Phase II Environmental Assessment

Land off Worlds End Road
Tydd St Mary
Spalding
PE13 5QW

Prepared for:

R K Wilson Builders Ltd
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EPS Project Reference:	UK18.4095B
Date Issued:	1st May 2019
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LAND OFF WORLDS END ROAD, TYDD ST MARYS

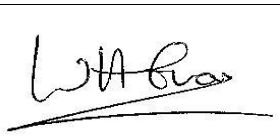
NON-TECHNICAL CLIENT SUMMARY

This report presents the findings of a Phase II Environmental Investigation which was carried out to provide an assessment of shallow ground conditions across the site and to identify potential contamination and make recommendations for and further works that may be required. Pertinent findings and conclusions may be summarised as follows:

- The site currently comprises a roughly rectangular plot of land which has recently been used as a farm, but at the time of the investigation all the buildings had been removed. The proposed development plans include five new residential dwellings with associated access roads and private gardens.
- Intrusive investigations included completion of a number of trial pits which found the ground conditions to predominantly comprise a layer of topsoil in the western half of the site, up to 0.25m thick, with made ground in the eastern area, up to 0.85m thick, overlying Tidal Flat Deposits.
- Laboratory analysis of shallow soil samples reported elevated levels of Lead in made ground. In addition, it was noted that made ground contained large fragments of bricks and other material which would not be considered suitable for use in garden areas. As such, a clean cover system of at least **100mm** of imported soils is recommended in all areas of domestic gardens.

The above points represent a simplified summary of the findings of this assessment and should not form the basis for key decisions for the proposed development. A thorough review of the details contained within the following report is recommended, or alternatively give us a call and we'll talk you through it.

Project Reference:	UK18.4095B
Title:	Phase II Environmental Assessment Land off Worlds End Road, Tydd St Marys
Client:	R K Wilson Builders Ltd
Date:	1st May 2019
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Status:	Issue 1

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If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS however, EPS cannot guarantee the validity of these data.

Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

No part of this report, or references to it, may be included in published documents of any kind without approval from EPS. This report and its contents, together with any supporting correspondence or other documentation, remain the property of Environmental Protection Strategies Ltd until paid for in full.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Previous Reports 1
1.2 Objectives 1
1.3 Scope of Work 2
1.4 Limitations and Constraints 2
2 SUMMARY OF INTRUSIVE INVESTIGATIONS 4
2.1 Borehole Locations 4
2.2 Soil Sampling and In-Situ testing 4
2.3 Laboratory Analysis 4
3 FINDINGS OF THE INVESTIGATiON 5
3.1 Ground Conditions 5
3.1.1 Topsoil 5
3.1.2 Made Ground 5
3.1.3 Tidal 5
3.2 Groundwater 5
3.3 Physical Evidence of Contamination 6
3.4 Laboratory Analysis – Soil 6
4 ENVIRONMENTAL APPRAISAL 8
4.1 Human Health 8
4.1.1 Land Use Setting & Screening Criteria 8
4.1.2 Assessment of Results 8
4.1.3 Risk Evaluation 9
4.2 Management of Contaminated Land 10
5 ENVIRONMENTAL CONCLUSIONS & RECOMMENDATIONS 11

Figures

Figure 1 Site Location Plan
Figure 2 Trial Pit Location Plan

Tables

Table 1 Laboratory Testing Schedule

Appendices

Appendix A Selected Site Photographs
Appendix B Proposed Development Plan
Appendix C Site Specific Borehole Logs
Appendix D Laboratory Results - Environmental
Appendix E Generic Screening Criteria
Appendix F Statistical Analysis
Appendix G Cover System Calculations
Appendix H Cover Soil Checklist
Appendix I Method Statement for Unexpected Contamination

1 INTRODUCTION

In March 2019, Environmental Protection Strategies Ltd (EPS) was commissioned by R K Wilson Builders Ltd to complete a Phase II Environmental Assessment at Land off Worlds End Road, Tydd St Marys, Spalding, PE13 ('the site'); see Figure 1.

This work was commissioned in order to support discharge of a planning condition (Condition 7) relating to potential contamination and associated with development proposals which are understood to include change of use from a disused farm to five residential properties with associated domestic garden areas, under the South Holland District Council Planning Reference: H21-0859-16.

This report summarises a Phase I Desk Study previously undertaken by EPS Ltd and presents the findings, conclusions and recommendations of the subsequent Phase II intrusive investigation. Selected site photographs are included as Appendix A and a proposed development plan is presented as Appendix B.

1.1 Previous Reports

This investigation supplements a Phase I Desk Study undertaken by EPS Ltd in April 2018. For background information, it is recommended that the reader reviews the following report:

- *Phase I Geo-Environmental Desk Study – Land off Worlds End Road* - (EPS Ltd Report Ref: UK18.4095)

In brief, the Phase I Desk Study included review of the historical activities at the site, review of geological and hydrogeological regime and development of a Conceptual Site Model.

The results of Phase I identified risks to future site users associated with exposure to site derived contaminants present within shallow soils, as a result of the sites previous use as a farm and associated red diesel storage. In addition, risks to groundwater were also highlighted as requiring further consideration. It was therefore recommended that a number of shallow trial pits are formed to assess the nature and quality of the underlying soils and to confirm their suitability within future private garden areas.

Since the previous Phase I works the farm buildings at the site had been demolished and removed from the site.

1.2 Objectives

The objectives of this investigation were as follows:

a) Investigate potential contaminant linkages previously identified through a Conceptual Site Model (CSM) by means of investigating the quality of shallow soils.
b) Determine the potential risks posed by the site and make recommendations for further work that may be required, to ensure safe development and suitability for use in accordance with the

Model Procedures for the Management of Land Contamination - Contaminated Land Report 11 and the *National Planning Policy Framework.*

1.3 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRAs '*Contaminated Land Statutory Guidance*' (2012), BS10175 (2011) –'*Investigation of Potentially Contaminated Sites*', and BS5930:2015 '*Code of Practice for Ground Investigation*', the following tasks were undertaken:

Site Work:

- Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- Health and safety briefing / site supervision.
- Excavation of eight trial pits to a maximum depth of 1.5 metre below ground level (m bgl).
- Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected soil samples.

Reporting:

- Data collection and interpretation.
- Reporting.

The findings of these investigations and their conclusions are presented in the following sections.

1.4 Limitations and Constraints

The purpose of this report is to present the findings of a ground investigation conducted at the location specified. When examining the data collected from the investigations made during the assessment, EPS makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the ground conditions encountered may differ to those encountered during the investigation.

Whilst it is recognised that information contained within this report may assist relevant and suitably qualified professionals, this report does not provide a geotechnical appraisal of ground conditions with respect to suitability of foundations or future structures, nor does it intend to identify a need for any associated geotechnical ground improvement works.

No visible evidence of Japanese Knotweed was identified during the site walkover. However, this plant can be difficult to identify in the early stages of growth and therefore it is not always possible

to identify its presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

The investigation was carried out to assess the significance of the underlying ground conditions as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

2 SUMMARY OF INTRUSIVE INVESTIGATIONS

The intrusive investigation was undertaken at the site on 26th March 2019 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections:

2.1 Borehole Locations

Borehole locations were selected through consideration of the Conceptual Site Model, the existing and proposed development layout, the location of below ground utilities, operational and health & safety considerations and to provide representative coverage across the site.

A total of eight trial pits (TP01 – TP08) were formed across the site to depths of up to 1.5m.

The overall objective in terms of trail pit location was to provide an appropriate lateral and vertical coverage of the shallow soils across the site, including targeting potential contamination sources. Further rationale for each sampling location is provided within the table below:

Location	Rationale
TP01 – TP08	To investigate the quality and nature of the shallow soils within the proposed garden areas and areas of soft landscaping.
TP01	Investigate the quality and nature of the shallow soils at the area of suspected burning, previously identified in the Phase I.
TP01-TP02 & TP06	Investigate the quality and nature of the shallow soils surrounding the area of the historic red diesel storage tank, previously identified in the Phase I.

All trial pits were formed in accordance with standard EPS drilling methodologies. A detailed site layout plan showing the location of the trial pits completed during the investigation is presented as Figure 2.

2.2 Soil Sampling and In-Situ testing

Each trial pit was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and presence of separate phase liquids on a precautionary basis. Soil samples were obtained from across the site for analysis of contaminants of concern given the proposed residential use.

2.3 Laboratory Analysis

Samples obtained for analysis of identified contaminants of concern were submitted to Jones Environmental Forensics Ltd of Deeside, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered to the laboratory by approved courier.

Copies of chain of custody documentation are held by EPS and will be made available on request.

A laboratory testing schedule is included as Table 1.

3 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the intrusive investigations undertaken.

3.1 Ground Conditions

Ground conditions encountered across the site can be briefly summarised as follows, site specific borehole logs are included as Appendix C.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Topsoil	0.25	0.20-0.25
Made Ground	0.85	0.50 – 0.85
Tidal Flat Deposits	Not Proven (>1.5)	Not Proven (>1.5)

3.1.1 Topsoil

Topsoil was encountered from the surface at TP03-TP04, in the western area of the site, and was present to depths of up to 0.25m below ground level (bgl), this material could be described as a dark brown sandy silty clay with common rootlets.

3.1.2 Made Ground

Made ground was encountered from the surface at TP01-TP02 & TP05-TP08, in the eastern area of the site, and was present to depths of up to 0.6m below ground level (bgl), this material was a dark brown sandy silty (sometimes slightly gravelly) clay with common rootlets, brick fragments, tiles fragments, pieces of wood and rubble. At TP08 the made ground recovered varied slightly and could generally be described as an orangish brown slightly clayey sand with brick fragments and wood. An additional layer of made ground was noted at WS01 which can be broadly described as soft, slightly sandy, silty, clay with cobble sized brick fragments, which extended to a maximum depth of 0.85m.

3.1.3 Tidal Flat Deposits

The topsoil and made ground were underlain by soils indicative of Tidal Flat Deposits. These soils which were encountered within all the boreholes typically comprised a layer of soft to firm brown slightly sandy silty clay which transitioned to a soft brownish grey silty clay with occasional orangish brown mottling proven to the maximum excavation depth of 1.5m.

3.2 Groundwater

Whilst groundwater was not encountered during the forming of any of the trial pits the base of TP05 was starting to become damp.

3.4 Physical Evidence of Contamination

Aside from evidence of made ground which contained brick, wood tile and rubble fragments no other physical evidence of contamination such as soil staining or odour was encountered in any of the sampling locations.

3.5 Laboratory Analysis – Soil

A laboratory analysis testing schedule is presented as Table 1 and all environmental sample results obtained from the laboratory are included as Appendix D. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	8	8	6.8	33.4	TP01 (0.1-0.4)
Cadmium	8	5	0.1	0.4	Various
Chromium III	8	8	16.2	47.1	TP01 (0.1-0.4)
Chromium VI	8	-	-		TP01 (0.1-0.4)
Copper	8	8	1	79	TP01 (0.1-0.4)
Lead	8	8	23	286	TP01 (0.1-0.4)
Mercury	8	2	0.2	0.3	TP02 (0.0-0.5)
Nickel	8	8	8.8	37	TP01 (0.1-0.4)
Selenium	8	2	1		Various
Zinc	8	8	25	275	TP01 (0.1-0.4)
Naphthalene	8	2	0.08	0.09	TP02 (0.0-0.5)
Benzo(a)pyrene	8	4	0.29	2.08	TP06 (0.1-0.5)
Dibenzo(ah)anthracene	8	4	0.07	0.40	TP06 (0.1-0.5)
PAH (Total of 16)	8	4	3.9	23.9	TP06 (0.1-0.5)
TPH Total Aliphatics C5 - 35	3	-	-		-
TPH Total Aromatics C5 - 35	3	2	133	166	TP06 (0.1-0.5)
MTBE	3	-	-		-
BTEX	3	-	-		-
Total Cyanide	2	-	-		-
ACM (% mass)	8	3	<0.001		Various

Notes:

-	Contaminant not identified above laboratory minimum instrument detection limits
PAH	Polycyclic Aromatic Hydrocarbons
ACM	Asbestos Containing Materials
MTBE	Methyl Tertiary Butyl Ether
BTEX	Benzene Toulene Ethylbenzene Xylene
TPH	Total Petroleum Hydrocarbons

- Metals were detected at background concentrations within the majority of shallow soil samples with elevated levels of lead recorded in TP01 0.1m – 0.4m.
- Individual PAH compounds were also detected within shallow soil samples at background concentrations with TP06 0.1m - 0.5m samples containing slightly elevated levels of select PAH compounds.

- TPH was detected in two of the three soil samples, TP01(0.1m- 0.4m) and TP06 (0.1m - 0.5m), analysed from the area in the vicinity of the red diesel storage tank, with the detections occurring in the made ground and corresponding to heavy end TPH fractions.
- The three samples analysed for MTBE & BTEX were found to contain concentrations below the laboratory detection limit.
- Asbestos, in the form of chrysotile fibre bundles was identified in three samples, TP05 (0.0m – 0.5m), TP06 (0.1m – 0.5m) and TP07 (0.0m – 0.55m), however upon quantification the concentration was identified to fall below the minimum detection limit (MDL) of 0.001% by mass.

4 ENVIRONMENTAL APPRAISAL

The following section summarises the method used to assess the risks posed to human health and controlled waters then identifies any sample results found by this investigation which warrant further consideration.

4.1 Human Health

4.1.1 Land Use Setting & Screening Criteria

It is understood that five residential dwellings will be constructed with associated areas of garden, planting and access roads. In order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health at a residential (with home-grown produce), relevant generic screening values for contaminants in soil have been used. The technical framework used to derive the screening values and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable For Use Levels (S4ULs) for Human Health Risk Assessment* – LQM and CIEH (2015).
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL:AIRE (2010)
- *Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010* – DEFRA (2013)

A summary of the screening criteria and the methodology used to derive them is included in Appendix E.

4.1.2 Assessment of Results

The results of the screening process for on-site human receptors show that generic screening criteria, representative of risk values for human health, have been exceeded for Lead and are summarised in the table below.

Contaminant	Screening Criteria (mg/kg)	Number of Exceedances	Exceedance (mg/kg) & Sampling Location
Lead	200	1	286 (TP01 0.1m-0.40m)

The results of the screening process for on-site human receptors show that generic screening criteria, representative of risk values for human health, have been exceeded for a Dibenzo[ah]anthracene measured at a concentration of 0.4mg/kg at TP06 (0.1m- 0.5m). However, it is considered reasonable to utilise Benzo(a)pyrene as a risk driver for genotoxic PAHs (i.e. including Dibenzo[ah]anthracene and Benzo(b)fluoranthene) to further assess the data set. This is primarily due to the fact that screening criteria representative of low risk rather than minimal exist for Benzo(a)pyrene but are not available for other genotoxic PAHs. As such assessment with use of Benzo(a)pyrene is considered to provide a more realistic and achievable results. As concentration of Benzo(a)pyrene in the shallow soil samples have not exceeded generic screening criteria risks from Benzo(a)pyrene and other genotoxic PAHs are considered acceptable.

In addition to the above an exceedance of lead in one out of eight samples was recorded in soils sampled beneath the site. The risks from lead are further evaluated through statistical analysis, as presented below.

4.1.3 Statistical Analysis

In order to further assess the potential risks posed to future site residents by lead within shallow soils, statistical analysis was carried out on these soil datasets.

It is noted that two out of eight shallow soil samples were collected from top soil. As the material was considered to represent a different source only shallow soil samples collected from made ground (where exceedance of lead was noted) were considered further in assessment of risks from lead.

The outlier test did not identify the highest concentration of lead (286mg/kg in TP01) as a statistical outlier. The made ground across the site appeared to be homogenous in nature therefore the concentration of lead is not considered to be representative of a 'secondary population' or 'hotspot' of contamination and on this basis was not removed from the datasets.

An upper 95th percentile confidence limit on the true mean (U95) was also calculated for these datasets so that a better comparison for lifetime exposure to future site users can be made for the site. This was carried out in line with recent guidance from CIEH and CL:AIRE entitled 'Guidance on *Comparing Soil Contamination Data with a Critical Concentration'* and the results are included in the following table.

Contaminant	Screening Criteria (mg/kg)	U95th Value
Lead	200	224.36

As shown above the results of the statistical analysis indicate that the Upper Confidence Limit (U95th Value) of the true population means are above relevant screening criteria. Which in turn indicates that the measured exceedances of lead could pose an unacceptable risk to future residents. The summary of the calculations for statistical testing referred to in this subsection are provided as Appendix F of this report, with detailed information regarding the calculations undertaken available on request.

4.1.4 Risk Evaluation

Lead was measured at a concentration which could pose a risk to future residents. The contaminant is known to exhibit low mobility and volatility in the environment, as such it is considered that the driving pathway associated with this contaminant is direct contact and dust inhalation. The exceedance was measured in soils sampled within the top 0.5m below ground level in the made ground. On this basis, shallow soils are not currently considered suitable for use where they coincide with the proposed domestic gardens. Consideration of control measures through which any such risks could be appropriately mitigated will be required.

Given the nature of the site and the type and magnitude of the exceedances, the most suitable management system is likely to comprise a clean soil cover system, in line with guidance presented within the BRE publication *Cover Systems for Land Regeneration: Thickness Design of Cover Systems for Contaminated Land (BRE, Mar 2004),* recommendations for which are presented in Section 5.

4.2 Controlled Waters

4.2.1 Generic Screening

In addition to screening the concentrations of contaminants in soil for risks to human health, EPS has also screened the concentrations for potential to cause harm to water resources. The criteria used for this process were derived by EPS using the following technical guidance:

- *Environment Agency Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination.*

Resource Sensitivity of Area	Basis of Tier 1 Criteria
High Groundwater Resource Potential (HGwRP) - Principal aquifers	UK Drinking Water Standards (UKDWS)
Low Groundwater Resource Potential (LGwRP) - Secondary aquifers not being abstracted and Un-productive groundwater strata	UK Environmental Quality Standards (EQS)

Screening criteria for Low Groundwater Resource Potential (LGwRP) have been adopted for this site due to the Tidal Flat Deposits being classified as an Unproductive Aquifer.

4.2.2 Assessment of Soil Results

The results of the screening process for controlled waters show that the screening values for Low Groundwater Resource Potential (LGwRP) were not exceeded for any contaminant in any of the samples analysed.

4.3 Management of Contaminated Land

In accordance with the Model Procedures for Management of Land Contamination (*Contaminated Land Report 11*), risks have not been identified by this work which will require further assessment. Using the approach outlined in CLR11, some recommended precautionary control measures are outlined in section 5 below.

5 ENVIRONMENTAL CONCLUSIONS & RECOMMENDATIONS

This environmental assessment has sought to establish if the contaminant linkages identified in the Phase 1 Desk Study are a significant risk to future site users. The main contaminant linkages comprised human health risks associated with exposure of future residents and site workers to potentially contaminated shallow soils as a result of the site's past agricultural use and the historical red diesel tank.

The exploratory intrusive investigation comprised the forming of eight trial pits to a maximum depth of 1.5m. Ground conditions were noted to comprise a layer of topsoil / made ground overlying a soft to firm brown slightly sandy silty clay which transitioned to a soft brownish grey silty clay with occasional orangish brown mottling.

Notable concentration of Lead was detected in the near-surface soils above minimum / low risk levels which have the potential to pose a risk to site end users in a residential setting. It is understood that private domestic gardens will form part of the proposed development and as such, it is recommended that clean soil should be placed to cover these area(s) in order to limit the level of interaction between future residents and underlying material. It should be noted that although only one out of eight shallow soil samples exceeded acceptable levels of contamination for lead, the physical properties of the made ground material were also considered, and it was concluded that shallow soil improvement would be required. No other contamination capable of posing unacceptable risk was noted beneath the site. Based on the above, recommendation is made for the installation of a clean cover system. Guidance presented within the BRE publication *Cover Systems for Land Regeneration: Thickness Design of* Cover *Systems for Contaminated Land (BRE, Mar 2004)* would indicate that a simple cover system involving **100mm** of clean soil cover would be adequate for any areas which are intended as private domestic gardens. It should be noted that this recommendation is made only for domestic garden areas and landscaping over areas of made ground, and there is no such requirement for areas beneath any hard standing / building footprint or where natural soils are encountered. The cover system calculations on which this minimum thickness is broadly based are included as Appendix G. To manage the suitability of the cover system material it is recommended that EPS' top soil checklist is used as a method of verification. The top soil checklist is included within Appendix H.

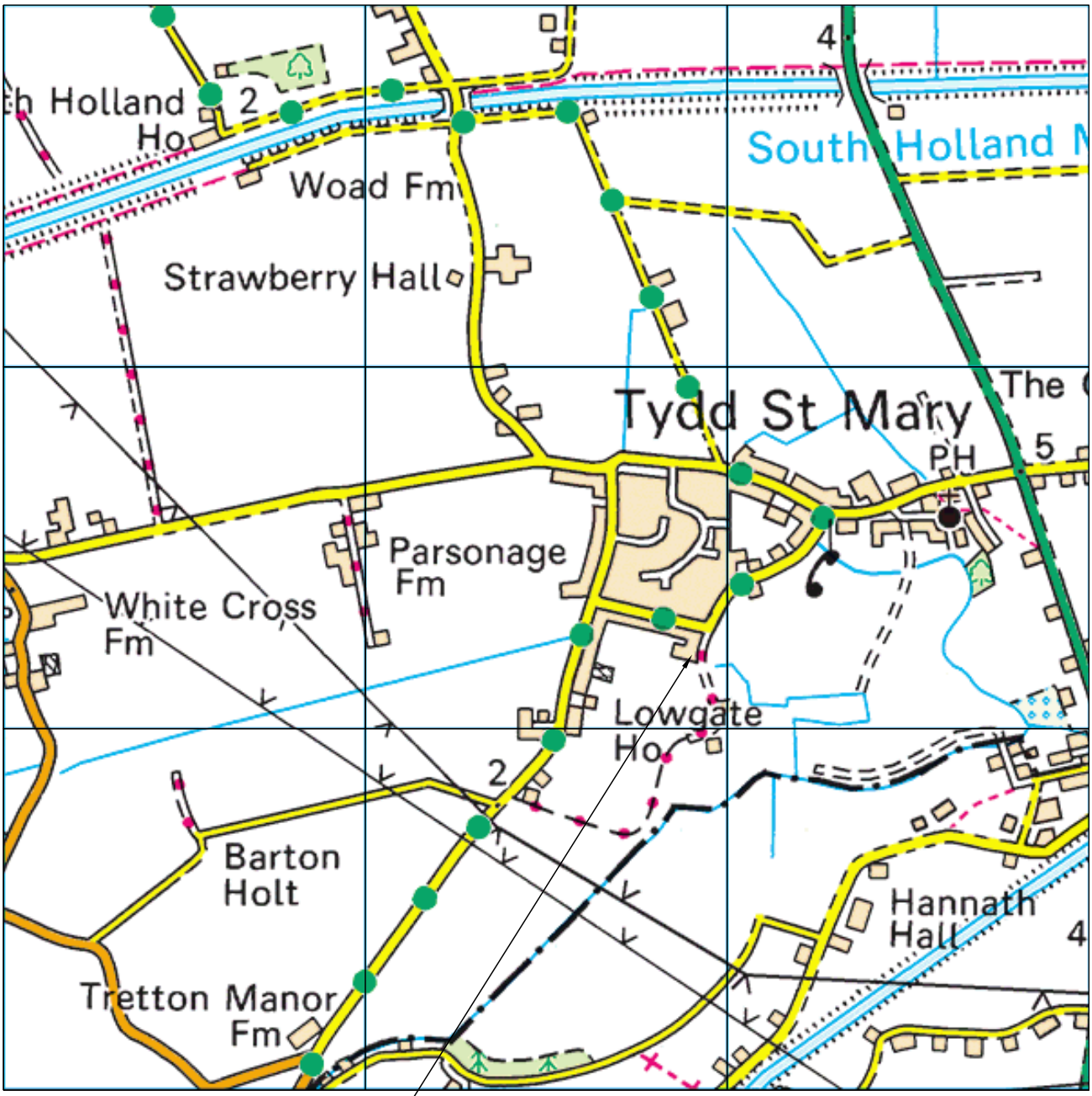
a) All construction workers operating at the site should be advised of the potential for exposure to and contact with Made Ground in the subsurface. Appropriate health and safety precautions should also be adopted during any excavation works to avoid exposure to soils. Reference should be made to relevant health & safety guidance including the following CIRIA document, *R132 Guide to Safe Working on Contaminated Sites*.

b) Should any palpable evidence of unexpected contamination be encountered during the redevelopment work, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out. A method statement for encountering any unexpected contamination is included as Appendix I of this report.

c) All waste material potentially containing asbestos should be disposed of with the appropriate duty of care in accordance with the control of Asbestos Regulations (2012), prior to any groundworks commencing.

In accordance with the *Model Procedures for Management of Land Contamination (Contaminated Land Report 11*), the risks identified by this work will not require further assessment. It is recommended that a copy of this report be provided to the Environmental Health Department of South Holland District Council for inclusion in their land quality record.

FIGURES



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Title: Site Location Plan

Project: Land off Worlds End Road, Tydd St Marys, PE13 5QW

Fig No: 1

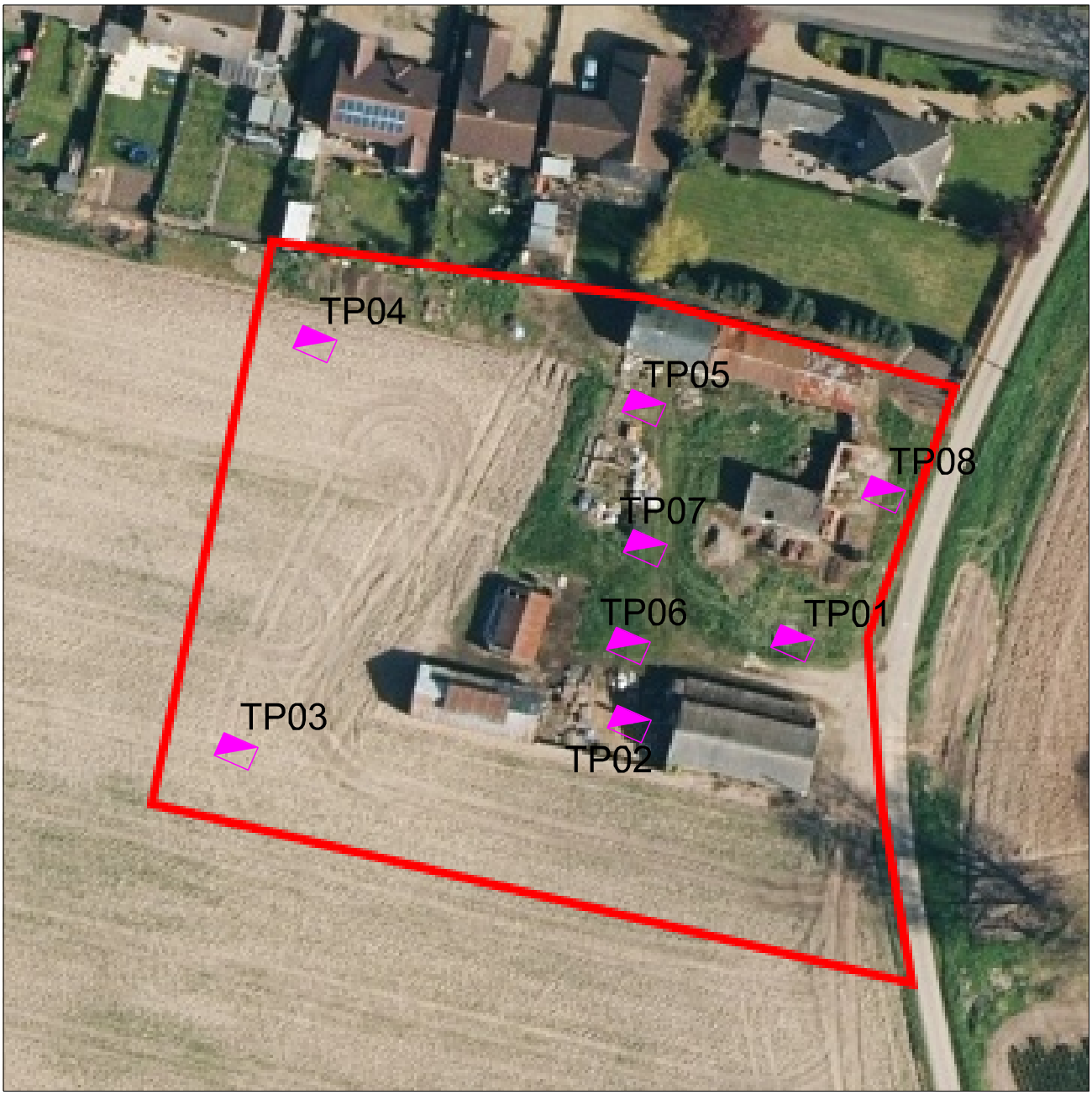
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Drawn By: JB | Approved By: WE

Job No: UK18.4095B

Dwg No: Spalding/0419/01

Date: April 2019



Approximate Site Boundary

Approximate Trial Pit Locations

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Title: Trial Pit Location Plan

Project: Land off Worlds End Road, Tydd St Marys, PE13 5QW

Fig No: 2

Scale: NTS

Drawn By: JB | Approved By: WE

Job No: UK18.4095B

Dwg No: Spalding/0419/02

Date: April 2019

TABLES

Table 1 – Laboratory Testing Schedule

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	EPS TPH Suite
TP01	0.1-0.4	1	1
TP02	0.0-0.5	1	1
TP03	0.2-0.5	1	-
TP04	0.25-0.5	1	-
TP05	0.0-0.5	1	-
TP06	0.1-0.5	1	1
TP07	0.0-0.55	1	-
TP08	0.0-0.30	1	-

Notes:

mbgl	meters below ground level
1	Sample Taken
EPS Mini Suite	Organic Matter, Cyanide, Metals, PAH's, Phenols, Asbestos
EPS TPH Suite	TPH CWG, MTBE, BTEX

APPENDICES

APPENDIX A

Selected Site Photographs



Approximate Site Boundary

(1) Approximate Photo Location

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Title: **Photo Location Plan**

Project: Land off Worlds End Road, Tydd St Marys, PE13 5QW

Appendix: A

Scale:	NTS
Drawn By: JB	Approved By: WE
Job No:	UK18.4095B
Dwg No:	Spalding/0419/A
Date:	April 2019

Photo 1: Photograph from the rear of the site looking east towards the World's End Road.	Photo 2: Photograph from the main access point, facing north.
	
Photo 3: Photograph showing the sidewall of TP04.	Photo 4: Photograph showing the made ground material and the damp base of TP05.
	
Photo 5: Photograph showing the made ground material in TP07.	Photo 6: Photograph showing the sandier material of TP08.
	

APPENDIX B

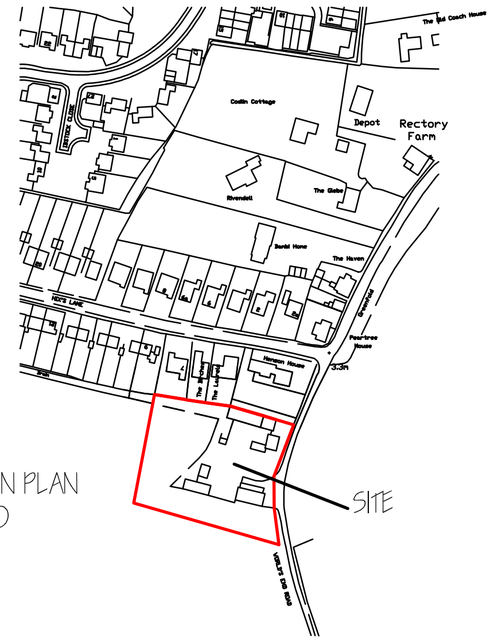
Indicative Proposed Development Plan



SITE AREA :- 0.49 Hectares.

SITE PLAN
1/500

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LOCATION PLAN
1/2500

INDICATIVE DWELLINGS SCHEDULE :-

PLOT 1 - 4 BEDROOM HOUSE & DETACHED DOUBLE GARAGE.
PLOT 2 - 3 BEDROOM HOUSE & DETACHED SINGLE GARAGE.
PLOT 3 - 3 BEDROOM BUNGALOW WITH ATTACHED SINGLE GARAGE.
PLOT 4 - 3/4 BEDROOM BUNGALOW & DETACHED DOUBLE GARAGE.
PLOT 5 - 3 BEDROOM BUNGALOW & DETACHED DOUBLE GARAGE.

INDIVIDUAL ACCESSES & PRIVATE DRIVEWAY OFF WORLD'S END ROAD TO BE INSTALLED TO THE REQUIREMENTS & SPECIFICATION OF LINC'S C C, HIGHWAYS DEPARTMENT.

- Derelict buildings to be demolished.

ref:	revision	date
B.	FOOTPATH EXTENDED - LCC HIGHWAYS.	JAN 17.
A.	INTRODUCE FOOTPATH - LCC HIGHWAYS.	JAN 2017.

G. R. MERCHANT GRM
I.ENG AMICE FIWO

ARCHITECTURAL, STRUCTURAL AND LAND DRAINAGE CONSULTANTS

Unit 4, Wrights Mews
12A Park Road, Holbeach,
Spalding, Lincs, PE12 7EE
Tel: 01406 490800
Fax: 01406 425744
E-Mail: G. R. Merchant @ Merchant. FS. Co. UK

Project
RESIDENTIAL DEVELOPMENT
WORLD'S END ROAD
TYDD ST MARY
WISBECH, CAMBS, PE13 5QL.

Client
MR & MRS T THORPE.

Drawing
LOCATION & SITE LAYOUT PLANS

Job Ref. 3019-16.
Drawing No. 01B.
Date AUG' 16.
Drawn GRM/ HLD
Scales AS INDICATED.

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All materials to be new unless otherwise stated and all components and materials etc. to be used fitted and installed etc., in strict accordance with manufacturers instruction and relevant code of practice. Materials shall conform to appropriate British standard specification or BBA certificate or European code equivalent. The Employer / Client shall ensure that the selected contractor is conversant with and adopts all measures necessary to achieve compliance with Health and Safety legislation for Building sites and Work places. The Employer / Client is advised that should the works need to comply with the Construction Design and Management Regulations an independant Planning Supervisor will be required. The works shall comprise of all that is shown on the drawing and details. Work that may not specifically shown but may be reasonably inferred as necessary to carry out the works shall be deemed to be included.

APPENDIX C

Site Specific Borehole Logs

Trial Pit Log

Trialpit No **TP01**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:
Location:	Spalding	Dimensions (m): Depth 1.30	1.6 × 0.7
Client:	R K Wilson Builders Ltd		

Date 26/03/2019

Scale 1:15

Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.40	ES					Made Ground: dark brown slightly sandy silty CLAY, with fragments of brick, tiles and rubble
				0.50			Made Ground: soft brown slightly sandy silty CLAY with brick fragments
				0.85			Soft brownish grey silty CLAY (TFD)
				1.30			End of pit at 1.30 m

1

2

3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP02**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:	Date 26/03/2019
Location:	Spalding	Dimensions (m): Depth 1.20	1.6 × 0.7	Scale 1:15
Client:	R K Wilson Builders Ltd			Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.50	ES		0.50			Made Ground: dark brown slightly sandy slightly gravelly silty CLAY, with fragments of brick, tiles and cobble sized hard standing.
				0.80			Soft brown slightly sandy silty CLAY (TFD)
				1.20			Soft brownish grey silty CLAY (TFD)
							End of pit at 1.20 m

1

2

3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP03**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:
Location:	Spalding	Dimensions (m): Depth 1.20	1.6 × 0.7
Client:	R K Wilson Builders Ltd		

Date 26/03/2019

Scale 1:15

Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 - 0.50	ES		0.20			Topsoil dark brown sandy silty CLAY with common rootlets.
				0.70			Firm soft brown slightly sandy silty CLAY (TFD)
				1.20			Soft brownish grey silty CLAY with orangish brown mottling (TFD)
							End of pit at 1.20 m

1

2

3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP04**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:
Location:	Spalding	Dimensions (m): Depth 1.20	1.8 × 0.7
Client:	R K Wilson Builders Ltd		

Date 26/03/2019

Scale 1:15

Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.25 - 0.50	ES		0.25			Topsoil dark brown sandy silty CLAY with common rootlets.
				0.70			Soft to firm soft brown slightly sandy silty CLAY (TFD)
				1.20			Soft brownish grey silty CLAY with orangish brown mottling (TFD)
							End of pit at 1.20 m

1

2

3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP05**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:	Date 26/03/2019
Location:	Spalding	Dimensions (m): Depth 1.50	1.5 / 0.7	Scale 1:15
Client:	R K Wilson Builders Ltd			Logged

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.50	ES					Made Ground: dark brown very sandy silty gravelly CLAY with fragments of brick, wood and tiles.
				0.60			Soft to firm soft brown slightly sandy silty CLAY (TFD)
				0.80			Soft brownish grey silty CLAY with occasional orangish brown mottling (TFD)
				1.50			End of pit at 1.50 m

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP06**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:
Location:	Spalding	Dimensions (m): Depth 1.40	1.65 × 0.7
Client:	R K Wilson Builders Ltd		

Date 26/03/2019

Scale 1:15

Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.50	ES					Made Ground: dark brown sandy silty CLAY with fragments of brick, rubble and wood.
				0.50			Soft to firm soft brown slightly sandy silty CLAY (TFD)
				0.70			Soft brownish grey silty CLAY with occasional orangish brown mottling (TFD)
				1.40			End of pit at 1.40 m

1 2 3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP07**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:
Location:	Spalding	Dimensions (m): Depth 1.50	1.7 × 0.7
Client:	R K Wilson Builders Ltd		

Date 26/03/2019

Scale 1:15

Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.55	ES					Made Ground: dark brown sandy silty CLAY with fragments of brick, rubble and wood.
				0.60			Soft to firm soft brown slightly sandy silty CLAY (TFD)
				0.90			Soft brownish grey silty CLAY with orangish brown mottling (TFD)
				1.50			End of pit at 1.50 m

1
2
3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

Trial Pit Log

Trialpit No **TP08**

Sheet 1 of 1

Project Name:	Land off Worlds End Road, Tydd St Mary	Project No. UK18.4095B	Co-ords: - Level:
Location:	Spalding	Dimensions (m): Depth 1.40	1.9 × 0.7
Client:	R K Wilson Builders Ltd		

Date 26/03/2019

Scale 1:15

Logged

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.00 - 0.30	ES		0.30			Made Ground: light orangish brown slightly clayey SAND with fragments of brick and wood. The sand is fine to coarse.
				0.80			Soft to firm soft brown slightly sandy silty CLAY (TFD)
				1.40			Soft brownish grey silty CLAY with orangish brown mottling (TFD)
							End of pit at 1.40 m

1 2 3

Remarks: TFD - Tidal Flat Deposits

Stability: Pit stable whilst excavating.

APPENDIX D

Laboratory Results - Environmental

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
CB23 6JN

4225

Attention :	James Bowley
Date :	4th April, 2019
Your reference :	UK18.4095B
Our reference :	Test Report 19/5035 Batch 1
Location :	Land off Worlds End Road Spalding
Date samples received :	28th March, 2019
Status :	Final report
Issue :	1

Eight samples were received for analysis on 28th March, 2019 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: EPS Ltd
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley
JE Job No.: 19/5035

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-8	9-10	11-13	14-16	17	18-19			LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08					
Depth	0.10-0.40	0.00-0.50	0.20-0.50	0.25-0.50	0.00-0.50	0.10-0.50	0.00-0.55	0.00-0.30					
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	J	V J					
Sample Date	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019					
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019					
Arsenic #M	33.4	26.8	12.5	8.9	-	-	-	8.0			<0.5	mg/kg	TM30/PM15
Cadmium #M	0.3	0.3	<0.1	<0.1	-	-	-	<0.1			<0.1	mg/kg	TM30/PM15
Chromium #M	47.1	40.0	41.2	44.1	-	-	-	35.3			<0.5	mg/kg	TM30/PM15
Copper #M	79	65	11	13	-	-	-	1			<1	mg/kg	TM30/PM15
Lead #M	286	179	23	23	-	-	-	6			<5	mg/kg	TM30/PM15
Mercury #M	0.2	0.3	<0.1	<0.1	-	-	-	<0.1			<0.1	mg/kg	TM30/PM15
Nickel #M	37.0	32.0	26.4	28.9	-	-	-	8.8			<0.7	mg/kg	TM30/PM15
Selenium #M	1	1	<1	<1	-	-	-	<1			<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #M	785	822	307	220	-	-	-	223			<50	mg/kg	TM50/PM29
Zinc #M	275	253	76	85	-	-	-	25			<5	mg/kg	TM30/PM15
Arsenic	-	-	-	-	6.8	17.2	13.5	-			<0.5	mg/kg	TM30/PM62
Cadmium	-	-	-	-	0.1	0.4	0.4	-			<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	-	16.2	19.6	18.7	-			<0.5	mg/kg	TM30/PM62
Copper	-	-	-	-	13	45	21	-			<1	mg/kg	TM30/PM62
Lead	-	-	-	-	30	152	178	-			<5	mg/kg	TM30/PM62
Mercury	-	-	-	-	<0.1	<0.1	<0.1	-			<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	-	15.3	21.0	21.3	-			<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	-	<1	<1	<1	-			<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	-	-	-	760	473	2440	-			<50	mg/kg	TM50/PM29
Zinc	-	-	-	-	56	148	151	-			<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene #M	0.08	0.09	<0.04	<0.04	<0.04	0.13	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.06	0.09	<0.03	<0.03	<0.03	0.19	0.05	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #M	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #M	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #M	0.44	0.86	<0.03	<0.03	0.06	1.72	0.25	0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	0.10	0.14	<0.04	<0.04	<0.04	0.48	0.08	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #M	1.11	1.80	<0.03	<0.03	0.09	4.36	0.68	0.06			<0.03	mg/kg	TM4/PM8
Pyrene #	0.99	1.50	<0.03	<0.03	0.08	3.72	0.60	0.06			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.50	0.73	<0.06	<0.06	<0.06	2.03	0.36	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #M	0.65	0.77	<0.02	<0.02	0.06	2.35	0.41	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	1.08	1.50	<0.07	<0.07	<0.07	3.98	0.69	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.49	0.76	<0.04	<0.04	<0.04	2.08	0.29	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #M	0.33	0.49	<0.04	<0.04	<0.04	1.17	0.21	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.10	0.15	<0.04	<0.04	<0.04	0.40	0.07	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.36	0.48	<0.04	<0.04	<0.04	1.19	0.23	<0.04			<0.04	mg/kg	TM4/PM8
PAH 16 Total	6.3	9.4	<0.6	<0.6	<0.6	23.9	3.9	<0.6			<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.78	1.08	<0.05	<0.05	<0.05	2.87	0.50	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.30	0.42	<0.02	<0.02	<0.02	1.11	0.19	<0.02			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	106	105	105	103	106	104	103	106			<0	%	TM4/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley
JE Job No.: 19/5035

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-8	9-10	11-13	14-16	17	18-19			LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08					
Depth	0.10-0.40	0.00-0.50	0.20-0.50	0.25-0.50	0.00-0.50	0.10-0.50	0.00-0.55	0.00-0.30					
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	J	V J					
Sample Date	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019					
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019					
TPH CWG													
Aliphatics													
>C5-C6 #M	<0.1 SV	<0.1 SV	-	-	-	<0.1 SV	-	-			<0.1	mg/kg	TM36/PM12
>C6-C8 #M	<0.1 SV	<0.1 SV	-	-	-	<0.1 SV	-	-			<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 SV	<0.1 SV	-	-	-	<0.1 SV	-	-			<0.1	mg/kg	TM36/PM12
>C10-C12 #M	<0.2	<0.2	-	-	-	<0.2	-	-			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #M	<4	<4	-	-	-	<4	-	-			<4	mg/kg	TM5/PM8/PM16
>C16-C21 #M	<7	<7	-	-	-	<7	-	-			<7	mg/kg	TM5/PM8/PM16
>C21-C35 #M	<7	<7	-	-	-	<7	-	-			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	-	-	-	<19	-	-			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1 SV	<0.1 SV	-	-	-	<0.1 SV	-	-			<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1 SV	<0.1 SV	-	-	-	<0.1 SV	-	-			<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	<0.1 SV	<0.1 SV	-	-	-	<0.1 SV	-	-			<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	-	-	-	<0.2	-	-			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	-	-	-	<4	-	-			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	20	<7	-	-	-	26	-	-			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	113	<7	-	-	-	140	-	-			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	133	<19	-	-	-	166	-	-			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	133	<38	-	-	-	166	-	-			<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5 SV	<5 SV	-	-	-	<5 SV	-	-			<5	ug/kg	TM31/PM12
Benzene #	<5 SV	<5 SV	-	-	-	<5 SV	-	-			<5	ug/kg	TM31/PM12
Toluene #	<5 SV	<5 SV	-	-	-	<5 SV	-	-			<5	ug/kg	TM31/PM12
Ethylbenzene #	<5 SV	<5 SV	-	-	-	<5 SV	-	-			<5	ug/kg	TM31/PM12
m/p-Xylene #	<5 SV	<5 SV	-	-	-	<5 SV	-	-			<5	ug/kg	TM31/PM12
o-Xylene #	<5 SV	<5 SV	-	-	-	<5 SV	-	-			<5	ug/kg	TM31/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15			<0.15	mg/kg	TM26/PM21
Natural Moisture Content	28.1	28.6	22.9	22.0	25.2	27.5	32.6	15.4			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M	0.0494	0.0469	<0.0015	<0.0015	-	-	-	0.0182			<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext)	-	-	-	-	0.0646	0.0119	0.0309	-			<0.0015	g/l	TM38/PM60
Chromium III	47.1	40.0	41.2	44.1	-	-	-	35.3			<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	16.2	19.6	18.7	-			<0.5	mg/kg	NONE/NONE
Total Cyanide #M	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM89/PM45
Organic Matter	16.0	17.7	2.2	1.7	NDP	NDP	NDP	0.4			<0.2	%	TM21/PM24
Organic Matter	-	-	-	-	1.9	10.2	5.1	-			<0.2	%	TM21/PM89
pH #M	8.25	8.06	8.24	7.07	8.36	8.11	8.17	8.85			<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley
JE Job No.: 19/5035

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-8	9-10	11-13	14-16	17	18-19			LOD/LOR	Units	Method No.
Sample ID	TP01	TP02	TP03	TP04	TP05	TP06	TP07	TP08					
Depth	0.10-0.40	0.00-0.50	0.20-0.50	0.25-0.50	0.00-0.50	0.10-0.50	0.00-0.55	0.00-0.30					
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	J	V J					
Sample Date	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019	26/03/2019					
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019	28/03/2019					
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand				None	PM13/PM0
Sample Colour	Dark Brown	Dark Brown	Medium Brown	Medium Brown	Medium Brown	Dark Brown	Medium Brown	Medium Brown				None	PM13/PM0
Other Items	loam, stones	loam, stones	stones, roots	srones	stones, sand	stones, roots, brick fragments	stones, sand	stones				None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd **Matrix : Solid**
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
19/5035	1	TP01	0.10-0.40	1-3	PAH's
19/5035	1	TP02	0.00-0.50	4-6	No interpretation possible
19/5035	1	TP06	0.10-0.50	14-16	PAH's

Client Name: EPS Ltd
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5035	1	TP01	0.10-0.40	3	28/03/2019	**General Description (Bulk Analysis)**	soil.stones
					28/03/2019	**Asbestos Fibres**	NAD
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	NAD
					28/03/2019	**Asbestos Level Screen**	NAD
19/5035	1	TP02	0.00-0.50	6	28/03/2019	**General Description (Bulk Analysis)**	soil.stones
					28/03/2019	**Asbestos Fibres**	NAD
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	NAD
					28/03/2019	**Asbestos Level Screen**	NAD
19/5035	1	TP03	0.20-0.50	8	28/03/2019	**General Description (Bulk Analysis)**	soil.stones
					28/03/2019	**Asbestos Fibres**	NAD
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	NAD
					28/03/2019	**Asbestos Level Screen**	NAD
19/5035	1	TP04	0.25-0.50	10	28/03/2019	**General Description (Bulk Analysis)**	Soil/Stone
					28/03/2019	**Asbestos Fibres**	NAD
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	NAD
					28/03/2019	**Asbestos Level Screen**	less than 0.1%
19/5035	1	TP05	0.00-0.50	13	28/03/2019	**General Description (Bulk Analysis)**	Soil/Stone
					28/03/2019	**Asbestos Fibres**	Fibre Bundles
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	Chrysotile
					28/03/2019	**Asbestos Level Screen**	less than 0.1%
					04/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					04/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					04/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5035	1	TP06	0.10-0.50	16	28/03/2019	**General Description (Bulk Analysis)**	Soil/Stone
					28/03/2019	**Asbestos Fibres**	Fibre Bundles
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	Chrysotile

Client Name: EPS Ltd
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5035	1	TP06	0.10-0.50	16	28/03/2019	**Asbestos Level Screen**	less than 0.1%
					04/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					04/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					04/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5035	1	TP07	0.00-0.55	17	28/03/2019	**General Description (Bulk Analysis)**	Soil/Stone
					28/03/2019	**Asbestos Fibres**	Fibre Bundles
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	Chrysotile
					28/03/2019	**Asbestos Level Screen**	less than 0.1%
					04/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					04/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					04/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					04/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5035	1	TP08	0.00-0.30	19	28/03/2019	**General Description (Bulk Analysis)**	soil.stones
					28/03/2019	**Asbestos Fibres**	NAD
					28/03/2019	**Asbestos ACM**	NAD
					28/03/2019	**Asbestos Type**	NAD
					28/03/2019	**Asbestos Level Screen**	NAD

Client Name: EPS Ltd **Matrix : Solid**
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Method No.	NDP Reason
19/5035	1	TP05	0.00-0.50	11-13	TM21/PM24	Asbestos detected in sample
19/5035	1	TP06	0.10-0.50	14-16	TM21/PM24	Asbestos detected in sample
19/5035	1	TP07	0.00-0.55	17	TM21/PM24	Asbestos detected in sample

Client Name: EPS Ltd
Reference: UK18.4095B
Location: Land off Worlds End Road Spalding
Contact: James Bowley

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/5035						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/5035

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 19/5035

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No

JE Job No: 19/5035

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM89	Preparation of positive asbestos samples for Eltra analysis			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes

JE Job No: 19/5035

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM60	As received solid samples are extracted with deionised water in a 2:1 ratio of water to solid.			AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes	Yes	AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes

APPENDIX E

Generic Screening Criteria

EPS Generic Quantitative Risk Assessment - Residential Land Use

Contaminant	Soil Targets			Groundwater Targets	
	Human Health	Controlled Waters		Controlled Waters	
		LGwRP	HGwRP	LGwRP	HGwRP
Unit	**mg/kg**			**ug/l**	
Arsenic	See C4SL	n/c	n/c	50	10
Cadmium	See C4SL	n/c	n/c	5	5
Chromium III	910	n/c	n/c	250	50
Chromium VI	See C4SL	n/c	n/c	n/c	n/c
Copper	2400	n/c	n/c	28	28
Mercury (elemental)	1.2	n/c	n/c	1	1
Nickel	180	n/c	n/c	200	50
Lead	See C4SL	n/c	n/c	250	10
Selenium	250	n/c	n/c	10	10
Zinc	3700	n/c	n/c	500	500
Benzene	See C4SL	0.252	0.008	30	1
Toluene	130	1.17	1.17	50	50
Ethylbenzene	47	15.0	10.0	300	200
Xylene (para)	56	0.885	0.885	30	30
MTBE#	49	0.138	0.0276	75	15
Benzo(a)Pyrene	See C4SL	10	1.44	0.7	0.1
Naphthalene	2.3	0.934	0.02	10	0.1
Dibenz(ah)anthracene	0.24	n/c	n/c	n/c	n/c
Aliphatic C5-C6	42	5.27	1.05	50	10
Aliphatic C6-C8	100	23.2	4.64	50	10
Aliphatic C8-C10	27	175	35.1	50	10
Aliphatic C10-C12	130(48)*	1380	276	50	10
Aliphatic C12-C16	1100(8.48)**	27500	5490	50	10
Aliphatic C16-C35	65000 (8.48)**	3.46E+06	6.91E+05	50	10
Aromatic C8-C10	34	8.74	1.75	50	10
Aromatic C10-C12	74	13.8	2.76	50	10
Aromatic C12-C16	140	27.5	5.5	50	10
Aromatic C16-C21	260	86.9	17.4	50	10
Aromatic C21-C35	1100	690	138	50	10

Notes:
LGwRP - Low Groundwater Resource Potential HGwRP - High Groundwater Resource Potential
f = Oral, dermal and inhalation exposure compared with oral HCV N/C = Not Calculated
* = S4UL exceeds vapour saturation limit (in brackets) ** = S4UL exceeds solubility saturation limit (in brackets)

Soil Targets

Targets for Human Health have been taken from *S4ULs 'Suitable For Use Levels for Human Health Risk Assessment' – LQM and CIEH (2014)* derived using standard sandy loam soil with 1% SOM, except (#) = *EIC/AGS/CL:AIRE GAC 'Soil Generic Assessment Criteria' (2010)* . For sites where ground conditions differ significantly from sandy loam or site-specific SOM and pH are available, the generic human health targets may be revised.

Targets for Controlled waters have been derived using EA Remedial Targets Worksheet (v3.1) - using standard Sandy Loam ground conditions as described in Science Report SC050021/SR3, assuming no degradation for a 10m compliance distance with criteria of EQS or UKDWS for LGwRP and HGwRP respectively (see notes for GW targets).

Groundwater Targets

For LGwRP, targets have been taken as Freshwater EQS where available. For Ethylbenzene and BaP the WHO Health limit has been used and for MTBE and individual TPH fractions a 5 times multiplier of taste threshold and UKDWS has been taken repectively.
For HGwRP, targets have been taken as UKDWS where available, with the exception of Copper and Zinc where the EQS is lower than the DWS and therefore the EQS has been used as the groundwater target. For Ethlylbenzene the upper WHO ATO limit has been used. For Toluene and Xylene, the WHO ATO limit is higher than the EQS and so the lower value has been taken. For MTBE the taste threshold has been taken.

Work carried out to calculate generic screening criteria for concentrations of contaminant in groundwater with respect of risks to Human Health has generally found that criteria far exceed (by at least 2 orders of magnitude) those listed for the protection of either LGwRP and HGwRP receptors. On this basis, the above Groundwater criteria are also considered protective of human health and further evaluation of these risks should be considered alongside any detailed quantitative risk assessments carried out for groundwater on a site specific basis.

EPS Generic Quantitative Risk Assessment

Generic Screening Criteria (C4SLs) - All Land Uses

Contaminant	Soil Targets					
	Residential		Allotments	Commercial	Public Open Spaces	
	With Home Grown Produce	Without Home Grown Produce			Residential	Parks
Unit	mg/kg					
Arsenic	37	40	49	640	79	168
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5	5.3	5.7	76	10	21
Cadmium	26	149	4.9	410	220	880
Chromium (VI)	21	21	170	49	23	250
Lead	200	310	80	2330	630	1300

Notes:

Targets for Human Health have been taken from the publicly available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA in December 2013.

Within the modelling for C4SLs, a Soil Organic Matter content of 6% has been used. Reference to site-specific data should be made where possible. EPS have carried out a sensitvity analysis in-house and the contaminant benzene is the current C4SL most susceptable to changes in SOM and therefore any risk assessment for this compound must account for this aspect.

APPENDIX F

Statistical Analysis

Client/client ref	R K Wilson Builders Ltd
Project ref	UK18.4095B
Site ref	Land off Worlds End Road, Tydd St Mary, Spalding, PE13 5QW
Data description	
Contaminant(s)	Lead
Test scenario	Planning: is true mean lower than critical concentration (μ < Cc)?
Date	29 April 2019
User details	JB

Statistics calculator (version 1)

Developed by:

On behalf of:

Chartered Institute of Environmental Health

Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the CIEH Statistics Calculator User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

Neither the CIEH nor ESI Ltd (ESI) promises that the spreadsheet will provide any particular facilities or functions. The user must ensure that the spreadsheet meets their needs and they remain solely responsible for the competent use of the spreadsheet. Users are entirely responsible for the consequences of any use of the spreadsheet, neither the CIEH nor ESI provides any warranty about the fitness for purpose or performance of any part of the spreadsheet. We do not promise that the media will always be free from defects, computer viruses, software locks or other similar code or that the operation of the spreadsheet will be uninterrupted or error free. The user should carry out all necessary virus checks prior to installing on their computing system.

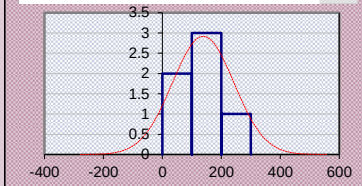
© ESI Ltd. 2008

Test Results

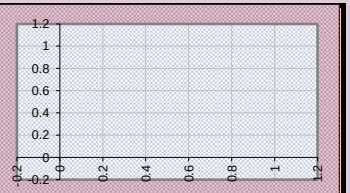
Client/client ref: R K Wilson Builc Site ref: Land off Worlds End Road, Tydd St Mary, S Date: 29-Apr-2019
Project ref: UK18.4095B Data description: User details: JB

Dataset: Lead	
Sample mean, $\overline{x}$	138.5
Sample standard deviation, s	104.37
Sample size, n	6
Critical concentration, Cc	200

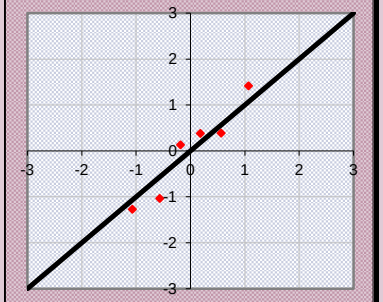
Use Normal distribution to test for



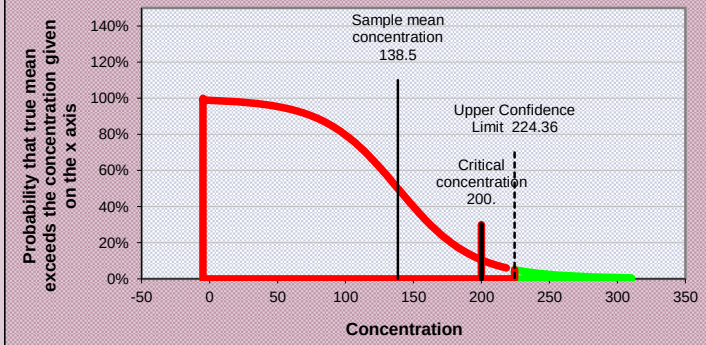
Outliers & non-detects	
Outliers present?	NO
Significance level	5%
Outliers removed?	0
Non-detects	0



Normality test	
Significance level:	5%
Normal distribution	
Use:	Auto: One-sample t-test



Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?
Null hypothesis:	The true mean concentration is equal to or greater than the critical concentration: μ ≥ Cc
Alternative hypothesis:	The true mean concentration is less than the critical concentration: μ < Cc



Evidence against Null hypothesis:	90%
Base decision on:	evidence level
Evidence level required:	95%
Balance of probability?	N/A
Reject Null Hypothesis?	No

Not enough evidence

Back to data | Back to summary | Go to outlier test | Go to normality test

APPENDIX G

Cover System Calculations

Calculations based on mixed zone (M)	600	mm

Contaminant	Site Data				Expressed as a Factor of Target Guideline Value				Cover Thickness Required for Compliance to Specified Target Guideline Value	
	Contamination of Ground (Cg)	Contamination of Cover (Cc)	Target Guideline Value 1	Target Guideline Value 2	Soil / Target Guideline Value 1	Cover / Target Guideline Value 1	Soil / Target Guideline Value 2	Cover / Target Guideline Value 2	Target Guideline Value 1	Target Guideline Value 2
	Units		Units		Fraction				(mm)	
Lead	224.36	80	200	200	1.1	0.4	1.1	0.4	101	101

Summary		
	Target Guideline Value 1	Target Guideline Value 2
Number of contaminants	1	1
Number of contaminants **with no** thickness calculation	0	0
Breakdown - Number for which no TV specfied	0	0
Breakdown - Number for which no soil specified	0	0
Breakdown - Number for which no cover specified	0	0
Breakdown - Number for which cover > TV	0	0
Number of contaminants **with** thickness calculation	1	1
Breakdown - Number for which no cover required	0	0
Breakdown - Number for which cover required	1	1

Overall thickness of cover required	**101**	**101**

APPENDIX H

Cover Soil Checklist

Pre-Verification Cover System Checklist		Yes?
Soil Source	The soil must not be a waste. Please confirm that the soil is not a waste and has never been deemed as such in the past.	
	Has the source of the soil been provided?	
	Have all the delivery notes confirming the source, volume and type of soil been provided for all that is to be used?	
Soil Quality	The soils are free of invasive plant species such as Japanese Knotweed, and have not been sourced from an affected area?	
	Do the soils look clean and of a high quality? I.e. the soil must not have an odour or contain any visual evidence of contamination, including oils, asbestos, glass, plastic, rubble, metal, ash, tarmac/bitumen?	
	Testing to 'BS 3882:2015 *Specification for topsoil and requirements for use*' is preferable but generally not essential for public health regulation, provided you can confirm the soils comply with the above points, are suitable for their intended purpose and will provide an adequate growing medium?	
	Has the soil been chemically tested prior to it arriving at site? Any soil test results presented to EPS by a third party must be current and clearly relate to the soil used, i.e. the testing must generally be dated within 6 weeks of delivery. The quantity of testing will be dependent on how much confidence is generated in the quality of the material, as well any specific local regulatory requirements. If the soil is clean soil from an established source such as British Sugar, the testing they provide at source may be sufficient alone. For other soils, EPS can advise on the likely testing frequencies but as a rule of thumb, anticipate at least one sample per plot. The testing would usually comprise the following: Heavy Metals, Poly Aromatic Hydrocarbons, Asbestos and Total Petroleum Hydrocarbons at an accredited lab. If adequate testing has not been completed, then EPS will need to test it from stockpiles prior to installation.	
Cover Thickness	Are all excavations ready which will allow the necessary thickness of cover soils to be installed?	
	If yes, can you provide waste transfer documentation for any excavated soils?	

APPENDIX I

Method Statement for Unexpected Contamination

METHOD STATEMENT

ACTIONS TO BE TAKEN IN THE EVENT OF DISCOVERING UNEXPECTED CONTAMINATION DURING INTRUSIVE GROUNDWORKS

If at any point during intrusive groundworks at a site, evidence of unforeseen contamination is encountered in the form of significant noxious odours, discolouration, or instability within soils or sheen/ discolouration in groundwater, the following actions will be taken:

- Intrusive works in the immediate area of the impacted ground will be suspended and the continuation of work in other areas of the site will be considered within the context of the site-specific health & safety plan.
- Environmental Protection Strategies Ltd (EPS) will be contacted and appraised of the situation so that arrangements can be made to characterise the impact and determine what action may be necessary in addition to the scheduled site works. Where possible / health & safety plan permits, digital photographs of the impacted ground will be taken and emailed to EPS at the address below to assist in the initial assessment.
- It may well be necessary for EPS to attend site to undertake visual inspection and obtain samples for field and/or laboratory analysis, although the actions taken will be dependent on the nature of what is encountered.
- In cases where EPS consider the unforeseen contamination likely to pose a significant risk of significant harm to adjacent site users or local environmental receptors, the local authority and the Environment Agency will be informed of the situation and the actions being taken.
- Once appropriate action has been agreed and undertaken, a written summary will be produced by EPS for submission to the Local Authority, (and where relevant, the Environment Agency) in accordance with planning requirements. The submission will include details of work undertaken, analytical results of investigative and validation samples obtained and conclusions and recommendations for any further actions considered necessary.
- Where regulatory bodies have been involved, site works should only recommence following their agreement and in all cases should only recommence when the site manager considers it safe to do so within the context of the site specific health & safety plan.

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