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CONTAMINATION INVESTIGATION REPORT

PEAR TREE FARM
ST JAMES ROAD
LONG SUTTON
LINCOLNSHIRE

Report Reference C15075

On behalf of:-

**Nene Transport (Lines) Limited
Greenworld Park
Sutton Bridge
Spalding
Lincolnshire
PE12 9RN**

July 2020

NENE TRANSPORT (LINCS) LIMITED

ROBERT DOUGHTY CONSULTANCY

CONTAMINATION INVESTIGATION REPORT

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

AT

PEAR TREE FARM

ST. JAMES ROAD

LONG SUTTON

LINCOLNSHIRE

Report Reference No. C15075

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INTRODUCTION

The client, Nene Transport (Lincs) Limited, proposes to construct a new large residential dwelling, replacing an existing farmyard and field at Pear Tree Farm, St. James Road, Long Sutton in Lincolnshire. The proposed development layout is presented on a plan following the report text.

Ground Engineering Limited was commissioned by the client, under the direction of Robert Doughty Consultancy, to carry out a contamination investigation to determine the nature and chemical properties of the underlying soils, and provide a contamination assessment report. A desk study had previously been undertaken for the client by others in March 2018, and a summary of the findings is included within this report. No foundation design recommendations were required within the scope of this report.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site is located at Pear Tree Farm, St. James Road, Long Sutton in Lincolnshire. The 1.1ha irregular shaped site is approximately 130m long fronting St. James Road to the north, and extends approximately 45m south. The National Grid Reference for the centre of the site is TF 4086 2026 and its location is shown on a plan following this report text.

At the time of the investigation in June 2020, the eastern part of the site contained a concrete surfaced yard area with piles of broken concrete from recent demolition and a couple of brick outbuildings. A demolition contractor's excavator and skip were also present in this area. The western part of the site was generally grassed with occasional mature trees including Horse Chestnut and Ash. Trees and hedgerows were present along the site boundaries, which included Ash, Sycamore and Field Maple amongst others. Overhead power lines cross the extreme western tip of the site.

The site was bounded by St. James Road (B1390) to the north and west; a field to the south; and a meadow with trees to the east. Peartree House fronts St. James Road adjacent the north-eastern corner of the site. Photographs from a site walkover on 15th June 2020 are presented following the plans.

The site stands at about 3mOD, on level ground within the Lincolnshire Fens. Drains are present along the boundaries in the south-western and south-eastern parts of the site. The site is approximately 400m north of the west-east aligned South Holland Main Drain.

The geological map, sheet 144 (1992) at 1:50,000 scale, shows superficial Terrington Beds (now named Tidal Flat Deposits), overlying the solid geology of the Ampthill Clay at depth. The site is within an area reclaimed by the time of the Domesday Survey in 1086.

SUMMARY OF HISTORICAL INFORMATION

The Ordnance Survey map of 1888 showed that the site was developed with Peartree House. By the 1970s there were more buildings on the site, which was then denoted as a piggery, and it is these buildings which were in the process of being demolished at the time of this investigation (June 2020). As part of a previous walkover in November 2017, the buildings on the site were noted to have asbestos cement roof sheets, at least one of which stored hazardous substances, and there were four above ground storage tanks for heating oil.

SUMMARY OF ENVIRONMENTAL DATA

From historical maps a piggery is recognised on the site, which was otherwise within a rural area.

No made ground is recorded beneath the site. Superficial Tidal Flat Deposits are recorded beneath the site, which is classified by the EA as an unproductive stratum. The underlying solid geology Ampthill Clay Formation is also classified by the EA as an unproductive stratum. There are no surface water or groundwater abstractions within 250m of the site. The site is not within a source protection zone.

The nearest surface water features are drains along the south-western and south-eastern corners of the site. The site has a negligible risk of flooding from Rivers and Sea. The site is within a nitrate vulnerable zone and a SSSI impact zone, both environmentally sensitive areas.

There is a moderate hazard from compressible ground and running sand; a low hazard from shrinking and swelling clay; a very low hazard from landslides; and a negligible hazard from soluble rocks and collapsible rocks. No mining areas are recognised within 250m of the site.

The site is not in a radon affected area and no radon protection measures are required for new dwellings on the site.

PRELIMINARY RISK ASSESSMENT

Potential sources of contamination present on or beneath the site would relate primarily to; the historical use of the site; the presence of contaminated soil; and the potential presence of hazardous or ground gases beneath the site.

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 overleaf in Table 1.

Table 1: Identified Potential Contaminant Sources

<i>Contaminant Source</i>	<i>Comments</i>
Drainage/buildings/tanks	Drains could provide a contaminant source. The existing buildings may contain asbestos. Former above ground fuel tanks could provide a contaminant source.
Soil Beneath Site	Contamination may be present within made ground materials on the site.
Soil Gas	Potential soil gas generated from made ground or natural soils.
Ground Contamination Outside Site Boundary	Ground contamination migrating from adjoining sites.

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 ***Targets 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

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

Table 3: Water Receptors and Pathways

<i>Receptor-Water Environment</i>	<i>Typical Exposure Pathway</i>
Groundwater The Tidal Flat Deposits are indicated to be an unproductive stratum. The underlying solid geology Ampthill Clay Formation is also indicated to be an unproductive stratum. The site is not within a Source Protection Zone.	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/Watercourses The nearest surface water features are the drains adjacent the south-west and south-eastern corners 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 is presented below in Table 4.

Table 4: Preliminary Conceptual Model Relative to Residential Development

Receptors	Pathway	Estimated Potential for Linkage with Contaminant Sources			
		Drainage/ Buildings/Above Ground Tanks	Soil Beneath Site	Soil Gas	Ground Contamination Outside Site Boundary
Human Health – ground or construction workers	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Low likelihood/ Likely (asbestos)/ Likely	Low likelihood	Low likelihood	Low likelihood
Human Health – end users	Ingestion and Inhalation of contaminated Soil, Dust and Vapour	Unlikely	Low likelihood	Low likelihood	Low likelihood
Water Environment	Migration through ground into surface water or surrounding groundwater	Low likelihood	Unlikely	Unlikely	Unlikely
Flora	Vegetation on site growing on contaminated soil	Low likelihood	Low likelihood	Low likelihood	Unlikely
Building Materials	Contact with contaminated soil	Low likelihood	Low likelihood	Low likelihood	Low likelihood
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

The site work conducted on 15th June 2020 comprised five hand augered boreholes (HA1 to HA5) across the proposed garden areas of the site. The positions are shown on the exploratory hole location plan and proposed development plan following this report text.

Public utility service drawings provided by the client were consulted prior to determining the exploratory hole positions. Prior to excavation, a service scan was made at each position using a CAT (Cable Avoidance Tool) to check for the absence of detectable buried services that may otherwise have been damaged by the investigation.

The exploratory hole records, presented following the plans, give the descriptions and depths of the various strata encountered, details of all samples taken and the groundwater conditions observed during boring and on completion.

Hand Augered Boreholes

Boreholes HA1 to HA5 were excavated using hand auger tools. The exposed strata were logged and sampled by a Geoenvironmental Engineer, and samples collected for subsequent laboratory testing.

Representative disturbed samples were taken at regular intervals throughout the depth of the boreholes.

On completion, the boreholes were backfilled with arisings and the surfaces reinstated.

LABORATORY WORK

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 descriptions have been made in accordance with BS5930:2015+A1:2020. The chemical test results are presented following the exploratory hole records.

Chemical analysis of five soil samples recovered from the exploratory holes was undertaken by an independent laboratory, primarily for characterisation purposes. The samples were tested for a suite encompassing a wide range 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'. Two of the samples were also tested for speciated Total Petroleum Hydrocarbons (TPH), BTEX and MTBE.

GROUND CONDITIONS

The ground conditions comprised made ground to between 0.15m (HA5) and 0.45m (HA4) depth, which was underlain by superficial Tidal Flat Deposit soils, which were proved to at least the base of all of the exploratory holes and a maximum depth of 0.90m. No groundwater was recorded within 0.90m below ground level during the investigation.

Made Ground

From surface, soft, brown and dark brown, slightly sandy, slightly gravelly, clayey silt fill was met to between 0.15m and 0.45m depth. The gravel fraction comprised angular and sub-angular ash, coal and brick fragments. Boreholes HA4 and HA5 were undertaken with yard areas of the former farm.

Tidal Flat Deposits

Beneath the made ground at between 0.15m and 0.45m depth, soft or firm, grey, brown and orange brown, silty clay was encountered to at least the base of the boreholes at between 0.70m and 0.90m depth. These soils were considered to represent superficial Tidal Flat Deposits.

Groundwater

All of the boreholes were dry during boring and on completion to between 0.70m and 0.90m depth.

Observations

Live roots were observed in all of the boreholes, and to at least 0.90m below ground level in HA5 which was close to trees in the south-eastern corner of the site.

Evidence of Contamination

The made ground encountered during this investigation was not noted to have olfactory or visual evidence of fuel contamination. The made ground contained fragments of ash, coal and brick.

COMMENTS ON THE SOIL CHEMICAL TEST RESULTS

The results of the laboratory chemical testing on near surface soil samples have primarily been compared to soil screening values (SSVs) produced by Land Quality Management Limited (LQM) and the Chartered Institute for Environmental Health (CIEH) presented in their document 'The LQM/CIEH S4ULs for Human Health Risk Assessment: 2015 (Publication Number S4UL3608)'. The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and are transparently-derived and cautious 'trigger values' above which further assessment of the risks or remedial action may be needed. The S4ULs (Suitable for Use Levels) have been derived, in accordance with UK legislation and Environment Agency policy, using a modified version of the Environment Agency CLEA 1.06 software.

Reference has also been given to ATRISKsoil soil screening values produced by Atkins Limited and provided under licence to Ground Engineering Limited. Atkins SSVs have been derived in line with the Environment Agency 2009 guidance using the CLEA 1.071 software. With the absence of a S4UL for cyanide the ATRISKsoil SSV has been used as the soil screening criteria within this report.

In 2014 the Department for Environment Food and Rural Affairs (DEFRA) published, in their document SP1010, Category 4 Screening Levels (C4SL) for several contaminants including lead. The C4SL represent screening levels below which the land could be considered suitable for a specified use and definitely not contaminated land in respect of those determinands. With the absence of S4UL for lead the C4SL has been used as the soil screening criteria within this report.

For each contaminant the adopted soil screening criteria have been calculated for the following land uses:

- 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.

Table 5 compares the test results for the made ground with the SSVs in relation to the specified uses. The number of test results which exceed these values, are also provided. Statistical analysis would not be meaningful for the small dataset and has not been undertaken.

Table 5: Comparison of Chemical Test Results with SSVs for Made Ground Soils

Determinand	Number of Samples	Min Value mg/kg	Max Value mg/kg	Number of Samples Exceeding SSV for			Measured 95 th Percentile mg/kg	Assessment Method	Soil Screening Criteria 2.5% SOM		
				Residential with home grown produce	Residential without home grown produce	Commercial/ Industrial			Residential with home grown produce mg/kg	Residential without home grown produce mg/kg	Commercial/ Industrial mg/kg
Organic Matter	5	4.2%	9.4%	-	-	-	-	-	-	-	-
Arsenic	5	11	16	0	0	0	15.13	S4UL	37	40	640
Cadmium	5	<0.2	2.1	0	0	0	1.39	S4UL	11	85	190
Chromium (III)	5	25	37	0	0	0	37.40	S4UL	910	910	8600
Chromium (VI)	5	<4.0	<4.0	0	0	0	<4.0	S4UL	6	6	33
Lead	5	19	350	1	1	0	142.83	C4SL	200	310	2330
Mercury	5	0.4	0.5	0	0	0	0.46	S4UL	11	15	320
Selenium	5	<1.0	2.1	0	0	0	1.69	S4UL	250	430	12,000
Nickel	5	21	27	0	0	0	27.08	S4UL	130	180	980
Phenols	5	<1.0	<1.0	0	0	0	<1.0	S4UL	200	690	690
Benzo[a]pyrene	5	<0.05	0.91	0	0	0	0.68	S4UL	0.98	1.2	15
Copper	5	15	65	0	0	0	49.74	S4UL	2400	7100	68,000
Zinc	5	64	1100	0	0	0	739.24	S4UL	3700	40,000	730,000
Free Cyanide	5	<1	<1	0	0	0	<1	ATRISK	34	34	34

Notes

S4UL and C4SL for metals were derived using 6% SOM. These values are not sensitive to SOM and would also be applicable for 1% SOM and 2.5% SOM.

LQM/CIEH S4ULs 'Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3608. All rights reserved'.

ATRISKsoil SSVs produced by Atkins Limited and provided under licence to Ground Engineering Limited.

Discussion of Soil Results

Levels of almost all elements and compounds were within the associated soil screening values for both residential and commercial/industrial end uses. A slightly elevated lead concentration in a sample of fill at the rear south-eastern corner of the farmyard, from 0.10m depth in HA5, exceeded the soil screening values for residential end uses, but not for a commercial/industrial end use.

Statistical analysis, using the mean value test, indicates that none of the US95 values for all the elements and compounds tested, including lead, exceeded the screening values for the most sensitive end use of residential with home grown produce. None of the US95 values exceeded the screening values for a commercial or industrial usage.

The made ground did not have any olfactory nor visual evidence of fuel contamination. The total petroleum hydrocarbon concentrations in the samples tested were 101mg/kg (HA5) and 137mg/kg (HA4), which are not considered significant. The concentrations of BTEX and MTBE in the samples tested were all below the laboratory detection limit and are also not considered significant.

The previous investigation found localised TPH contamination beside two above ground fuel tanks in the farmyard, with total TPH concentrations of 2100mg/kg and 4800mg/kg, respectively.

The results indicate that the made ground would generally be considered suitable for retention at the surface in the context of a proposed residential setting. Where TPH impacted soils are encountered, they should be removed from the site and replaced with clean imported granular soils, subsoil, or topsoil.

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 relative to the existing site and proposed residential use of the site is presented in Table 6 below.

Table 6: General Conceptual Model Relative to Future Residential Development

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

<u>Key to Table 6</u> 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 existing site, the site history and proposed residential end use of the site, in the context of the conceptual model, are discussed as follows.

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

Contaminated Soil

On the basis of this ground investigation, the site is underlain by between 0.15m and 0.45m of made ground resting on naturally deposited Tidal Flat Deposits. The level of contaminants indicates that there is a low risk of contaminants affecting groundworkers during any construction works, and there will be a low to moderate risk of affecting future end users of the site within a residential setting.

Any TPH impacted soils, including those previously identified beneath the proposed building, should be removed from the site and replaced with clean imported granular fill, subsoil or topsoil. The 0.15m to 0.45m thick surface fill encountered would generally be considered suitable for retention or re-use with garden or landscaped areas, and if geotechnically suitable could be considered for re-use beneath buildings or hardstanding areas.

There is a very low risk of contamination affecting the proposed dwelling and its foundations.

The underlying naturally deposited soils encountered beneath the site would also be considered suitable for re-use within the development.

Drainage

Redundant foul or surface water drain runs, if present, should be removed where encountered from beneath the site and precautions should ensure that any remaining effluent or sediment is directly disposed off-site. The integrity of any existing drains should be checked, and where they are to be retained, any damaged sections should be replaced prior to development.

Buildings

The existing remaining outbuildings within the site may have asbestos containing materials within them and an asbestos survey should be undertaken prior to the proposed redevelopment. Suitable precautions, in line with current best practice, should be put in place to protect workers from the effects of asbestos material, during the site clearance and redevelopment phases.

Soil Gas

There are no landfills within 250m of the site. The site is underlain by a surface layer of made ground, covering superficial, silty clay soils.

There is a low risk that hazardous gases would affect groundworkers during the construction phase and a low risk of hazardous gases affecting future users of the site.

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

Human Health - Construction Workers

The risk of the made ground affecting the groundworkers during the construction phase would be considered to be low.

Based on the chemical test results, 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) Generation of dust should be limited by damping-down.

d) Suitable precautions, in line with current best practice, should be put in place to protect workers from the effects of asbestos containing material, during the site clearance phase. Asbestos containing materials should be handled by qualified operatives and disposed of at a suitably licensed landfill.

e) 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.

Human Health - Users of Completed Development

The results of the chemical analysis would indicate that the made ground should generally be considered to be suitable for re-use at the surface within any new landscaped or garden areas. Where garden/landscaped areas are proposed within the former farmyard (around HA4 and HA5), a clean cover with up to 0.30m of clean inert topsoil may be required to provide a suitable growing medium.

The made ground, except any TPH impacted soils, could be considered for re-use beneath proposed buildings and permanent hardstanding, if suitable for engineering purposes, where it is unlikely to affect future users of the site.

Any soil imported to site must be certified as "suitable for use".

No precautionary measures are required to protect the development from radon.

Water Environment

The site is underlain by superficial Tidal Flat Deposits, indicated by the EA to be an unproductive stratum, which cover the solid geology Ampthill Clay Formation at depth, also indicated by the EA to be an unproductive stratum. The nearest surface water features are the drains on the south-western and south-eastern corners of the site. The site does not lie within a source protection zone.

No groundwater was recorded within 0.90m below ground level during the investigation.

The risk to the water environment is considered very low as it is unlikely that the proposed development would impact the quality of the water environment.

Effects on Buried Services

The local water supply company should be consulted if new buried plastic water pipes within the made ground soils on this site are proposed.

Off-Site Disposal of Soil Arisings

The results of chemical analysis are provided following the exploratory hole records and can be used within the information necessary for basic characterisation of the soil destined for landfill. The Environment Agency publication Hazardous Waste, Technical Guidance WM3 outlines the methodology for classifying wastes and should be referenced for guidance. The test results (total metals, hydrocarbons and cyanide) should be compared to the relevant thresholds to determine whether they fall into the primary categories of non-hazardous or hazardous waste and will help indicate the likely European Waste Catalogue (EWC) code which is determined by the waste type. Asbestos containing materials would be considered hazardous and should be appropriately disposed of.

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. Basic characterisation is the responsibility of the waste producer, whilst compliance checking and on-site verification are generally the responsibility of the landfill operator. The landfill operator will need to liaise with the waste producer, as the approach relies on the information from basic characterisation.

It is expected that arisings of natural soils from the excavations across this site would 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.

CONCLUSIONS

The proposed development is understood to comprise construction of a new large residential dwelling, with associated gardens, landscaping and hardstanding areas.

Remediation Strategy

Suitable precautions, in line with current best practice, should be put in place to protect workers from the effects of any asbestos containing material during the site clearance phase.

The results of the chemical analysis would indicate that the made ground should generally be considered to be suitable for re-use at the surface within any new garden, landscaped or patio areas. Similarly, for areas to be covered by buildings or permanent hard surfaced areas, the made ground could also be re-used, however these soils could affect buried services or be geotechnically unsuitable.

Any TPH impacted soils should be removed from the site and replaced with clean imported granular fill, subsoil, or topsoil.

In the former farmyard area (around HA4 and HA5), a clean cover of imported subsoil and topsoil may be required to provide a suitable growing medium.

Any soil imported to site must be certified as "suitable for use".

Imported Materials

Any imported materials should have appropriate certificates confirming its suitability prior to placement.

REMEDICATION METHOD STATEMENT

The following points will constitute a plan for remedial works considered necessary in order to ensure that soils retained within the development are fit for use.

- The groundworks contractor should undertake a watching brief during works to check for polluted soil.
- An asbestos survey should be undertaken and any asbestos materials should be handled by qualified operatives and disposed of at a suitably licensed landfill.
- The made ground is generally considered suitable for retention where private residential garden areas are proposed, however in the former farmyard area a clean imported topsoil may be required to provide a suitable growing medium. Selected made ground could be considered for re-use beneath proposed buildings and permanent hardstanding.
- TPH impacted soils should be removed from the site and replaced with clean imported granular fill, subsoil or topsoil.
- If soils are revealed which are different to those encountered by this ground investigation, the advice of a specialist should be sought.
- A photographic record of such remediation should be undertaken by the contractor.
- Any imported 'clean' inert topsoil and granular fill should be supported by verification certificates to provide proof of its suitability. Documentation relating to the source of clean inert topsoil should be presented to the Local Planning Authority for approval prior to infilling. Samples of any imported clean topsoil placed in the garden areas should be tested to verify that the soil is suitable for use.
- The Local Authority should also be informed regarding each stage of the works and photographic evidence together with copied waste transfer receipts for any arisings should be gathered, as they are essential to demonstrate the works.
- The local water supply company should be consulted if new buried plastic water pipes within the made ground soils on this site are proposed.

VALIDATION

As the scheme includes private gardens and/or landscaped areas, a watching brief would be recommended. Implementation of the remediation method statement 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.

GROUND ENGINEERING LIMITED



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Site Location Plan

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Not To Scale



Project : Pear Tree Farm, St. James Road, Long Sutton,
Lincolnshire

Client : Nene Transport (Lincs) Limited

**GROUND
ENGINEERING
LIMITED**

Peterborough

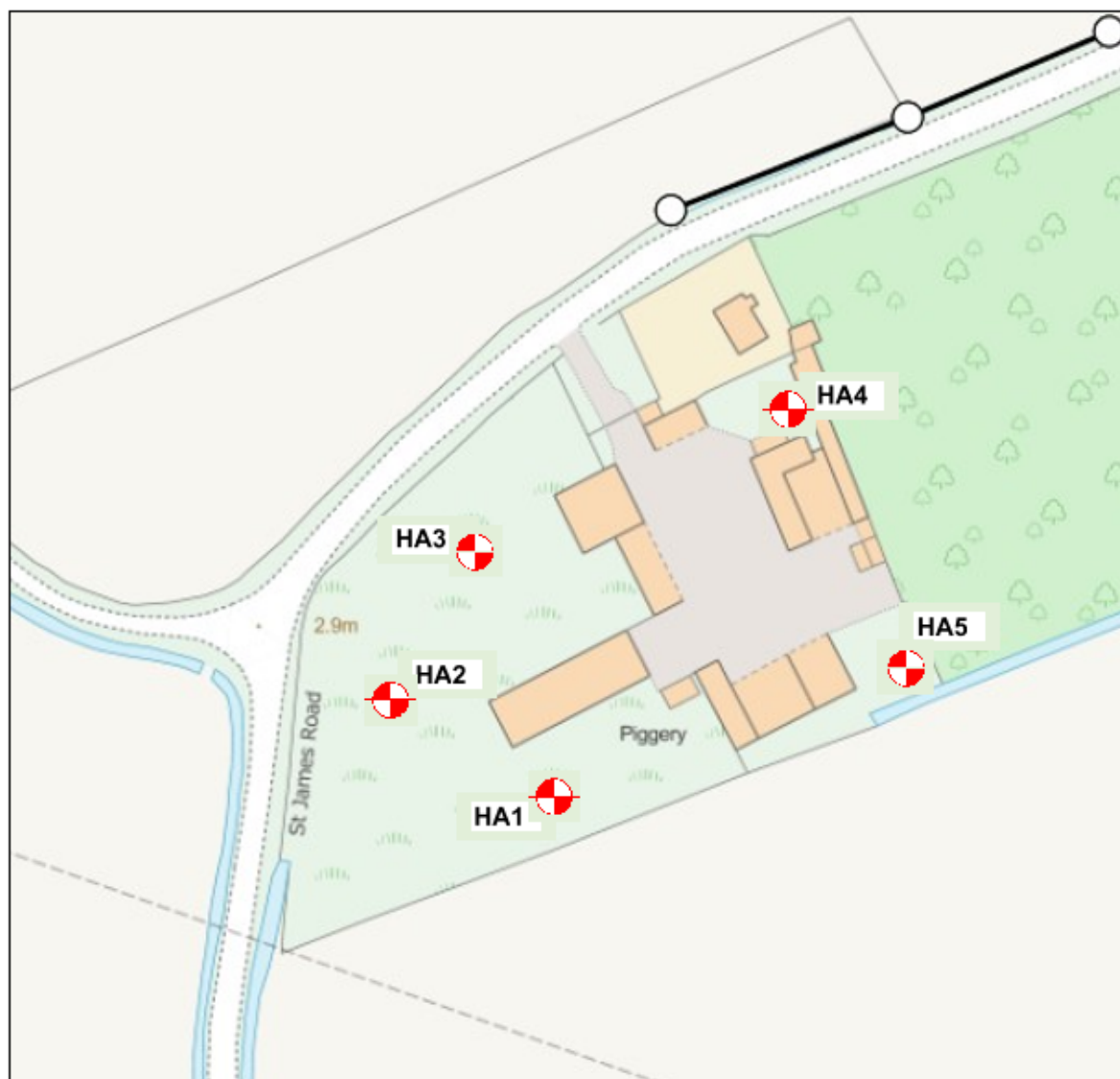
Tel : 01733 566566

Project No.

C15075

Exploratory Hole Location Plan

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Not To Scale



Project : Pear Tree Farm, St. James Road, Long Sutton,
Lincolnshire

Client : Nene Transport (Lincs) Limited

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

Project No.
C15075

Based on plan provided by client.



Project No.
C15075

Site Photographs



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Lincolnshire

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**GROUND
ENGINEERING
LIMITED**

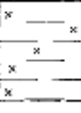
Peterborough Tel : 01733 566566

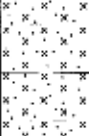
**Project No.
C15075**

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: PEAR TREE FARM, ST. JAMES ROAD, LONG SUTTON				HAND AUGER HA1			
			Date: 15/06/20		Hole Size: 70mm dia to 0.90m		Ground Level:			
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m			
Depth m	Type	Result								
0.30	ES1			MADE GROUND - Brown, slightly sandy, clayey SILT with rare fine angular brick fragments.		0.40				
0.60	ES2			Orange brown, slightly clayey SILT. (TIDAL FLAT DEPOSIT)		0.70				
0.80	ES3			Soft, brown and orange brown, silty CLAY. (TIDAL FLAT DEPOSIT)		0.90				
				Hole completed at 0.90m depth						
REMARKS 1. Live roots observed to 0.20m depth 2. Hole sides stable							Project No 15075			
							Scale 1:25 Page 1/1			
KEY D - Disturbed Sample MP - Mackintosh Probe B - Bulk Sample V - Vane Shear Test U - Undisturbed Sample Cohesion () kPa W - Water Sample ES - Environmental R - Root Sample Sample ☒ Water Strike ☒ Water Rise ☒c Level on completion ☒s Standpipe Level				Groundwater Strikes			Groundwater Observations			
				Depth m			Depth m			
				No Struck	Rose to	Rate	Cased	Scaled	Date	Hole
						15/06/20	0.90		dry	

GROUND ENGINEERING LIMITED Tel: 01793-556566 www.groundengineering.co.uk			Site: PEAR TREE FARM, ST. JAMES ROAD, LONG SUTTON				HAND AUGER HA2					
			Date: 15/06/20		Hole Size: 70mm dia to 0.70m		Ground Level:					
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m					
Depth m	Type	Result										
0.20	ES1			MADE GROUND - Soft, brown, slightly sandy, clayey SILT with rare fine angular brick fragments.		0.40						
0.50	ES2			Soft, brown and grey, silty CLAY. (TIDAL FLAT DEPOSIT)		0.70						
				Hole completed at 0.70m depth								
REMARKS 1. Live roots observed to 0.20m depth 2. Hole sides stable							Project No 15075					
							Scale 1:25	Page 1/1				
KEY D - Disturbed Sample MP - MacIntosh Probe B - Bulk Sample V - Vane Shear Test U - Undisturbed Sample Cohesion () kPa W - Water Sample ES - Environmental R - Root Sample Sample ▽ Water Strike Water Rise ▽c Level on completion ▽s Standpipe Level			Groundwater Strikes				Groundwater Observations					
			Depth m						Depth m			
			No	Struck	Rose to	Rate	Cased	Scaled	Date	Hole	Casing	Water
							15/06/20	0.70		dry		

GROUND ENGINEERING LIMITED Tel: 01793-666566 www.groundengineering.co.uk			Site: PEAR TREE FARM, ST. JAMES ROAD, LONG SUTTON				HAND AUGER HA3																
			Date: 15/06/20		Hole Size: 70mm dia to 0.70m			Ground Level:															
Samples and in-situ Tests			(Date) Water		Description of Strata		Legend		Depth m		O.D. Level m												
Depth m			Type			Result																	
0.30			ES1			MADE GROUND - Soft, brown and dark brown, slightly sandy, clayey SILT with rare fine angular brick fragments. Firm, friable, grey, brown and orange brown, silty CLAY. (TIDAL FLAT DEPOSIT)					0.35												
0.50			ES2								0.70												
						Hole completed at 0.70m depth																	
REMARKS 1. Live roots observed to at least 0.70m depth 2. Hole sides stable										Project No 15075													
										Scale 1:25		Page 1/1											
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample W - Water Sample R - Root Sample ✓ Water Strike ✓ Level on completion MP - Mackintosh Probe V - Vane Shear Test Cohesion () kPa ES - Environmental Sample ✓ Water Rise ✓ Standpipe Level						Groundwater Strikes						Groundwater Observations											
						Depth m						Depth m											
						No Struck		Rose to		Rate		Cased		Sealed		Date		Hole		Casing		Water	
																15/06/20		0.70				dry	

GROUND ENGINEERING L I M I T E D Tel: 01783-566566 www.groundengineering.co.uk			Site: PEAR TREE FARM, ST. JAMES ROAD, LONG SUTTON				HAND AUGER HA4			
			Date: 15/06/20		Hole Size: 70mm dia to 0.80m		Ground Level:			
Samples and in-situ Tests			(Date)	Description of Strata			Legend	Depth m	O.D. Level m	
Depth m	Type	Result	Water							
0.30	ES1			MADE GROUND - Brown, slightly gravelly, sandy SILT. Gravel is fine and medium, angular and sub-angular brick, ash and coal. Firm, friable, grey, brown and orange brown, silty CLAY. (TIDAL FLAT DEPOSIT)				0.45		
0.60	ES2									
				Pit completed at 0.80m depth				0.80		
REMARKS 1. Live roots observed to at least 0.80m depth								Project No 15075		
								Scale 1:25	Page 1/1	
KEY D - Disturbed Sample MP - Mackintosh Probe B - Bulk Sample V - Vane Shear Test U - Undisturbed Sample Cohesion () kPa W - Water Sample ES - Environmental R - Root Sample Sample ☒ Water Strike ☒ Water Rise ☒c Level on completion ☒s Standpipe Level				Groundwater Strikes			Groundwater Observations			
				Depth m			Depth m			
				No	Struck	Rose to	Rate	Cased	Sealed	Date
						15/06/20	0.80		dry	

GROUND ENGINEERING L I M I T E D Tel: 01733-686686 www.groundengineering.co.uk			Site: PEAR TREE FARM, ST. JAMES ROAD, LONG SUTTON				HAND AUGER HA5														
			Date: 15/06/20		Hole Size: 70mm dia to 0.90m		Ground Level:														
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m														
Depth m	Type	Result																			
0.10	ES1			MADE GROUND - Dark brown, slightly sandy, slightly gravelly, slightly clayey SILT. Gravel is fine angular brick fragments. Brown and orange brown, slightly sandy, clayey SILT.		0.15															
0.40	ES2			(TIDAL FLAT DEPOSIT)		0.70															
0.80	ES3			Firm, friable, grey, brown and red brown, silty CLAY. (TIDAL FLAT DEPOSIT)		0.90															
				Hole completed at 0.90m depth																	
REMARKS 1. Live roots observed to at least 0.90m depth 2. Hole sides stable							Project No 15075														
							Scale 1:25 Page 1/1														
KEY D - Disturbed Sample MP - Mackintosh Probe B - Bulk Sample V - Vane Shear Test U - Undisturbed Sample Cohesion () kPa W - Water Sample ES - Environmental R - Root Sample Sample ☒ Water Strike ☒ Water Rise ☒ Level on completion ☒ Standpipe Level				Groundwater Strikes Depth m <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>No</th> <th>Struck</th> <th>Rose to</th> <th>Rate</th> <th>Cased</th> <th>Sealed</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>			No	Struck	Rose to	Rate	Cased	Sealed							Groundwater Observations Date Hole Casing Water 15/06/20 0.90 dry		
No	Struck	Rose to	Rate	Cased	Sealed																



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M/CERTS



Environmental Science

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e: reception@i2analytical.com

e: simon@groundengineering.co.uk

Analytical Report Number : 20-14432

Project / Site name:	Pear Tree Farm, Long Sutton	Samples received on:	16/06/2020
Your job number:	SW-C-5075	Sample instructed / Analysis started on:	16/06/2020
Your order number:		Analysis completed by:	23/06/2020
Report Issue Number:	1	Report issued on:	23/06/2020
Samples Analysed:	5 soil samples		

Signed: *Agnieszka Czerwińska*

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 20-14432-1 Pear Tree Farm, Long Sutton SW-C-5075

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

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Environmental Science

Analytical Report Number: 20-14432

Project / Site name: Pear Tree Farm, Long Sutton

Lab Sample Number	1535278	1535279	1535280	1535281	1535282
Sample Reference	HA1	HA2	HA3	HA4	HA5
Sample Number	ES1	ES1	ES1	ES1	ES1
Depth (m)	0.30	0.20	0.30	0.30	0.10
Date Sampled	15/06/2020	15/06/2020	15/06/2020	15/06/2020	15/06/2020
Time Taken	1100	1130	1200	1230	1300
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	29	31
Total mass of sample received	kg	0.001	NONE	0.50	0.50

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	5.9	6.9	7.1	7.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	25	38	44	250	66
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.019	0.022	0.12	0.033
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	12.3	18.9	22.2	124	33.0
Organic Matter	%	0.1	MCERTS	4.4	4.2	5.7	6.9	9.4

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.1	0.98
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.9	1.6
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.6	1.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.1	0.46
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.1	0.78
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.3	0.78
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.52	0.41
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.91	0.49
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.55	0.42
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.61	0.46

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	10.6	7.46
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	13	14	16	13
Boron (water soluble)	mg/kg	0.2	MCERTS	2.7	2.4	2.8	7.7	4.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	2.1
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (III)	mg/kg	1	NONE	25	34	36	30	37
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	35	36	30	37
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	16	22	32	65
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	22	23	53	350
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	0.4	0.4	0.5	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	24	26	26	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	2.1
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	64	81	96	240	1100



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MCERTS



Environmental Science

Analytical Report Number: 20-14432

Project / Site name: Pear Tree Farm, Long Sutton

Lab Sample Number	1535278	1535279	1535280	1535281	1535282
Sample Reference	HA1	HA2	HA3	HA4	HA5
Sample Number	ES1	ES1	ES1	ES1	ES1
Depth (m)	0.30	0.20	0.30	0.30	0.10
Date Sampled	15/06/2020	15/06/2020	15/06/2020	15/06/2020	15/06/2020
Time Taken	1100	1130	1200	1230	1300
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic > EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC10 - EC12	mg/kg	1	MCERTS	-	-	-	3.6	1.2
TPH-CWG - Aliphatic > EC12 - EC16	mg/kg	2	MCERTS	-	-	-	7.7	3.7
TPH-CWG - Aliphatic > EC16 - EC21	mg/kg	8	MCERTS	-	-	-	15	14
TPH-CWG - Aliphatic > EC21 - EC35	mg/kg	8	MCERTS	-	-	-	42	51
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	66	69

TPH-CWG - Aromatic > EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	-	-	-	1.9	< 1.0
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	-	-	-	4.6	< 2.0
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	-	-	-	22	< 10
TPH-CWG - Aromatic > EC21 - EC35	mg/kg	10	MCERTS	-	-	-	40	28
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	69	32



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Environmental Science

Analytical Report Number : 20-14432**Project / Site name: Pear Tree Farm, Long Sutton**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of soil should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1535270	HA1	ES1	0.30	Brown loam and sand with gravel.
1535279	HA2	ES1	0.20	Brown loam and sand with gravel.
1535280	HA3	ES1	0.30	Brown loam and sand with gravel.
1535281	HA4	ES1	0.30	Brown loam and sand with gravel and vegetation.
1535282	HA5	ES1	0.10	Brown loam and sand with gravel and vegetation.



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Environmental Science

Analytical Report Number : 20-14432

Project / Site name: Pear Tree Farm, Long Sutton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monocaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L015-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	Test Name	Test Ref	Test Deviation Code
HA4	ES1	S	20-14432	1535281	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
HA4	ES1	S	20-14432	1535281	b	TPHCWG (Soil)	L088/76-PL	b
HA5	ES1	S	20-14432	1535282	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
HA5	ES1	S	20-14432	1535282	b	TPHCWG (Soil)	L088/76-PL	b

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature