ignition	2610	%	N	1.69			10
Total BTEX	2761	mg kg^{-1}	M	<0.005	6		
Total PCBs (7 congeners)	2811	mg kg^{-1}	N	<1	1		
TPH Total WAC	2670	mg kg^{-1}	M	< 10	500		
Total (of 17) PAHs	2700	mg kg^{-1}	N	<2	100		
pH	2010		M	7.8		>6	
Acid Neutralisation Capacity	2015	mol kg^{-1}	N	0.013		To evaluate	To evaluate

Eluate Analysis

Determinand	SOP	*	2:1 Eluate mg l^{-1}	8:1 Eluate mg l^{-1}	2:1 Eluate mg kg^{-1}	Cumulative 10:1 Eluate mg kg^{-1}	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg: Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Arsenic	1450	N	0.011	0.007	<0.05	<0.05	0.5	2	25
Barium	1450	N	0.024	0.027	<0.5	<0.5	20	100	300
Cadmium	1450	N	<0.0005	<0.0005	<0.01	<0.01	0.04	1	5
Chromium	1450	N	0.005	0.004	<0.05	<0.05	0.5	10	70
Copper	1450	N	0.004	0.004	<0.05	<0.05	2	50	100
Mercury	1450	N	<0.0005	<0.0005	<0.01	<0.01	0.01	0.2	2
Molybdenum	1450	N	0.042	0.013	<0.05	0.09	0.5	10	30
Nickel	1450	N	0.003	0.002	<0.05	<0.05	0.4	10	40
Lead	1450	N	0.023	0.032	0.02	0.16	0.5	10	50
Antimony	1450	N	0.024	0.011	0.03	0.06	0.06	0.7	5
Selenium	1450	N	0.012	0.005	0.01	0.03	0.1	0.5	7
Zinc	1450	N	0.082	0.061	<0.5	<0.5	4	50	200
Chloride	1220	N	7.3	1.5	7.63	11.5	800	15000	25000
Fluoride	1220	N	1.3	0.48	1.36	2.98	10	150	500
Sulphate	1220	N	1400	1200	1460	6190	1000	20000	50000
Total Dissolved Solids	1040	N	1300	1100	1360	5690	4000	60000	100000
Phenol index	1920	N	<0.030	<0.030	<0.5	<0.5	1		
Dissolved Organic Carbon	1610	N	1.7	0	<50	<50	500	800	1000

Solid Information

Dry mass of test portion/kg	0.175
Moisture (%)	8.62

Leach Test Information

Leachant volume 1st extract/l	0.1665	20-Oct-2011
Leachant volume 2nd extract/l	0.7	20-Oct-2011
Eluate recovered from 1st extract/l	0.1192	

All tests undertaken between 30-Dec-1899 and 24-Oct-2011

* Accreditation status

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

LIMS sample ID range AG58782 to AG58785

Chemtest
LABORATORY TEST REPORT
CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

Ground Engineering Limited
Newark Road
Peterborough

PE1 5UA

FAO Steve Fleming

Result of analysis of 4 samples recieved 13 October 2011

Star Lane, Great Wakering - C12519

Report Date 24 October 2011

Log Batch No	**140433**
Chemtest LIMS ID	[redacted]
Sample ID	TP14
Sample No	D1
Sampling Date	12/10/2011
Depth	0.2m

Solid Waste Analysis

Determinand ↓	SOP ↓		*		
Total Organic Carbon	2625	%	M	1.6	
Loss on ignition	2610	%	N	2.93	
Total BTEX	2761	mg kg⁻¹	M	<0.005	6
Total PCBs (7 congeners)	2811	mg kg⁻¹	N	<1	1
TPH Total WAC	2670	mg kg⁻¹	M	< 10	500
Total (of 17) PAHs	2700	mg kg⁻¹	N	<2	100
pH	2010		M	8.3	>6
Acid Neutralisation Capacity	2015	mol kg⁻¹	N	0.013	To evaluate

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
		10
To evaluate	To evaluate	

Eluate Analysis

Determinand ↓	SOP↓	*	2:1 Eluate mg l⁻¹	8:1 Eluate mg l⁻¹	2:1 Eluate mg kg⁻¹	Cumulative 10:1 Eluate mg kg⁻¹
Arsenic	1450	N	0.024	0.029	0.05	0.29
Barium	1450	N	0.016	0.03	<0.5	<0.5
Cadmium	1450	N	<0.0005	<0.0005	<0.01	<0.01
Chromium	1450	N	0.023	0.01	0.05	0.11
Copper	1450	N	0.012	0.016	<0.05	0.16
Mercury	1450	N	<0.0005	<0.0005	<0.01	<0.01
Molybdenum	1450	N	0.11	0.025	0.22	0.33
Nickel	1450	N	<0.001	0.003	<0.05	<0.05
Lead	1450	N	<0.001	0.014	<0.005	0.13
Antimony	1450	N	0.013	0.011	0.03	0.11
Selenium	1450	N	0.009	0.004	0.02	0.04
Zinc	1450	N	0.009	0.025	<0.5	<0.5
Chloride	1220	N	10	4.6	20	51.3
Fluoride	1220	N	1.2	0.63	2.4	6.86
Sulphate	1220	N	350	56	699	848
Total Dissolved Solids	1040	N	270	100	539	1170
Phenol index	1920	N	<0.030	<0.030	<0.5	<0.5
Dissolved Organic Carbon	1610	N	12	5.8	<50	64.1

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15000	25000
10	150	500
1000	20000	50000
4000	60000	100000
1		
500	800	1000

Solid Information

Dry mass of test portion/kg	0.0875
Moisture (%)	16.9

Leach Test Information

Leachant volume 1st extract/l	0.157	20-Oct-2011
Leachant volume 2nd extract/l	0.7	20-Oct-2011
Eluate recovered from 1st extract/l	0.0857	

All tests undertaken between 30-Dec-1899 and 24-Oct-2011

* Accreditation status

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

LIMS sample ID range AG58782 to AG58785

APPENDIX 6

CLASSIFICATION OF AGGRESSIVE CHEMICAL ENVIRONMENT FOR BURIED CONCRETE

TABLE C2 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS[a]

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations [a]

Sulfate and magnesium						Groundwater		ACEC
Design Sulfate Class for location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	< 500		< 400		< 0.24	≥ 2.5		AC-1s
							> 6.5[d]	AC-1
							5.5–6.5	AC-2z
							4.5–5.5	AC-3z
							2.5–4.5	AC-4z
DS-2	500–1500		400–1400		0.24–0.6	> 5.5		AC-1s
							> 6.5	AC-2
						2.5–5.5		AC-2s
							5.5–6.5	AC-3z
							4.5–5.5	AC-4z
							2.5–5.5	AC-5z
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5		AC-2s
							> 6.5	AC-3
						2.5–5.5		AC-3s
							5.5–6.5	AC-4
							2.5–5.5	AC-5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4
						2.5–5.5		AC-4s
							2.5–6.5	AC-5
DS-4m	3100–6000	> 1200[e]	3100–6000	> 1000[e]	1.3–2.4	> 5.5		AC-3s
							> 6.5	AC-4m
						2.5–5.5		AC-4ms
							2.5–6.5	AC-5m
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5		AC-4s
						2.5–5.5	≥ 2.5	AC-5
DS-5m	> 6000	> 1200[e]	> 6000	> 1000[e]	> 2.4	> 5.5		AC-4ms
						2.5–5.5	≥ 2.5	AC-5m

Notes

a Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that include the suffix 'z' have primarily to resist acid conditions and may be made with any of the cements in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.