



38-44 LONDON ROAD – MCCARTHY & STONE RETIREMENT LIFESTYLES LTD

Site Investigation and Contaminated Land Report

FEBRUARY 2018





38-44 London Road – McCarthy & Stone Retirement Lifestyles Ltd

Site Investigation and Contaminated Land Report

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Grant of Planning

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Exploratory Hole Logs

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Chemical Analysis Results

Appendix E

Assessment Criteria and CLEA Model Output Sheets

EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

Instructions / Brief	Conduct an intrusive ground investigation including laboratory testing to enable the preparation of a Site Investigation & Contamination Appraisal Report for a site comprising 38-44 London Road, Purbrook, Hampshire, PO7 5LJ. The objective of the investigation and assessment is to ascertain whether there are likely to be any constraints to the proposed development of the Site in relation to contaminated land.
Proposed Development	Planning Application No. APP/17/01141 was submitted to Havant Borough Council on 23 October 2017. The application was granted permission on 21 December 2017 for the following proposal: <i>“Construction of 43no retirement apartments for older persons including communal facilities, parking, associated landscaping with access from Stakes Road and 2no. commercial /retail units fronting onto London Road. Revised scheme from planning Permission APP/00896”.</i>
Previous Reports	Crossfield Consulting Ltd – Site Investigation Report – CCLO2684. BY07 – May 2015 ACS Testing Ltd – Geotechnical Investigation Report – 17-82110/BG/GIR – May 2017 ACS Testing Ltd – Site Investigation Strategy Report – 17-89338/AD/SIS – December 2017
Exploration & Laboratory Testing	Ten trial pits were excavated to a maximum depth of 2.00mbgl. Ten soil samples (ten from made ground and four from natural soil) were collected and tested for a contaminant screening suite. A VOC suite and presence of asbestos test was scheduled on a further four samples each.
Findings (Ground Conditions)	From all investigation that has taken place, three distinct soil units have been identified. Made Ground was recorded in all exploratory holes to a maximum depth of 2.00mbgl. The unit was variable with both granular and cohesive material recorded across the site. Anthropogenic constituents such as brick, concrete, chalk, glass and ceramic were recorded. Underlying the Made Ground in all locations was the Wittering Formation which typically comprised grey/green mottled orange sand in the north-western area of the Site and cohesive light grey/green mottled orange silt and clay across the rest of the Site. The London Clay Formation was only recorded within cable percussion boreholes and proven to 19.00mbgl. Recorded to typically comprise firm to stiff dark grey clay and silt. The ACS geotechnical report concluded that perched water was present within the Made Ground with deeper resting levels recorded during cable percussion drilling at 4.80-12.20mbgl more representative of actual groundwater level.

Findings (Contamination)	No inorganic or organic contaminants exceeded the SSAC. Some organic contaminants exceeded the theoretical soil saturation limit but not the SSAC. Given the cohesive nature of most of the underlying natural deposits and the low to very low mobility within groundwater of the contaminants recorded to exceed the theoretical soil saturation limit it is considered there is a very low risk to controlled waters from the Site and no further assessment is required. Asbestos was recorded to be present within five Made Ground samples, in the form of chrysotile cement and free fibres. Site wide action is required in regard to asbestos as there is a potential significant risk to people accessing soil beneath the site, and therefore measures need to be taken to remove this risk.
Recommendations (Contamination)	As asbestos is present within the Made Ground it will be necessary to address the potential risk to future Site users where they are most likely to be exposed to soil, i.e. in gardens and soft landscaping. It may be suitable to remove the Made Ground in high exposure areas which will remove the potential risk, or alternatively, a clean cover system should be applied. The clean cover system will likely comprise a capping layer of 450mm in soft landscaped areas. Where Made Ground is present a depth greater than the thickness of the cover, the cover should be underlain by a brightly coloured close weave geotextile to prevent soil mixing and excavation. Contractors should be warned of the potential contamination present in soils so appropriate protection measures can be adopted. A remediation method statement will be required to outline the planned remedial works to be undertaken at the Site. Following completion of the remedial works a validation report should be completed, documenting all the validation works undertaken on Site. These reports are likely to be required as a condition of planning permission, and also to provide reassurance to any potential Site owner or company providing a warranty.

1 INTRODUCTION

1.1 Terms of Reference

ACS Testing Limited (ACS) were instructed by Mr Tim Beckett of McCarthy & Stone Retirement Lifestyles Ltd (the Client) on the 20th December 2017 to carry out a site investigation and provide a contaminated land assessment for the site comprising 38-44 London Road, Purbrook, Waterlooville, Hampshire, PO7 5LJ.

The term 'Site' within this report refers to the land outlined in red shown on the Site Location Plan included as Figure 1.

1.2 Site Setting

The Site (National Grid Reference SU67303, 07905) is located on London Road in Purbrook. At the time of the investigation the Site had been recently demolished with all structures and hardstanding removed.

The former site layout prior to demolition is included as Figure 2.

1.3 Previous Reporting

Investigation and assessment reports previously produced for this Site include;

- ▶ Crossfield Consulting Ltd – Site Investigation Report – CCLO2684. BY07 – May 2015
- ▶ ACS Testing Ltd – Geotechnical Investigation Report – 17-82110/BG/GIR – May 2017
- ▶ ACS Testing Ltd – Site Investigation Strategy Report – 17-89338/AD/SIS – December 2017

Reference should be made to these reports for a better understanding of the site conditions.

1.4 Objectives and Scope

The main objectives of this study are;

- ▶ To establish whether there are likely to be contaminated land constraints to the proposed redevelopment of the Site
- ▶ Target known possible contaminant sources as well as providing suitable coverage to provide information about the ground conditions across the Site.
- ▶ Enable meaningful assessment of the potential contamination risks associated with the proposed development of the Site, and to inform the design of remedial measures if necessary.
- ▶ To inform the design of the proposed development, or provide reassurance to the regulators, a possible owner of the Site or insurance provider.

The scope of work has included;

- ▶ Intrusive investigation including 10 trial pits and laboratory chemical testing;
- ▶ Generic quantitative contaminated land risk assessment;

1.5 Proposed Development

Planning Application No. APP/17/01141 was submitted to Havant Borough Council on 23 October 2017. The application was granted permission on 21 December 2017 for the following proposal:

‘Construction of 43no. retirement apartments for older persons including communal facilities, parking, associated landscaping with access from Stakes Road and 2no. commercial/retail units fronting onto London Road. Revised scheme from Planning Permission APP/15/00896).’

Conditions 3 of the Grant of Planning is a pre commencement contaminated land planning condition. The condition is split into four parts as follows;

1. *A site walk-over survey and/or sufficient desk based research to identify;*
 - *All relevant previous uses of the site*
 - *Potentially significant contaminants associated with those uses*
 - *Uncertainties relating to previous use or associated potential contaminants*
 - *A conceptual site model identifying all relevant sources, exposure pathways and receptors, and;*
 - *A summary of potentially unacceptable risks arising from contamination at site.*
2. *Site investigation based on (1), to provide sufficient data and information to adequately identify and characterise any physical contamination on or affecting the site, and to inform an appropriate assessment of the risks to all receptors that may be affected, including those off site.*
3. *The results of an appropriate risk assessment based upon (1) and (2), and where unacceptable risks are identified, a Remediation Strategy that includes;*
4. *A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the Remediation Strategy (3) are complete, identifying any requirements for longer term monitoring of pollutant linkages, maintenance and arrangements for contingency action.*

It is considered that this report will assist with the discharge of Parts 2 and 3 of this Planning Condition, although it does not include a Remediation Strategy. A copy of the Grant of Planning is included as Appendix A.

1.6 Limitations

This report has been prepared in accordance with the instructions received from the Client and includes the findings of a ground investigation and contamination assessment carried out by ACS. The information contained in this report is intended for the use of the Client pursuant to the development described above. The recommendations contained herein may not be appropriate to other development proposals.

We confirm that in preparing this report we have exercised reasonable skill and care as would be expected of a suitably qualified and experienced geoscience consultant working within the limits of the Client’s instructions.

The report is based upon the findings of an intrusive ground investigation which includes soil sampling and laboratory testing. It should be appreciated that there may be areas of the Site that have not been investigated where contaminant concentrations or ground conditions may vary from those encountered. It should also be appreciated that the contaminant concentrations or sub-surface features revealed may be more widespread than identified by the works carried out.

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation and information included in previous reports. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of samples tested. No liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the Client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by ACS Testing Ltd.

The investigation, analysis and recommendations in respect of contamination are made solely in respect of the prevention of harm to identified receptors, using where possible, best practice at the date of preparation of the report. Changes in codes of practice and / or legislation, made after preparation of this report could invalidate the conclusions presented within this report.

1.7 Applicable Legislation and Regulation

Part 2A of the Environmental Protection Act (1990) and the subsequent statutory guidance (Defra, 2012) forms the basis for the current statutory regime for the identification and remediation of contaminated land in England and Wales. The 2012 statutory guidance states that the aim of Part 2A is to:

- a) To identify and remove unacceptable risks to human health and the environment
- b) To seek to ensure that contaminated land is made suitable for its current use
- c) To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

A legal definition of contaminated land is stated in the Environmental Protection Act 1990, Part 2A, Section 78A(2). Within this Act contaminated land is defined as:

“Any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, or under the land that:

- ▶ *Significant harm is being caused or there is significant possibility of such harm being caused;*
or
- ▶ *Pollution of controlled waters is being, or is likely to be caused.”*

Contamination within the ground is often addressed via the planning regime. Guidance principles for sites dealt with via planning was outlined in Planning Policy Guidance 23 (PPG23). As part of the government’s drive to reduce red tape, PPG23 was withdrawn in 2012 and replaced with more streamlined guidance in the form of the National Planning Policy Framework (NPPF). The following references to contaminated land and site investigation are made within the NPPF:

Para 121 – Planning policies and decisions should ensure that:

- ▶ *The site is suitable for its new use taking account of ground conditions and land stability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation; and*
- ▶ *After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environment Protection Act 1990; and*
- ▶ *Adequate site investigation information prepared by a competent person, is presented.*

The NPPF defines a competent person 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.*

The current legislation and guidance on the assessment of potentially contaminated sites acknowledges the need for a tiered risk based approach comprising of:

- ▶ Tier 1 Assessment: comparison of the site contaminant levels with generic standards and compliance criteria including an assessment of risk using a source-pathway-receptor model.
- ▶ Tier 2 Assessment: derivation of site-specific risk assessment criteria and calculation of site specific clean-up values.

2 REVIEW OF PREVIOUS REPORTS

2.1 Introduction

This section provides a summary of the findings of the ACS Site Investigation Strategy Report – 17-89338/AD/SIS dated 15/12/2017. The Site Investigation Strategy Report was based upon a review of the Crossfield Site Investigation and ACS Geotechnical Investigation Report. It is recommended that both these reports are read in full to gain a better understanding of the Site and the previous phases of investigation.

2.2 Previous Reports and Investigation

2.2.1 Crossfield Site Investigation Report

Crossfield produced a desk based study and site investigation report for the proposed development in May 2015. The desk based study was based on information obtained from historic maps, a site walkover, BGS mapping and public register information. Based on the information gained from the desk study a limited site investigation was undertaken whilst the Site was still operational as its former use as a builder's merchant, car dealership, vehicle servicing workshop and tyre workshop. The investigation that was undertaken comprised of 6no windowless sampled boreholes to depths between 4-5mbgl.

Testing was undertaken on soil samples obtained during the investigation, and this identified chrysotile asbestos within four made ground samples.

It was recommended by Crossfield that a capping layer be considered in areas of proposed soft landscaping due to the presence of asbestos, and that further investigation be carried out following demolition of the existing buildings enabling greater access across the Site.

2.2.2 ACS Geotechnical Report

ACS carried out an intrusive investigation in May 2017 in order to provide geotechnical data to assist with pile design. The scope of the investigation included three boreholes, but did not include chemical analysis of soil or water.

2.2.3 ACS Site Visit

ACS attended the Site on the 7th December 2017 to assess contamination identified during demolition in the area of an above ground waste oil storage tank. Trial pits were undertaken around the tank location revealing some hydrocarbon impacted material to the west and east of the tanks. In the trial pit undertaken to the north of the tank fragments of asbestos were observed.

Testing was scheduled on several samples collected during the site visit to assist with material disposal. It is understood that material contaminated with waste oil surrounding the tank was scheduled for removal by Ebsford Environmental Ltd. Results of the sampling indicated that the underlying natural material had not been impacted by the historic leaks and spills.

2.3 Conceptual Site Model and Risk Assessment

A preliminary conceptual site model (CSM) and risk assessment was undertaken based on the information from the reviewed reports.

The studies identified the following potential sources of contamination;

- ▶ Made Ground – Heavy metals, polycyclic aromatic hydrocarbons (PAH), petroleum hydrocarbons, asbestos fibres
- ▶ Former and existing buildings on the site – possible presence of asbestos containing materials – asbestos fibres in the soil released during demolition or dilapidation.
- ▶ Former and recent site use including works and depository/storage, vehicle workshop, car dealership, and builders' merchant – use and storage of fuel and oils, vehicle washing – metals, petroleum hydrocarbons, PAH, volatile organic compounds (VOC).

The risk assessment concluded that there are potential pollutant linkages which pose a potential risk to future site users and to controlled waters, and therefore further investigation was required to allow better characterisation of the risk associated with the development of the Site. It was noted that the investigation should be carried out after demolition of the buildings so that locations of potential sources could be investigated.

The strategy proposed ten trial pit locations with testing requirements for samples obtained from this location. Table 1 below outlines the rationale for each location and the samples scheduled for testing.

3 INTRUSIVE INVESTIGATION - SCOPE

3.1 Introduction

An intrusive investigation was undertaken by ACS on the 9th January 2018. The investigation design was based on the ACS Site Investigation Strategy Report – 17-89338/AD/SIS dated 15/12/2017. The rationale for each sampling location and the testing scheduled on samples obtained during the investigation are summarised in Table 1 below.

Table 1 Summary of Sampling Location Rationale and Analysis

Exploratory Hole Reference	Rationale for Location	Depth of Samples Analysed (mbgl)	Soil Unit	Testing/Analysis
TP01	Targeted – Under footprint of former Builders' Yard Office	0.40	Made Ground	General suite
TP02	Untargeted – within external former Builders' Yard Area	0.20	Made Ground	General suite, Asbestos
		1.00	Natural	General suite
TP03	Untargeted – within external former Builders' Yard Area	0.45	Made Ground	General suite, Asbestos
		0.70	Natural	General suite
TP04	Untargeted – within external former Builders' Yard Area	0.20	Made Ground	General suite
TP05	Targeted – Under footprint of former single storey car sales office	0.30	Made Ground	General suite
		1.10	Natural	
TP06	Untargeted – within external area outside of former garages	0.50	Made Ground	General suite, Asbestos
TP07	Targeted – Under footprint of former Garage	0.50	Made Ground	General suite, VOC
TP08	Targeted – Under footprint of former Garage	0.30	Made Ground	General suite, VOC
TP09	Targeted – Under footprint of former Garage	0.40	Made Ground	General suite, VOC
TP10	Targeted – Under footprint of former Garage	0.30	Made Ground	General suite, Asbestos, VOC
		0.70	Natural	General suite

VOC – Volatile organic compounds.

The work was supervised by a suitably qualified and experienced ACS Site Engineer. Photographs of the investigation are included as Appendix B.

Plans showing the exploratory hole locations, with the current and proposed layout, are included as Figures 3 and 4.

3.2 Trial Pits

Ten trial pits were excavated to depths between 1.40mbgl to 2.00mbgl. Samples were collected from the arisings to enable testing for various contaminants. All the holes penetrated through made ground and were terminated within underlying natural soils.

Trial pit logs are included as Appendix C.

3.3 Chemical Analysis

3.3.1 Soils

Fourteen soil samples were collected, ten from the Made Ground and four from the natural deposits, and were analysed for a general suite of contaminants as follows;

- ▶ Metals – Arsenic, Cadmium, Chromium (III & VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc
- ▶ Speciated Polycyclic Aromatic Hydrocarbons – PAH
- ▶ Speciated Total Petroleum Hydrocarbons – TPH aliphatic / aromatic split
- ▶ Soil Organic Matter (SOM) & Fraction Organic Carbon (FOC)
- ▶ pH

Other analysis was carried out on Made Ground samples from particular locations, as indicated in Table 1 Summary of Sampling Location Rationale and Analysis above, including;

- ▶ Volatile Organic Compounds - VOC
- ▶ Asbestos identification

All samples were dispatched to a UKAS accredited laboratory (ACS Environmental) under a chain of custody procedure, and in suitable conditions in accordance with best practice.

Chemical laboratory test result certificates are included as Appendix D.

4 GROUND CONDITIONS

4.1 Geology

Table 2 summarises the strata encountered during all investigation that has been undertaken on Site. Full details are provided in the exploratory hole logs included as Appendix C.

Table 2: Summary of Strata

Strata	Exploratory Holes	Depth to Base of Stratum (mbgl)
Made Ground	All	0.25 – 2.00
Wittering Formation	All	3.00 - 5.30
London Clay Formation	WS1-6 and CP01-03	Proven to 19.00

mbgl – metres below ground level

4.1.1 Made Ground

Made Ground was recorded within all locations to depths between 0.25mbgl and 2.00mbgl (WS2). Typically the Made Ground is between 0.60-1.00m thick. Within WS2, WS4, WS5 and WS6 the Made Ground is recorded 1.40-2.00m thick. The unit was variable across the site with granular and cohesive units recorded in various locations. Typically the unit was dark grey or dark brown in colour. Most of the exploratory holes recorded predominantly granular deposits comprising sand and gravel, with some locations recording clay and silt. Anthropogenic constituents were recorded in all locations, typically comprising brick, chalk and concrete with rare glass, ashy material and ceramic. No evidence of degradable material was recorded in any of the exploratory holes.

4.1.2 Wittering Formation

In all locations the Made Ground was recorded to be underlain by the Wittering Formation. Typically in the north-western area of the Site the unit was recorded to comprise grey and green mottled orange sand, typically recorded to be silty/clayey. The rest of the Site was underlain by cohesive deposits of the Wittering Formation, typically light grey/green mottled orange silt and clay. The cohesive units were generally described as firm to stiff.

4.1.3 London Clay Formation

The London Clay Formation was recorded in locations WS1-6 and CP01-03 only, underlying the Wittering Formation. The unit was typically recorded to comprise firm to stiff dark grey clay and silt.

4.2 Groundwater

Table 3. Summary Of Groundwater Strikes And Standing Levels Recorded During Investigation

Exploratory Hole Location	Strike Depth (mbgl)	Geology of Strike	Standing Water Depth (mbgl)
CP01	12.50	London Clay Formation	12.20
CP02	5.00	Wittering Formation	4.80
WS1	1.00	Made Ground	N/A
WS2	1.00	Made Ground	1.30 (depth on completion)
WS3	1.00	Wittering Formation	N/A
WS4	1.00	Made Ground	N/A
WS5	1.00	Made Ground	1.90 (depth on completion)
WS6	1.00	Made Ground	1.50 (depth of completion)

mbgl – metres below ground level

Table 3 above summarises the water strikes and standing levels recorded during investigation at the Site. It was concluded within the ACS geotechnical report and the Crossfield report that the water strikes within WS1-6 are likely to relate to a perched groundwater body within the Made Ground located on top of the cohesive Wittering Formation. The resting water levels in CP01 and CP02 at 12.20mbgl and 4.80mbgl respectively are considered to represent groundwater levels underlying the Site.

5 HUMAN HEALTH RISK ASSESSMENT

5.1 Basis of Assessment

The following provides a review of the chemical analysis results and an assessment of their significance with respect to the potential harm to people through exposure to the soils underlying the Site.

In order to assist in the assessment of the potential risk to future Site users through exposure to contaminants in the soil, the results of the soil chemical analysis have been screened against generic assessment criteria (GAC). The GAC used for the majority of the determinands are LQM CIEH Suitable 4 Use Levels (S4ULs), with the exception of lead for which there is no S4UL value and therefore the Defra Category 4 Screening Level (C4SL) has been adopted.

S4ULs were published (S4UL3023) by Land Quality Management Ltd (LQM) and the Chartered Institute of Environmental Health (CIEH). The S4ULs have been derived in accordance with UK Legislation, Environment Agency (EA) Policy and a modified version of the EA's CLEA Model (v1.06). The S4ULs have been designed to replace the 2009 LQM/CIEH Generic Assessment Criteria (GACs). The approach to collection and use of toxicology data used to produce the S4ULs is in accordance with current EA guidance (SR2 – Human Health Toxicology Assessment of Contaminants in Soil) which are based on the principles of 'minimal' or 'tolerable' risk. They are therefore equivalent to Soil Guideline Values (SGVs) and previous LQM/CIEH GACs.

Based on the development proposals, the following land use has been adopted.

Residential without plant uptake – proposed development comprises sheltered residential accommodation where residents are not permitted to grow their own fruit and vegetables. Soft landscaped areas will be maintained by an external contractor. The proposed end use of the Site differs considerably from the conceptual site model used to derive the S4ULs as the proposed redevelopment will comprise apartments and the residents will only be elderly people. Site specific assessment criteria (SSAC) have therefore been derived using the CLEA v1.06 model.

Table 4 below summarises the site specific input parameters that have been adopted for the sheltered residential land use:

Table 4: Summary of Input Parameters for Deriving Site Specific Assessment Criteria (SSAC)

Input Parameter	Value	Source/Rationale
Chemical Input Parameters	Contaminant Specific	Inorganic Contaminants (excluding Lead) – LQM/CIEH, 2014
		Organic Contaminants – LQM/CIEH, 2014
		VOCs – AGS/EIC, 2010 & LQM/CIEH, 2014
Age Class	Age class 18	Retirement period of adult life (SR3)
Occupancy Period (indoor)	16 hours	Table 4.1 – SR4
Occupancy Period (outdoor)	1 hour	Table 4.1 – SR4
Skin to Soil Adherence Factor (indoor)	0.06	Table 4.1 – SR4
Skin to Soil Adherence Factor (outdoor)	0.3	Table 4.1 – SR4
Soil and dust ingestion rate	0.05	Table 4.1 – SR4
Inhalation Rate	13.6	USEPA, 2011
Living Space Height	2.40m	Standard McC&S building design for one unit.

Where contaminants are sensitive to soil organic matter (SOM), LQM/CIEH S4UL provide three GAC values for; 6%, 2.5% and 1% SOM. Based on the results of the soil sample analysis for SOM (ranging from 1.29-6.59%), and for a conservative robust approach to risk assessment, the lowest SOM value of 1% has been adopted.

Lead

Category 4 Screening Levels (C4SLs) have been published by Defra. The purpose of the C4SLs is to provide a “relevant technical tool” as outlined in paragraph 4.21(c) below, at which if soils show concentrations below, the land is within Category 4 as defined by the 2012 revised Statutory Guidance for Part 2A of the Environmental Protection Act (1990). Category 4 is defined as:

“4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.

(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4: Human Health if following a detailed quantitative risk assessment it is satisfied that the level of risk posed is sufficiently low.” (Defra, 2012)

C4SLs model a ‘low’ level of risk; a higher level than the ‘minimal’ risk approach adopted when deriving the S4ULs. In the absence of an alternative criteria for lead, the use of low risk screening criteria within the planning regime are considered acceptable in this instance.

The CLEA v1.071 model has been used to derive the SSAC for lead using the input parameters summarised in Table 4.

Volatile Organic Compounds (VOC)

Assessment criteria for VOCs are taken from LQM / CIEH S4ULs and *Soil Generic Assessment Criteria for Human Health Risk Assessment* – AGS EIC (January 2010). It should be noted that some VOCs do not have commercially available assessment criteria. Where this is the case no comparison has been made, however, it is considered that there are a sufficient number of substances with robust assessment criteria to inform a suitable risk assessment.

The assessment criteria are summarised in Appendix E.

5.2 Discussion of Results - Soil

The following summarises those determinands which showed concentrations greater than the site specific assessment criteria from both the current ACS investigation and the previous Crossfield investigation.

5.2.1 Inorganic Determinands

None of the soil samples taken from the Made Ground or Wittering Formation recorded concentrations of inorganic determinands in excess of the SSAC. Therefore, no further assessment is required in relation to inorganic contaminants.

5.2.2 Organic Determinands

None of the soil samples taken from the Made Ground or Wittering Formation samples recorded organic contaminants to exceed the site specific assessment criteria. Therefore, no further assessment is required in relation to organic contaminants.

5.2.3 Asbestos

Five of the ten Made Ground samples scheduled for asbestos testing were recorded to contain asbestos. In all cases the asbestos recorded was to be chrysotile type in the form of loose fibres or cement. Table 5 below summarises the locations and type of asbestos recorded. When assessing the sample locations of the material which contains asbestos there is no correlation which would indicate a contamination hotspot. Therefore, further action is required site wide in regard to asbestos.

Table 5. Summary of Samples Containing Asbestos

Sample Location and Depth (mbgl)	Asbestos Type
WS1 (0.30)	Chrysotile cement
WS2 (0.40)	Chrysotile loose fibres
WS3 (0.30)	Chrysotile loose fibres
WS4 (0.40)	Chrysotile loose fibres
TP10 (0.30)	Chrysotile cement

5.3 Human Health - Conclusions

There are no inorganic or organic contaminants within the Made Ground and the Wittering Formation which exceed the SSAC for the Site. However, chrysotile asbestos in the form of cement and loose fibres have been recorded within five Made Ground samples. The presence of asbestos means there is a potential for the soil to pose significant risk to people accessing the existing soil beneath the Site on a frequent and regular basis, such as maintenance workers. Therefore, measures will need to be taken to remove this potential pollutant linkage.

6 CONTROLLED WATERS RISK ASSESSMENT

It is considered that the Site does not pose a significant risk to controlled waters based on the evidence presented below.

- ▶ The Site is underlain by Made Ground to depths of up to 2.00mbgl, this is underlain by the Wittering Formation to depths of 3.00-5.30mbgl, with London Clay Formation proven to 19.00mbgl.
- ▶ Perched groundwater has been recorded in exploratory holes WS1-6 within the Made Ground. Deeper boreholes CP01 and CP02 have recorded deeper groundwater levels from 4.80-12.20mbgl. It has been considered that the groundwater within the Made Ground is a perched water body resting on top of the cohesive Wittering Formation, with the true groundwater level represented within the cable percussion boreholes.
- ▶ Groundwater flow direction is likely to be towards the south and west
- ▶ The nearest identified surface water course is located 112m west of the Site.
- ▶ The site is at a ground level ranging from approximately 42-45mAOD. The nearest sensitive surface body (noted above) is located at a marginally lower level than the site at approximately 39mAOD.
- ▶ There are no ground or surface water abstractions located within 500m of the Site.

Soil samples taken from both the Made Ground and Wittering Formation did not identify significant contamination. No evidence of a viable source has been identified in the investigation and therefore it is concluded that the proposed development of the Site does not pose a potential significant risk to controlled waters and no further investigation or assessment is required. If evidence of contamination is identified during the pre-construction works then this assessment must be readdressed.

Some soil samples were recorded to contain contaminants which exceeded the theoretical soil saturation limit for organic contaminants. However, based on experience, the concentrations recorded will unlikely pose a risk. Within the locations with exceedances there was no record of visual or olfactory contamination within the samples. Therefore, it is not considered that these organic contaminant concentrations will pose a significant risk to controlled waters.

Based on the information above we consider that no further investigation or assessment in relation controlled waters is required at the Site.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Geo-environmental Considerations

Based on the information gathered during review of the previous Crossfield desk study and site investigation and the recent ground investigation the following conclusions have been made. The recommendations contained below are solely in relation to potential pollutant linkages identified during the investigations undertaken by ACS. Some of the following may form the basis of a remediation strategy and further detail may be required by the Local Authority to fulfil the planning condition and further design will be required in conjunction with the development design and Building Control requirements.

- ▶ The Site is underlain by varying thicknesses of Made Ground (up to 2.00m), above silt and clay deposits of the Wittering Formation which have been proven to depths of 5.00-5.30mbgl.
- ▶ This assessment has concluded that the Site poses a potential risk to future Site users due to the presence of asbestos in the Made Ground. Mitigation measures are therefore required, as discussed below.
- ▶ The Site does not pose a significant risk to controlled waters and no further assessment is required.
- ▶ Previous sampling within the ACS geotechnical investigation indicated that waste soil arising from the Wittering Formation is likely to be classified as inert. Soil arising from the Made Ground may be suitable for disposal in a Non-Hazardous landfill. A prospective landfill operator should be supplied with the information included in this and other investigation reports to enable them to confirm whether their site is able to accept waste soil.

7.1.1 Clean Cover System

- ▶ Asbestos has been identified in five samples taken from the Made Ground. This poses a potential risk to future Site users, in particular groundworkers/gardeners where they are most likely to be exposed to soil, i.e. in gardens and soft landscaped areas. The Made Ground is variable in depth but typically around ~0.75mbgl therefore it may be suitable to remove materials in high exposure areas as a means of removing this potential risk. Otherwise, the existing soils would need to be covered to discourage human contact with the impacted soil.
- ▶ Because of the nature of these contaminants (non-threshold), if a cover system is being applied above made ground, it is likely to be necessary for a capping layer of 450mm in soft landscape areas. This depth is based on BRE research which indicates that a spade depth is generally 300mm, and therefore we have allowed some buffer to discourage mixing of the original and imported soil.

BS3882:2015 suggests that subsoil should be used below 300mm as it is structurally more robust and will settle less after placement.

Where Made Ground is present at a depth greater than the thickness of the clean cover system, the imported soil should be underlain by a brightly coloured close weave geotextile which will reduce mixing of the existing and imported soil, and will discourage excavation into the Made Ground.

- ▶ To ensure the topsoil imported to the Site is fit for its intended purpose, this material should be subject to chemical analysis at a ratio of 1 sample per 100m³. Chemical analysis should then

be compared with the assessment criteria included within Appendix C of this report or site specific criteria agreed with the Local Authority.

7.1.2 Construction and Maintenance Workers

Contractors working on the Site should be warned that there is potential for chemical contaminants to be present in the soils, so that appropriate protection measures can be adopted to protect their health and safety. The potential hazards identified by the investigations, which should be considered during below ground works include;

- ▶ Asbestos fibres

It is possible that there is gross contamination on the site which has not been identified and this should be considered a potential hazard.

Site specific construction workers risk assessment and appropriate health and safety practices to adequately mitigate the potential risks must be put in place before construction or maintenance work. Works should be conducted in accordance with the Health and Safety Executive publication entitled "Protection of Workers and the General Public during the Development of Contaminated Land", 1991, the CDM Regulations (2015) and any other relevant guidance.

7.1.3 Utilities

It is recommended that chemical laboratory test results are forwarded to the Utility Service Providers so services can be correctly specified, in particular plastic water supply pipes.

8 REFERENCES

BS EN ISO 14688-1:2002. Geotechnical Investigation and Testing. Identification and Classification of Soil. BSI 2002.

BS 5930:2015. Code of Practice for Site Investigations. BSI 2015.

BS:10175 2011+A2:2017. Investigation of Potential Contaminated Sites. Code of Practice. BSI 2011.

CIRIA, Construction Industry Research and Information Association (2001). Contaminated Land Risk Assessment. CIRIA 552.

CL:AIRE, AGS, EIC (2010). Soil Generic Assessment Criteria for Human Health Risk Assessment.

CL:AIRE (2014). Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. SP1010

Department of the Environment (1994). Sampling Strategies for Contaminated Land. CLR Report No. 4.

Department of Communities and Local Government (2012). National Planning Policy Framework.

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Department of Environment and Rural Affairs (2012). Environmental Protection Act 1990: Part 2A. Contaminated Land Statutory Guidance.

Environment Agency (2000). Technical Aspects of Site Investigation in relation to Contaminated Land, Volume 1. R&D Report P5-065/TR.

Environment Agency (2000). Technical Aspects of Site Investigation in relation to Contaminated Land, Volume 2. R&D Report P5-065/TR.

Environment Agency (2004). Model Procedures for the Management of Land Contamination. CLR Report No. 11.

Environment Agency (2008). *Updated Technical Background on the CLEA Model*. Science Report SC50021/SR3.

LQM, Land Quality Management (2014). S4ULs for Human Health Risk Assessment. (S4UL3023)

Figure 1 – Site Location Plan

Figure 2 – Former Site Layout

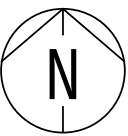
Figure 3 – Exploratory Hole Location Plan (Current Layout)

Figure 4 – Exploratory Hole Location Plan (Proposed Layout)



Notes:

Key:



DO NOT SCALE

Drawing: Site Location Plan	
Client: McCarthy & Stone Retirement Lifestyles Ltd	
Project: 38-44 London Road Purbrook Waterlooville PO7 5LJ	Project No: 17-82110 Drawing No: 17-82110/01 Revision:
Drawn By: BG	Date: 27/04/2017
Checked By: RJH	Date: 27/04/2017



ACS Testing Ltd
Unit 14 Blackhill Road West
Holton Heath Trading Park
Poole, BH16 6LE
T: 01202 622858 | F: 01202 625045
E: geo@acstesting.co.uk | W: acstesting.co.uk
© ACS Testing Ltd

Notes:

Key:

- MOT & Servicing Garage, Tyre Workshop
- Builders' Yard Area
- Above Ground Waste Oil Tank
- Site Boundary



DO NOT SCALE

Drawing:
Former Site Layout Plan

Client:
McCarthy & Stone Retirement Lifestyles Ltd

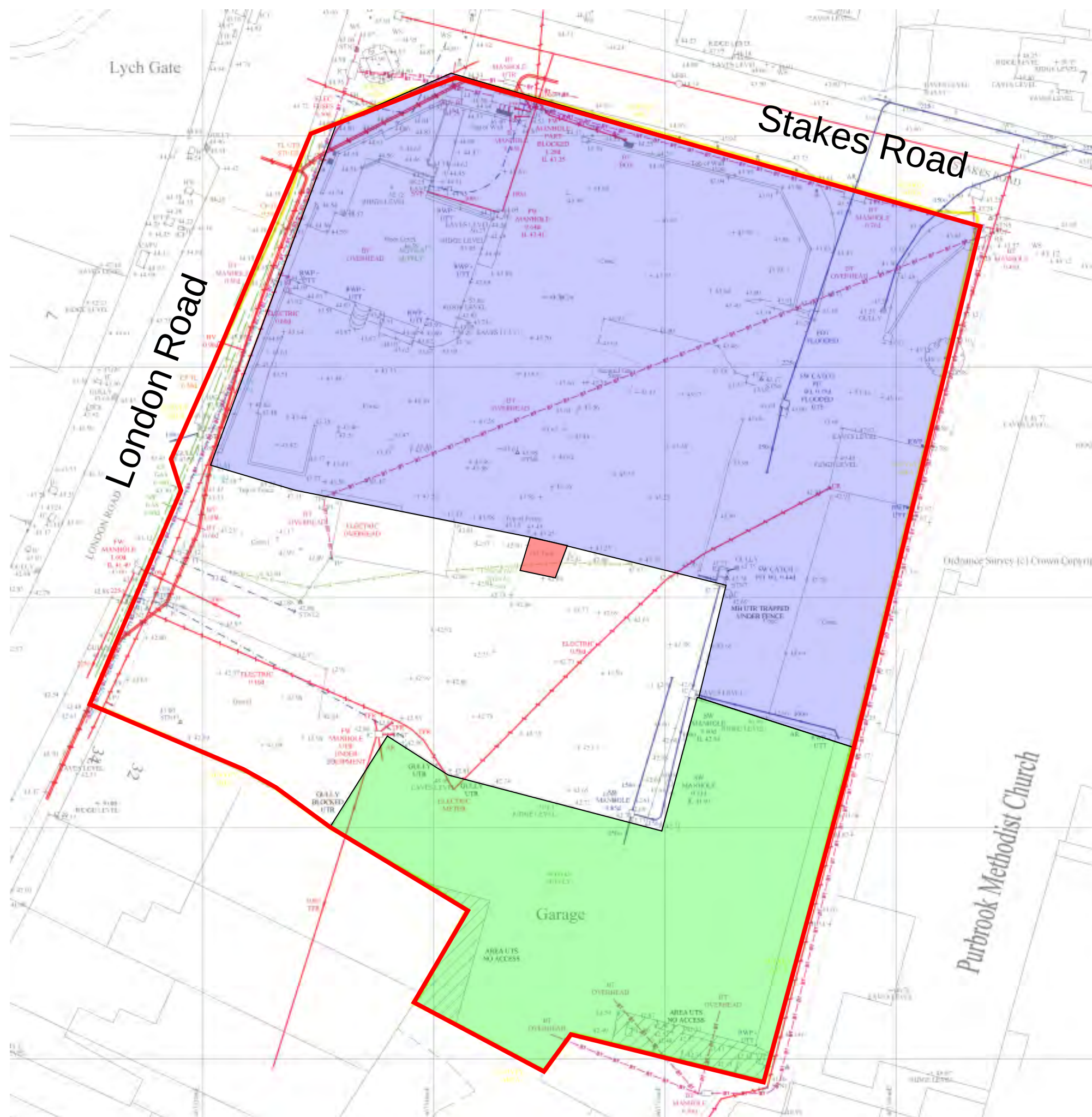
Project: 38-44 London Road Purbrook Waterlooville PO7 5LJ	Project No: 17-89338 Drawing No: 17-89338/04 Revision:
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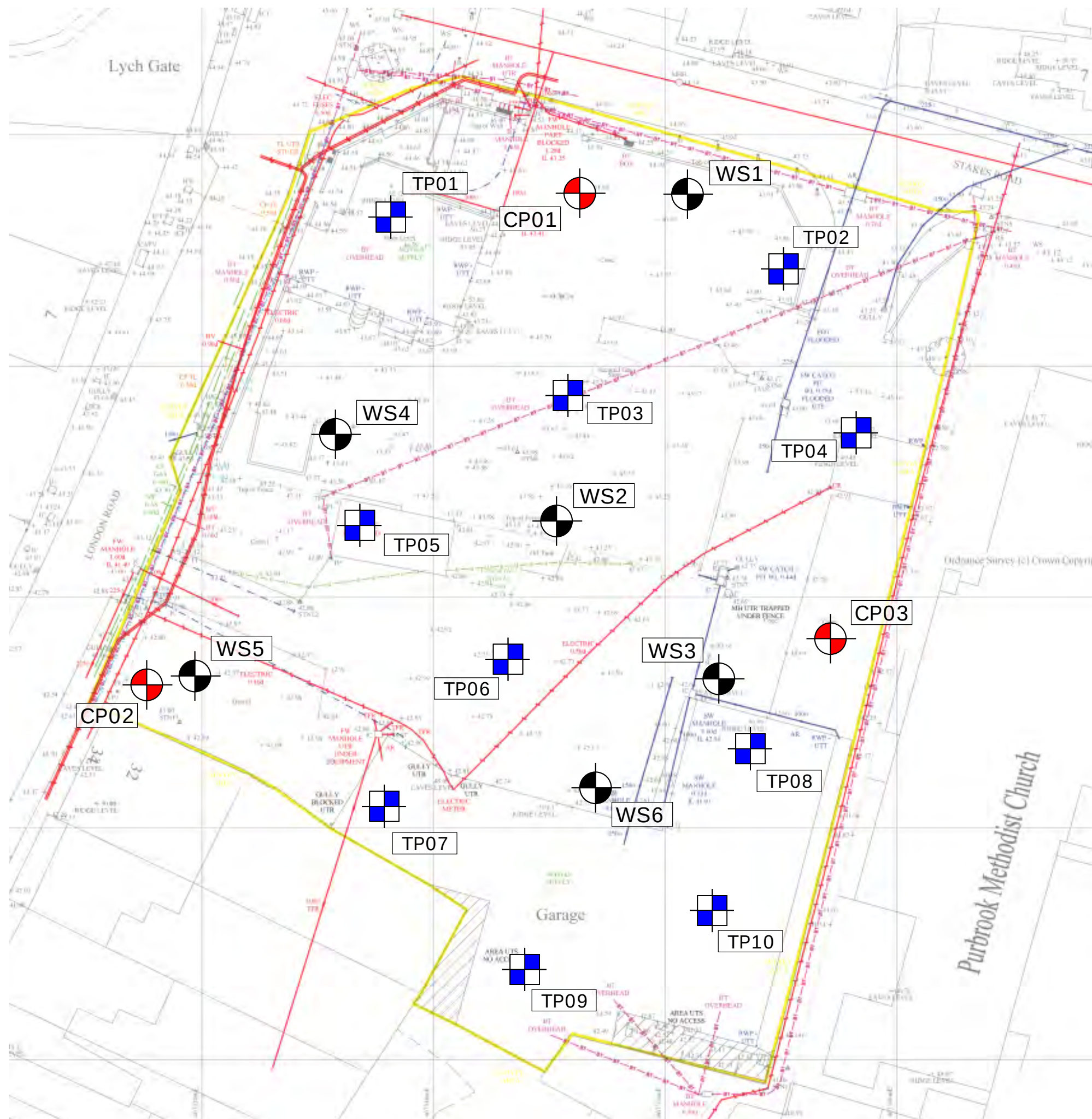
Drawn By: AD	Date: 14/12/2017
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Checked By: AJE	Date: 14/12/2017
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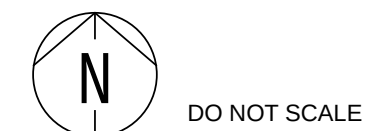
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Notes:
Exploratory hole locations are approximate

- Key:
-  ACS Shell & Auger Borehole
 -  Crossfield Windowless Borehole
 -  Proposed Trial Pit



Drawing:
Exploratory Hole Plan - Former Site Layout

Client:
McCarthy & Stone Retirement Lifestyles Ltd

Project: 38-44 London Road Purbrook Waterlooville PO7 5LJ	Project No: 18-90244 Figure No. 03 Revision:
---	--

Drawn By: AD	Date: 07/02/2018
Checked By: BG	Date: 07/02/2018



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Notes:
Exploratory hole locations are approximate

- Key:
- ACS Shell & Auger Borehole
 - Crossfield Windowless Borehole
 - Proposed Trial Pit



Drawing:
Exploratory Hole Plan - Proposed Site Layout

Client:
McCarthy & Stone Retirement Lifestyles Ltd

Project: 38-44 London Road Purbrook Waterlooville PO7 5LJ	Project No: 18-90244 Figure No. 03 Revision:
---	--

Drawn By: AD	Date: 07/02/2018
Checked By: BG	Date: 07/02/2018



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APPENDIX A

Grant of Planning





Havant
BOROUGH COUNCIL

Public Service Plaza
Civic Centre Road
Havant
Hampshire PO9 2AX

T 023 9247 4174
F 023 9248 0263

www.havant.gov.uk

Mr G Bendinelli
The Planning Bureau Ltd
C/O Southern
1 Embankment Way
Ringwood BH20 1EU

For: Mr Paull
McCarthy & Stone Retirement Lifestyles Ltd.

**The Town and Country Planning (Development Management Procedure) (England)
Order 2015**
Grant of Planning Permission

Application Number: APP/17/01141

Site Address: Land at, 38-44 London Road, Purbrook, Waterlooville

Proposal: Construction of 43no. retirement apartments for older persons including communal facilities, parking, associated landscaping with access from Stakes Road and 2no. commercial/retail units fronting onto London Road. Revised scheme from Planning Permission APP/15/00896)

Further to your application received on 23 October 2017, Havant Borough Council, as Local Planning Authority **Grants Planning Permission** for the above proposal in accordance with the submitted plans and particulars as detailed below.

This permission is subject to compliance with:

- (i) The plans and other documents submitted with regard to your application; and
- (ii) The following conditions:

Conditions:

- 1 The development must be begun not later than three years beginning with the date of this permission.
Reason: To comply with the requirements of Section 91 of the Town and Country Planning Act 1990 as amended by Section 51 of the Planning and Compulsory Purchase Act 2004.
- 2 The development hereby permitted shall be carried out in accordance with the following approved plans:

Tree constraints plan - 8817/01
Topo survey - SD17421-01
Location Plan - SE - 2168-03-AC-001
Site Plan - SE - 2168-03-AC-200
GF plan - SE - 2168-03-AC-210 Rev G
FF plan - SE - 2168-03-AC-211
SF plan - SE - 2168-03-AC-212
Roof plan - SE - 2168-03-AC-213
Proposed elevations north and west - SE - 2168-03-AC-220
Proposed elevations south and east - SE - 2168-03-AC-221

Our Ref: APP/17/01141

Proposed streetcene - SE - 2168-03-AC-225

Plan 1 - SE - 2168-03-AC-230

Plan 2 - SE - 2168-03-AC-231

Drainage Layout - SE - 2168-03-DE-20

Hard landscape proposals - SE - 2168-03-LA-003

Soft landscape proposals - SE - 2168-03-LA-004

Reason: - To ensure provision of a satisfactory development.

- 3 Prior to the commencement of development approved by this planning permission (excluding the demolition of any existing buildings) or such other date or stage in development as may be agreed in writing with the Local Planning Authority, an assessment of the nature and extent of contamination at the site, whether originating from within or outside the curtilage, shall be submitted to and approved in writing by the Local Planning Authority. The assessment shall be undertaken by competent persons, and the findings presented as a written report.

The assessment may comprise separate reports as appropriate, but unless specifically excluded in writing by the Local Planning Authority, shall include;

1) A site walk-over survey &/or sufficient desk-based research to identify;

- All relevant previous uses of the site
- Potentially significant contaminants associated with those uses
- Uncertainties relating to previous use or associated potential contaminants
- A conceptual site model identifying all relevant sources, exposure pathways and receptors, and;
- A summary of potentially unacceptable risks arising from contamination at the site.

2) Site investigation based on (1), to provide sufficient data and information to adequately identify & characterise any physical contamination on or affecting the site, and to inform an appropriate assessment of the risks to all receptors that may be affected, including those off site.

3) The results of an appropriate risk assessment based upon (1) & (2), and where unacceptable risks are identified, a Remediation Strategy that includes;

- appropriately considered remedial objectives,
- an appraisal of remedial &/or risk mitigation options, having due regard to sustainability, and;
- clearly defined proposals for mitigation of the identified risks.

4) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the Remediation Strategy (3) are complete, identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

All elements shall be adhered to unless agreed in writing by the Local Planning Authority.

Reason - in the interest of the safety of the site and having due regard for Policy DM10 of the Local Plan (Core Strategy 2011) and the National Planning Policy Framework 2012.

- 4 Prior to the occupation of any relevant part of the permitted development, any verification report required in accordance with condition 3 above shall be submitted to and approved in writing by the Local Planning Authority. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan, and must demonstrate that site remediation criteria have been met. Where longer-term monitoring of pollutant linkages is identified as being necessary, the report shall clearly set out plans for monitoring, provision for maintenance, relevant triggers and contingency actions (a “long-term monitoring and maintenance plan”). The long-term monitoring and maintenance plan shall be implemented as approved.

Reason - in the interest of the safety of the site and having due regard for Policy DM10 of the Local Plan (Core Strategy 2011) and the National Planning Policy Framework 2012.

- 5 No development hereby permitted shall commence until plans and particulars specifying the layout, depth and capacity of all foul and surface water drains and sewers proposed to serve the same, and details of any other proposed ancillary drainage works/plant (e.g. pumping stations) have been submitted to and approved in writing by the Local Planning Authority. Unless agreed otherwise in writing by the Local Planning Authority, the development hereby permitted shall not be brought into use prior to the completion of the implementation of all such drainage provision in full accordance with such plans and particulars as are thus approved by the Authority.

Reason: To safeguard the amenities of the locality and ensure that all such drainage provision is constructed to an appropriate standard and quality and having due regard to policies and proposals CS16 and DM10 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.

- 6 No development shall take place until plans and particulars specifying the following matters have been submitted to and approved in writing by the Local Planning Authority:

(i) The provision to be made within the site for contractors' vehicle parking during site clearance and construction of the development;

(ii) The provision to be made within the site for a material storage compound during site clearance and construction of the development.

Thereafter, throughout such site clearance and implementation of the development, the approved parking provision and storage compound shall be kept available and used only as such.

Reason: To safeguard the amenities of the locality and in the interests of traffic safety and having due regard to policies CS16 and DM10 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.

- 7 No development shall take place until details of existing and finished floor and site levels relative to previously agreed off-site datum point(s) have been submitted to and approved in writing by the Local Planning Authority. The development shall be undertaken in accordance with the approved details.

Reason: in the interest of the appearance of the development and having due regard for Policy CS16 of the Local Plan (Core Strategy 2011) and the National Planning Policy Framework 2012.

- 8 No above ground construction works shall take place until a more detailed soft landscaping scheme for all open parts of the site not proposed to be hardsurfaced has been submitted to and approved in writing by the Local Planning Authority. Such scheme shall specify the proposed finished ground levels in relation to the existing levels, the distribution and species of ground cover to be planted, the positions, species and planting sizes of the trees and shrubs to be planted and/or retained, and timing provisions for completion of the implementation of all such landscaping works. The implementation of all such approved landscaping shall be completed in full accordance with such approved timing provisions. Any tree or shrub planted or retained as part of such approved landscaping scheme which dies or is otherwise removed within the first 5 years shall be replaced with another of the same species and size in the same position during the first available planting season.
Reason: To ensure the appearance of the development is satisfactory and having due regard to policies CS16, DM8 and DM9 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework 2012.
- 9 No development hereby permitted shall commence until a specification of the materials to be used for the surfacing of all open parts of the site proposed to be hardsurfaced has been submitted to and approved in writing by the Local Planning Authority. The development hereby permitted shall not be brought into use until the implementation of all such hardsurfacing has been completed in full accordance with that specification.
Reason: In the interests of the amenities of the locality and having due regard to policies CS11.1, CS11.4, CS16, and DM8 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework 2012.
- 10 No part of the development shall be first occupied until details of the type, siting, design and materials to be used in the construction of all means of enclosure including boundaries, screens or retaining walls, have been submitted to and approved in writing by the Local Planning Authority and the approved structures have been erected in accordance with the approved details. The structures shall thereafter be retained.
Reason: To safeguard the amenities of the locality and having due regard to policy CS16 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.
- 11 With the exception of any site manager/warden's accommodation, at no time shall the sheltered apartments development hereby approved be occupied by persons under the age of 60, unless in the case of a couple where one person is over the age of 60, the second person shall not be under the age of 55.
Reason: In order that the occupancy of the development is compatible with the limited amount of on-site parking provision, and having due regard to Policies CS20 and DM13 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.
- 12 The development shall be carried out in strict accordance with the agreed acoustic report prepared by Parsons Brinkerhoff dated May 2017.
Reason: in the interests of the amenity of the nearby locality and having due regard to Policy DM13 of the Havant Borough Local Plan (Core Strategy 2011) and the National Planning Policy Framework 2012.
- 13 No development shall commence until a scheme for the eradication and / or control of Japanese Knotweed shall be submitted to and approved by the Local Planning Authority and the approved scheme shall be implemented prior to the commencement of the use of the building.
Reason: in the interests of the amenity of the locality and having due regard to Policy DM8 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.

- 14 No development shall commence until details relating to the following have been submitted to and agreed by the Local Planning Authority:
- i. confirmation of the existing drainage system
 - ii. infiltration tests should be carried out to discover if this method of surface water disposal is appropriate and the results provided.
 - iii. Evidence of the appropriate number of treatment stages in the surface water management train as states in CIRIA C69.
 - iv. Calculations comparing the existing surface water run off rate, in l/s for a 1 in 100 year flood event +30% for climate change, with the proposed development's surface water run off rate for the same event.
 - v. Calculations to demonstrate the existing run off volume for a 1 in 100 year, 6 hour flood event and evidence showing that there be adequate storage for the attenuation of this volume on site, and allowing discharge without increasing the run off rate or volume off site.
- Reason:** To safeguard the amenities of the locality and ensure that all such drainage provision is constructed to an appropriate standard and quality and having due regard to policies and proposals CS16 and DM10 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.
- 15 A sample panel of inset of brick and flintwork shall be constructed on site to accurately reflect the brick bond, finish, mortar type, finish and capping detail with accompanying specification for approval by the Local Planning Authority in writing before any ground construction shall take place. The approved sample panel shall be retained on site until the work is completed and the work carried out in full accordance with the approval granted.
- Reason:** To ensure the appearance is satisfactory and quality and having due regard to policies and proposals CS16, CS11 and DM20 of the Havant Borough Local Plan (Core Strategy and Allocations) 2011 and the National Planning Policy Framework.
- 16 Before any above ground construction takes place, large scale (1:20) details of the proposed shop fronts (elevation and vertical cross-sections including the stall riser and fascia) shall be submitted to, and approved in writing by the Local Planning Authority. All work shall be carried out in accordance with such approval.
- Reason:** To ensure the appearance is satisfactory and quality and having due regard to policies and proposals CS16, CS11 and DM20 of the Havant Borough Local Plan (Core Strategy and Allocations) 2011 and the National Planning Policy Framework.
- 17 Details of the siting and design of any proposed external meter boxes / metal ducting / flues shall be submitted to and approved in writing by the Local Planning Authority prior to the commencement of development. The development shall thereafter be carried out in accordance with the approved details.
- Reason:** To protect the character and appearance of the adjacent conservation area and having due regard to policies and proposals CS16, CS11 and DM20 of the Havant Borough Local Plan (Core Strategy and Allocations) 2011 and the National Planning Policy Framework.

Other Important Information:

- (1) This notice only relates to the decision of Havant Borough Council as Local Planning Authority under the Town and Country Planning Acts. It does not relate to any other application that may be required under the Building Regulations or under any other Act, Regulation, Byelaw or Order where the Council's approval may be needed. For further guidance as to the need for consent under the Building Regulations please phone 023 9244 6571.
- (2) Your attention is drawn to the attached information regarding firstly your right to appeal to the Planning Inspectorate, if you are aggrieved by the Council's decision, and secondly the rights of an owner to, in certain circumstances serve a purchase notice on the Council. See www.planningportal.gov.uk/pcs.
- (3) Any failure to adhere to the details of the approved plans, and other documents or to comply with any conditions listed above may lead to enforcement action being taken by the Council. If you wish to depart from the approved details or conditions in any way you should contact the Planning and Development service at the Plaza or by telephoning 023 9244 6015.
- (4) In accordance with paragraphs 186 and 187 of the NPPF Havant Borough Council (HBC) takes a positive and proactive approach and works with applicants/agents on development proposals in a manner focused on solutions by:
 - Offering a pre-application advice service, and
 - Updating you of any issues that may arise in the processing of your application and where possible suggesting solutions, and,In this instance:
 - Your application was acceptable as submitted and no further assistance was required.
- (5) You are hereby requested to ensure that the Environmental Health Pollution team, at Havant Borough Council are advised in writing as to what measures are to be put in place for the control of any dust that might emanate from the development site. This is in order to protect the occupants of nearby residential properties from dust pollution.
- (6) You are hereby requested to ensure that no bonfires take place on this site, during any phase of the operation i.e. demolition, excavation, clearance and construction works. If you feel you have a legitimate reason for a bonfire, it is recommended you enquire with the Environmental Health Pollution team, at Havant Borough Council, prior to taking this action. This is in order to protect the occupants of nearby residential properties from smoke pollution.
- (7) You are hereby requested to ensure that no works or ancillary operations associated with any demolition, excavation, clearance and construction works at the development, which are audible at the site boundary, shall take place on any Sunday

Our Ref: APP/17/01141

or Bank / Public Holiday, nor on any other day except between the following times:
Monday to Friday: 08.00 - 18.00 and Saturday: 08:00 - 13.00.

This is in order to protect the occupants of nearby residential properties from noise and vibration nuisance

- (8) You are hereby requested to ensure that any external lighting that may be installed on this site, within the grounds or attached to the building, is so positioned so as not to cause nuisance to neighbouring properties.

This is in order to protect the occupants of nearby residential dwellings from light pollution.

Andrew Biltcliffe

Andrew Biltcliffe
Head of Planning

21 December 2017

APPENDIX B

Photographs





Photo 1: View within TP01.



Photo 2: View within TP04. Note brick within Made Ground.



Photo 3: View within TP06.



Photo 3: View within TP08

APPENDIX C

Exploratory Hole Logs

- ▶ Crossfield windowless logs – WS1-6
- ▶ Cable percussion logs – CP01-03
- ▶ Trial pit logs – TP01-10



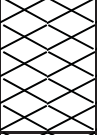
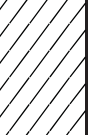
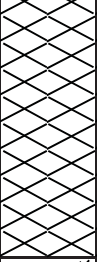
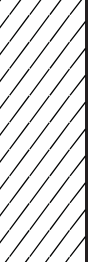
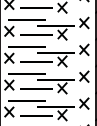
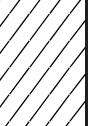
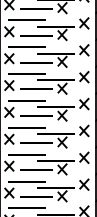
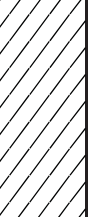
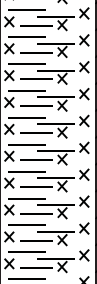
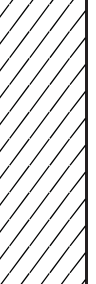
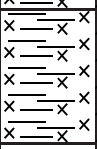
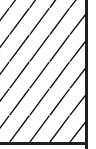
Crossfield CONSULTING GEOTECHNICAL ENVIRONMENTAL					Windowless Sample Record Sheet					Hole Ref. WS1	
					Project: 38-44 London Road, Waterlooville					Sheet 1 of 1	
					Date: 06/05/2015					Job No. CCL02684	
Contractor Dynamic Sampling Ltd			Equipment Premier Compact 110			Ground Level. 43.90 m OD					
Method 0.0 m to 5.0 m windowless sampling								Co-ordinates			
Boring Diameter 100 mm								Logged by: SC Logged on site during drilling operations			
								Checked by: 			
Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.		
0.30	Gg				Concrete surfacing (150 mm) over dark brown fine to coarse sand and fine to coarse and angular to subangular gravel with concrete and brick fragments and rare ashy materials (MADE GROUND)						
1.00-1.45	S	1.00		N=4	Green with pockets of orange silty fine to medium SAND (WITTERING FORMATION)	1.00			42.90		
2.00-2.45	S	1.00		N=4	No recovery	2.00			41.90		
3.00-3.45	S	1.00		N=0							
4.00-4.45	S	1.00		N=0		4.00			39.90		
5.00-5.45	S	1.00		N=7	Firm to stiff consistency dark grey clayey SILT (LONDON CLAY)						
					End of Hole	5.45			38.45		
Core Recovery					Groundwater			Additional Tests			
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value			
0.00-1.00	70%	1.00	1.00	-	Water entry						
1.00-2.00	70%										
2.00-3.00	0%										
3.00-4.00	0%										
4.00-5.00	20%										
Remarks					Notes						
Ground level based on a topographical survey drawing by Prospaplans Limited, Dwg No. PP/3066/M&S/Purbrook/F1					1. All logging and sampling in accordance with BS 5930:1999+A2:2010 2. The depths to strata change are approximate only 3. Symbols and abbreviations are explained on the accompanying key 4. All linear dimensions are in metres unless otherwise stated 5. Undrained shear strength test value given in kN/m ²						

					Windowless Sample Record Sheet					Hole Ref. WS2	
					Project: 38-44 London Road, Waterlooville					Sheet 1 of 1	
					Date: 06/05/2015					Job No. CCL02684	
Contractor Dynamic Sampling Ltd			Equipment Premier Compact 110			Ground Level. 43.30 m OD					
Method 0.0 m to 5.0 m windowless sampling								Co-ordinates			
Boring Diameter 100 mm								Logged by: SC Logged on site during drilling operations Checked by: 			
Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.		
0.40	Gg				Concrete surfacing (200 mm) over light grey sandy fine to coarse angular to subangular gravel (MADE GROUND)						
1.00-1.45	S	1.00		N=2	Dark brown slightly gravelly sandy silt with rare ashy materials (MADE GROUND)	1.00			42.30		
2.00-2.45	S	1.00		N=7							
2.50	J				Soft consistency grey mottled orange silty sandy CLAY (WITTERING FORMATION)	2.00			41.30		
3.00-3.45	S	1.00		N=10							
4.00-4.45	S	1.00		N=13	Firm to stiff consistency dark grey sandy SILT (LONDON CLAY)	3.90			39.40		
5.00-5.45	S	1.00		N=12	End of Hole	5.45			37.85		
Core Recovery				Groundwater				Additional Tests			
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value			
0.00-1.00	40%	1.00	1.00	-	Water entry						
1.00-2.00	10%	5.00	-	1.30	Water depth on completion						
2.00-3.00	90%										
3.00-4.00	90%										
4.00-5.00	70%										
Remarks					Notes						
Ground level based on a topographical survey drawing by Proscaplans Limited, Dwg No. PP/3066/M&S/Purbrook/F1					1. All logging and sampling in accordance with BS 5930:1999+A2:2010 2. The depths to strata change are approximate only 3. Symbols and abbreviations are explained on the accompanying key 4. All linear dimensions are in metres unless otherwise stated 5. Undrained shear strength test value given in kN/m ²						

					Windowless Sample Record Sheet			Hole Ref. WS3	
					Project: 38-44 London Road, Waterloooville			Sheet 1 of 1	
					Date: 06/05/2015			Job No. CCL02684	
Contractor Dynamic Sampling Ltd		Equipment Premier Compact 110			Ground Level. 42.70 m OD				
Method 0.0 m to 5.0 m windowless sampling					Co-ordinates				
Boring Diameter 100 mm					Logged by: SC Checked by: 		Logged on site during drilling operations		
Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.30	Gg				Tarmac over concrete (200 mm) over dark brown fine to coarse sand and subrounded to angular gravel with concrete and brick fragments (MADE GROUND)				
					Dark brown slightly gravelly silt with rare brick fragments and ashy materials MADE GROUND	0.50			42.20
					Firm consistency greenish grey mottled orange silty CLAY (WITTERING FORMATION)	0.80			41.90
1.00-1.45 1.00	S, G, g C _{iv} *	1.00		N=4 60					
2.00-2.45	S	1.00		N=4	Firm consistency orangish brown silty CLAY (WITTERING FORMATION)	2.00			40.70
3.00-3.45	S	1.00		N=9					
					Firm to stiff consistency dark grey clayey sandy SILT	3.50			39.20
4.00-4.45	S	1.00		N=7					
5.00-5.45	S	1.00		N=12	End of Hole	5.45			37.25
Core Recovery					Groundwater			Additional Tests	
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value	
0.00-1.00	90%	1.00	1.00	-	Water entry				
1.00-2.00	100%								
2.00-3.00	50%								
3.00-4.00	100%								
4.00-5.00	80%								
Remarks					Notes				
Ground level based on a topographical survey drawing by Proscaplans Limited, Dwg No. PP/3066/M&S/Purbrook/F1					1. All logging and sampling in accordance with BS 5930:1999+A2:2010 2. The depths to strata change are approximate only 3. Symbols and abbreviations are explained on the accompanying key 4. All linear dimensions are in metres unless otherwise stated 5. Undrained shear strength test value given in kN/m ²				

					Windowless Sample Record Sheet					Hole Ref. WS4	
					Project: 38-44 London Road, Waterlooville					Sheet 1 of 1	
					Date: 06/05/2015					Job No. CCL02684	
Contractor Dynamic Sampling Ltd			Equipment Premier Compact 110			Ground Level. 43.50 m OD					
Method 0.0 m to 5.0 m windowless sampling								Co-ordinates			
Boring Diameter 100 mm								Logged by: SC Logged on site during drilling operations Checked by: 			
Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.		
0.40	Gg				Concrete (200 mm) over brown fine to coarse sand and fine to coarse subrounded to angular gravel with brick and concrete fragments (MADE GROUND)						
1.00-1.45	S	1.00		N=4		1.60			41.90		
2.00-2.45	S	1.00		N=4	Firm consistency green sandy SILT (WITTERING FORMATION)						
3.00-3.45	S	1.00		N=4		3.00			40.50		
4.00-4.45	S	1.00		N=7	Firm to stiff consistency dark grey sandy SILT (LONDON CLAY)						
5.00-5.45	S	1.00		N=8	End of Hole	5.45			38.05		
Core Recovery					Groundwater			Additional Tests			
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value			
0.00-1.00	60%	1.00	1.00	-	Water entry						
1.00-2.00	60%										
2.00-3.00	0%										
3.00-4.00	0%										
4.00-5.00	0%										
Remarks					Notes						
Ground level based on a topographical survey drawing by Prospaplans Limited, Dwg No. PP/3066/M&S/Purbrook/F1					1. All logging and sampling in accordance with BS 5930:1999+A2:2010						
No core recovery below 2.0 m, description based on SPT sample recovery					2. The depths to strata change are approximate only						
					3. Symbols and abbreviations are explained on the accompanying key						
					4. All linear dimensions are in metres unless otherwise stated						
					5. Undrained shear strength test value given in kN/m ²						

					Windowless Sample Record Sheet					Hole Ref. WS5	
					Project: 38-44 London Road, Waterlooville					Sheet 1 of 1	
					Date: 06/05/2015					Job No. CCL02684	
Contractor Dynamic Sampling Ltd			Equipment Premier Compact 110			Ground Level. 42.90 m OD					
Method 0.0 m to 5.0 m windowless sampling								Co-ordinates			
Boring Diameter 100 mm								Logged by: SC Logged on site during drilling operations Checked by: 			
Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.		
0.50	Gg				Gravel over concrete (200 mm) over fine to coarse sand and fine to coarse subrounded to angular gravel with brick and concrete fragments (MADE GROUND)						
1.00-1.45	S	1.00		N=4	Soft to firm consistency brown slightly gravelly silty clay. Gravel is fine to medium and subangular to angular (MADE GROUND)	1.00			41.90		
1.50	J				Firm consistency green mottled orange silty CLAY (WITTERING FORMATION)	1.40			41.50		
2.00-2.45	S	1.00		N=7							
3.00-3.45	S	1.00		N=8		3.00			39.90		
4.00-4.45	S	1.00		N=9	Firm to stiff dark grey clayey SILT (LONDON CLAY)						
5.00-5.45	S	1.00		N=12	End of Hole	5.45			37.45		
Core Recovery					Groundwater			Additional Tests			
Depth		Recovery		Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value	
0.00-1.00		50%		1.00	1.00	-	Water entry				
1.00-2.00		100%		5.00	-	1.90	Water depth on completion				
2.00-3.00		90%									
3.00-4.00		20%									
4.00-5.00		100%									
Remarks						Notes					
Ground level based on a topographical survey drawing by Prospaplans Limited, Dwg No. PP/3066/M&S/Purbrook/F1						1. All logging and sampling in accordance with BS 5930:1999+A2:2010 2. The depths to strata change are approximate only 3. Symbols and abbreviations are explained on the accompanying key 4. All linear dimensions are in metres unless otherwise stated 5. Undrained shear strength test value given in kN/m ²					

					Windowless Sample Record Sheet				Hole Ref. WS6		
					Project: 38-44 London Road, Waterlooville				Sheet 1 of 1		
					Date: 06/05/2015				Job No. CCL02684		
Contractor		Dynamic Sampling Ltd		Equipment		Premier Compact 110		Ground Level. 42.60 m OD			
Method		0.0 m to 4.0 m windowless sampling						Co-ordinates			
Boring Diameter		100 mm						Logged by: SC Logged on site during drilling operations Checked by: 			
Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.		
0.30	Gg				Concrete (200 mm) over brown fine to coarse sand and fine to coarse gravel with brick fragments (MADE GROUND)	0.50			42.10		
					Dark brown gravelly silt with brick, concrete, glass and ashy materials (MADE GROUND)						
1.00-1.45	S	1.00		N=		1.50			41.10		
1.70	J				Firm consistency green mottled orange silty CLAY (WITTERING FORMATION)						
2.00-2.45	S	1.00		N=							
					...becoming orange below 2.8 m						
3.00-3.45	S	1.00		N=							
						4.00			38.60		
4.00-4.45	S	1.00		N=	Firm to stiff dark grey silty CLAY (LONDON CLAY)						
						4.45			38.15		
					Base of Hole						
5.00-5.45	S	1.00		N=							
Core Recovery					Groundwater			Additional Tests			
Depth		Recovery		Hole Depth		Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value
0.00-1.00		50%		1.00		1.00	-	Water entry			
1.00-2.00		70%		5.00		-	1.50	Water depth on completion			
2.00-3.00		30%									
3.00-4.00		20%									
Remarks						Notes					
Ground level based on a topographical survey drawing by Prospaplans Limited, Dwg No. PP/3066/M&S/Purbrook/F1						1. All logging and sampling in accordance with BS 5930:1999+A2:2010 2. The depths to strata change are approximate only 3. Symbols and abbreviations are explained on the accompanying key 4. All linear dimensions are in metres unless otherwise stated 5. Undrained shear strength test value given in kN/m ²					



CABLE PERCUSSION

CP01

Sheet 1 of 2

Lab. Ref: 17-80954

Drilling Equipment:

Pilcon 1 Ton Shell & Auger Rig

Date(s): 06/03/2017 - 07/03/2017

Logged By
LF

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Backfill	Water Strike Depth	Casing Depth	Sample (Type) Depth	In Situ Testing		
									Depth	Type	Results
1 <											

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				BOREHOLE LOG CABLE PERCUSSION				Borehole No. CP01 Sheet 2 of 2			
Client: McCarthy & Stone Retirement Lifestyles Ltd				Lab. Ref: 17-80954				Hole Type WLS			
Contract: 38-44 London Road				Drilling Equipment: Pilcon 1 Ton Shell & Auger Rig				Scale 1:55			
Location: Purbrook, Waterlooville								Logged By LF			
Ground Level (mAOD): 44.14		Co-ords: DNS		Date(s): 06/03/2017 - 07/03/2017							
All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Backfill	Water Strike Depth	Casing Depth	Sample (Type) Depth	In Situ Testing		
									Depth	Type	Results
11	Firm becoming stiff grey silty slightly sandy CLAY. (LONDON CLAY FORMATION)	12.50 (31.64)				12.50	10.50		SPT(S)	N=44 (6,7/8,10,12,14)	
								11.00			
12	Firm becoming very stiff grey silty slightly sandy CLAY. (LONDON CLAY FORMATION)							12.50 (U)		U100 Blows = 150 U100 Rec = 90%	
								12.95			
13									SPT(S)	N=48 (8,8/10,12,12,14)	
								14.00			
14										N=48 (8,8/10,12,12,14)	
								14.00			
15								15.50 (U)		U100 Blows = 150 U100 Rec = 70%	
								15.95			
16									SPT(S)	N=52 (10,10/12,13,13,14)	
								17.00			
17										N=52 (10,10/12,13,13,14)	
								17.00			
18								18.50 (U)		U100 Blows = 150 U100 Rec = 80%	
								18.95			
19	LIMESTONE ROCK. Drillers description. End of Borehole at 19.100m	19.00 (25.14)							SPT(S)	100 (25 for 50mm/100 for 30mm)	
		19.10 (25.04)									
20									SPT(S)	100 (25 for 40mm/100 for 10mm)	
Remarks: Borehole terminated at 19.10m due to refusal in bedrock. Ground level inferred from topographical survey.		Chiselling		Groundwater Observations:							
		Depth	Time	Date	Strike	Casing	Time Elapsed	Standing	Remarks		
		19.00-19.10m	01:15	06-03-2017	12.50m	10.50m	20mins	12.20m			
		Technical Notes (where applicable): Fine grained soil consistencies and rock strengths have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are described based on SPT[N] values where available. Chalk is described in accordance with CIRIA C574.									



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BOREHOLE LOG

CABLE PERCUSSION

Borehole No.

CP02

Sheet 1 of 2

Client: McCarthy & Stone Retirement Lifestyles Ltd

Contract: 38-44 London Road

Location: Purbrook, Waterlooville

Lab. Ref: 17-80954

Drilling Equipment: Pilcon 1 Ton Shell & Auger Rig

Hole Type: WLS

Scale: 1:55

Logged By: LF

Ground Level (mAOD): 43.02

Co-ords: DNS

Date(s): 07/03/2017 - 08/03/2017

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Backfill	Water Strike Depth	Casing Depth	Sample (Type) Depth	In Situ Testing			
									Depth	Type	Results	
	CONCRETE	0.10 (42.92)										
	MADE GROUND. Light grey mottled brown very silty very sandy GRAVEL. Gravel comprises fine, medium and coarse; angular to sub-rounded flint and brick. Numerous angular cobble bricks noted.	0.40 (42.62)										
1	Soft to firm light brown mottled yellow slightly clayey slightly gravelly SILT. Gravel comprises fine, medium and coarse; sub-angular to sub-rounded flint. (WITTERING FORMATION)	1.20 (41.82)							1.20	SPT(S)	N=7 (1,1/2,2,1,2)	
2	Soft grey mottled yellow slightly clayey slightly sandy slightly gravelly SILT. Gravel comprises fine to medium; sub-angular to sub-rounded flint. Unit is mottled orange in places and gravel is less frequent at depth. (WITTERING FORMATION)								2.00	SPT(S)	N=7 (1,1/1,2,2,2)	
3									3.00	SPT(S)	N=4 (1,1/1,1,1,1)	
4									4.00	SPT(S)	N=0 (1,0/0,0,0,0)	
5						5.00	5.00		5.00	SPT(S)	N=10 (2,2/2,2,3,3)	
6	Firm becoming stiff grey silty slightly sandy CLAY. (LONDON CLAY FORMATION)	5.30 (37.72)							6.50 (U)		U100 Blows = 32 U100 Rec = 100%	
7									6.95			
8									8.00	SPT(S)	N=34 (5,6/7,8,9,10)	
9									9.50	SPT(S)	N=48 (6,9/9,11,13,15)	
10												

Remarks:

Borehole terminated at 15.60m due to refusal in bedrock. Ground level inferred from topographical survey.

Chiselling

Depth	Time
15.50-15.60m	01:00

Groundwater Observations:

Date	Strike	Casing	Time Elapsed	Standing	Remarks
07-03-2017	5.00m	5.00m	20mins	4.80m	

Technical Notes (where applicable):

Fine grained soil consistencies and rock strengths have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are described based on SPT[N] values where available. Chalk is described in accordance with CIRIA C574.



CABLE PERCUSSION

CP02

Sheet 2 of 2

Lab. Ref: 17-80954

Drilling Equipment:

Pilcon 1 Ton Shell & Auger Rig

Co-ords: DNS

Date(s): 07/03/2017 - 08/03/2017

WLS

1:55

IF

[illegible]

Chiselling

Groundwater Observations:

Depth	Time
15.50-15.60m	01:00

Date
07-03-2017

Casing
5.00m

Time Elapsed	
20mins	

Standing
4.80m

Remarks

Technical Notes (where applicable):
Fine grained soil consistencies and rock strengths have been determined by hand worked field tests as described in BS5930:2015.
Coarse grained soil densities are described based on SPT[N] values where available. Chalk is described in accordance with CIRIA C574

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG CABLE PERCUSSION				Borehole No. CP03 Sheet 1 of 2	
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 17-80954				Hole Type WLS	
Contract: 38-44 London Road		Drilling Equipment: Pilson 1 Ton Shell & Auger Rig				Scale 1:55	
Location: Purbrook, Waterlooville						Logged By LF	
Ground Level (mAOD): 42.80		Co-ords: DNS		Date(s): 08/03/2017			

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Backfill	Water Strike Depth	Casing Depth	Sample (Type) Depth	In Situ Testing		
									Depth	Type	Results
	CONCRETE.										
1	MADE GROUND. Brown very silty very sandy GRAVEL. Gravel comprises fine, medium and coarse; sub-angular to sub-rounded flint, concrete and brick.	0.25 (42.55)	(0.95)								
2	Soft grey mottled brown very silty slightly sandy CLAY. Unit becomes dominantly brown with depth and has mottled orange areas throughout. (WITTERING FORMATION)	1.20 (41.60)	(2.80)					2.00 (U) 2.45	1.20	SPT(S)	N=2 (1,0/1,0,1,0) U100 Blows = 25 U100 Rec = 80%
3									3.00	SPT(S)	N=9 (1,1/1,2,3,3)
4	Soft grey clayey slightly sandy SILT. (LONDON CLAY FORMATION)	4.00 (38.80)	(1.10)						4.00	SPT(S)	N=8 (1,1/2,2,2,2)
5	Firm grey silty slightly sandy CLAY. (LONDON CLAY FORMATION)	5.10 (37.70)	(6.10)					5.00 (U) 5.45			U100 Blows = 53 U100 Rec = 100%
6									6.50	SPT(S)	N=16 (2,2/3,3,5,5)
7											
8									8.00	SPT(S)	N=22 (3,3/4,5,6,7)
9											
10								9.50 (U) 9.95			U100 Blows = 75 U100 Rec = 100%

Remarks: Borehole terminated at 11.40m due to refusal in bedrock. Groundwater not encountered. Ground level inferred from topographical survey.	Chiselling		Groundwater Observations:					
	Depth	Time	Date	Strike	Casing	Time Elapsed	Standing	Remarks
	11.20-11.40m	01:00						
Technical Notes (where applicable): Fine grained soil consistencies and rock strengths have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are described based on SPT[N] values where available. Chalk is described in accordance with CIRIA C574.								

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG CABLE PERCUSSION		Borehole No. CP03 Sheet 2 of 2							
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 17-80954		Hole Type WLS							
Contract: 38-44 London Road		Drilling Equipment:		Scale 1:55							
Location: Purbrook, Waterlooville		Pilcon 1 Ton Shell & Auger Rig		Logged By LF							
Ground Level (mAOD): 42.80		Co-ords: DNS		Date(s): 08/03/2017							
All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Backfill	Water Strike Depth	Casing Depth	Sample (Type) Depth	In Situ Testing		
									Depth	Type	Results
11	Firm grey silty slightly sandy CLAY. (LONDON CLAY FORMATION)										
	LIMESTONE ROCK. Drillers description.	11.20 (31.60)									
	End of Borehole at 11.400m	11.40 (31.40)									
12											
13											
14											
15											
16											
17											
18											
19											
20											
Remarks:		Chiselling		Groundwater Observations:							
Borehole terminated at 11.40m due to refusal in bedrock. Groundwater not encountered. Ground level inferred from topographical survey.		Depth	Time	Date	Strike	Casing	Time Elapsed	Standing	Remarks		
		11.20-11.40m	01:00								
		Technical Notes (where applicable): Fine grained soil consistencies and rock strengths have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are described based on SPT[N] values where available. Chalk is described in accordance with CIRIA C574.									



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TRIAL PIT LOG

Trial Pit No.

TP01

Sheet 1 of 1

Client	McCarthy & Stone Retirement Lifestyles	Depth (m):	2.00	Dimensions (m):	2.90 0.70	Lab Ref.	18-89861	Hole Type	TP
Site	38-44 London Road					Plant Used:	8t Tracked Excavator	Scale	1:20
Location	Purbrook, Waterlooville							Logged By	BG
Ground Level (mAOD):	DNS	Co-ords:	DNS			Date(s)	09/01/2018		

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Greyish brown slightly sandy slightly gravelly CLAY with occasional cobbles. Gravel comprises fine, medium and coarse; angular to sub-rounded flint, brick, chalk and concrete.	0.60	(0.60)						
	Brownish green very silty SAND.								
	Light green / greyish green mottled orangish brown very silty SAND.	0.90	(1.10)						
2	End of Trial Pit at 2.000m	2.00							
3									
4									

Remarks:

Pit Stability: Stable

Technical Notes (where applicable):

Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.

Groundwater: Not encountered



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TRIAL PIT LOG

Trial Pit No.

TP02

Sheet 1 of 1

Client	McCarthy & Stone Retirement Lifestyles	Depth (m):	1.60	Dimensions (m):	2.60 0.65	Lab Ref.	18-89861	Hole Type	TP
Site	38-44 London Road					Plant Used:	8t Tracked Excavator	Scale	1:20
Location	Purbrook, Waterlooville							Logged By	BG
Ground Level (mAOD):	DNS	Co-ords:	DNS			Date(s)	09/01/2018		

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
	MADE GROUND. Brownish red mottled grey slightly silty gravelly SAND. Gravel comprises flint, brick, tiles and concrete. Rare brick cobbles noted.		(0.35)						
	MADE GROUND. Dark grey slightly sandy slightly gravelly SILT. Gravel comprises fine medium and coarse; angular to sub-angular brick and flint.	0.35	(0.35)						
	Light grey mottled orangish brown silty to very silty SAND.	0.70							
1			(0.90)						
	End of Trial Pit at 1.600m	1.60							
2									
3									
4									

Remarks:

Pit Stability: Stable

Technical Notes (where applicable):

Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.

Groundwater: Not encountered



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TRIAL PIT LOG

Trial Pit No.

TP03

Sheet 1 of 1

Client	McCarthy & Stone Retirement Lifestyles	Depth (m):	1.70	Dimensions (m):	3.00 0.70	Lab Ref.	18-89861	Hole Type	TP
Site	38-44 London Road					Plant Used:	8t Tracked Excavator	Scale	1:20
Location	Purbrook, Waterlooville							Logged By	BG
Ground Level (mAOD):	DNS	Co-ords:	DNS			Date(s)	09/01/2018		

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
	MADE GROUND. Dark grey slightly silty sandy GRAVEL. Gravel comprises fine, medium and coarse sub-angular to rounded flint.								
	MADE GROUND. Dark grey gravelly silty to very silty SAND. Gravel comprises fine, medium and coarse; angular to sub-angular brick, concrete and flint.	0.30	(0.35)						
	Very soft to soft light grey mottled orangish brown sandy clayey SILT.	0.65	(0.35)						
1	Light grey mottled orangish brown clayey SAND.	1.00	(0.70)						
	End of Trial Pit at 1.700m	1.70							
2									
3									
4									

Remarks:

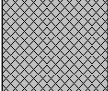
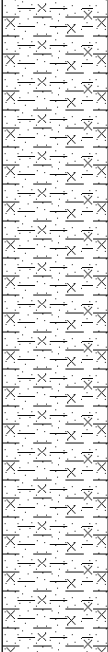
Pit Stability: Stable

Technical Notes (where applicable):

Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.

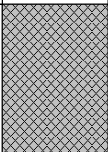
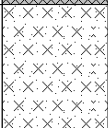
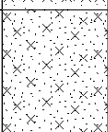
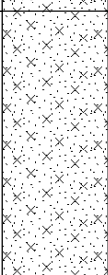
Groundwater: Not encountered

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				TRIAL PIT LOG			Trial Pit No. TP04 Sheet 1 of 1		
Client McCarthy & Stone Retirement Lifestyles		Depth (m): 2.00	Dimensions (m): 2.80 1.00	Lab Ref. 18-89861		Hole Type TP			
Site 38-44 London Road				Plant Used: 8t Tracked Excavator		Scale 1:20			
Location Purbrook, Waterlooville						Logged By BG			
Ground Level (mAOD): DNS		Co-ords: DNS		Date(s) 09/01/2018					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Dark grey slightly sandy slightly gravelly SILT. Gravel comprises fine, medium and coarse; angular to sub-rounded flint, brick and concrete.	0.25							
	Very soft to soft light grey mottled orangish brown sandy silty CLAY.								
2	End of Trial Pit at 2.000m	2.00							
3									
4									

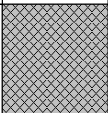
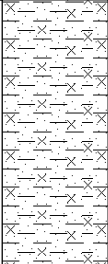
Remarks:				Pit Stability: Unstable within Made Ground.			
Technical Notes (where applicable): Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.				Groundwater: Not encountered			

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				TRIAL PIT LOG			Trial Pit No. TP05 Sheet 1 of 1		
Client McCarthy & Stone Retirement Lifestyles		Depth (m): 1.80	Dimensions (m): 2.80 0.65	Lab Ref. 18-89861		Hole Type TP			
Site 38-44 London Road				Plant Used: 8t Tracked Excavator		Scale 1:20			
Location Purbrook, Waterloooville						Logged By BG			
Ground Level (mAOD): DNS		Co-ords: DNS		Date(s) 09/01/2018					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Dark grey gravelly silty SAND and slightly sandy slightly gravelly SILT. Gravel comprises fine, medium and coarse; angular to sub-rounded flint, brick, chalk and concrete.	0.40	(0.40)						
									
									
									
	Dark grey sandy to very sandy SILT with occasional chalk gravel.		(0.35)						
	Brownish green very silty SAND.	0.75	(0.35)						
	Light greyish green mottled orangish brown very silty SAND.	1.10	(0.70)						
	End of Trial Pit at 1.800m	1.80							
2									
3									
4									

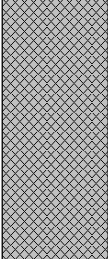
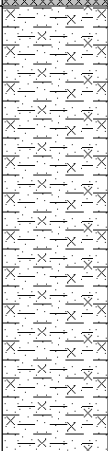
Remarks:					Pit Stability: Stable				
Technical Notes (where applicable): Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.					Groundwater: Not encountered				

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				TRIAL PIT LOG			Trial Pit No. TP06 Sheet 1 of 1		
Client McCarthy & Stone Retirement Lifestyles		Depth (m): 1.40	Dimensions (m): 2.80 	Lab Ref. 18-89861		Hole Type TP			
Site 38-44 London Road				Plant Used: 8t Tracked Excavator		Scale 1:20			
Location Purbrook, Waterlooville						Logged By BG			
Ground Level (mAOD): DNS		Co-ords: DNS		Date(s) 09/01/2018					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Grey sandy silty GRAVEL. Gravel comprises fine, medium and coarse; angular to sub-rounded flint and brick.	0.30	(0.40)						
	MADE GROUND. Dark gravelly silty SAND. Gravel comprises fine, medium and coarse; angular to sub-rounded flint, brick and chalk.								
	Firm to stiff light greyish green mottled brown slightly sandy silty CLAY.	0.70	(0.70)						
	End of Trial Pit at 1.400m	1.40							
2									
3									
4									

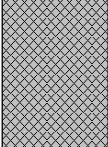
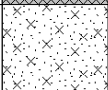
Remarks:				Pit Stability: Stable	
Technical Notes (where applicable): Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.				Groundwater: Not encountered	

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				TRIAL PIT LOG			Trial Pit No. TP07 Sheet 1 of 1		
Client McCarthy & Stone Retirement Lifestyles		Depth (m): 1.90	Dimensions (m): 2.95 0.65	Lab Ref. 18-89861		Hole Type TP			
Site 38-44 London Road				Plant Used: 8t Tracked Excavator		Scale 1:20			
Location Purbrook, Waterlooville						Logged By BG			
Ground Level (mAOD): DNS		Co-ords: DNS		Date(s) 09/01/2018					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Dark grey gravelly very silty SAND with rare cobbles. Gravel comprises fine, medium and coarse; angular to sub-rounded flint, brick, chalk, glass and clay piping.	0.70	(0.70)						
	Firm to stiff light greyish green mottled orangish brown slightly sandy silty CLAY.		(1.20)						
2	End of Trial Pit at 1.900m	1.90							
3									
4									

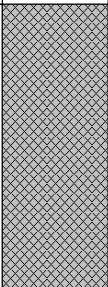
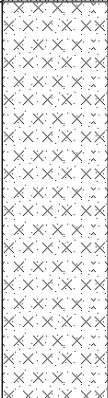
Remarks:				Pit Stability: Partial side collapse within Made Ground			
Technical Notes (where applicable): Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.				Groundwater: Not encountered			

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				TRIAL PIT LOG			Trial Pit No. TP08 Sheet 1 of 1		
Client McCarthy & Stone Retirement Lifestyles		Depth (m): 1.60	Dimensions (m): 3.00 0.70	Lab Ref. 18-89861		Hole Type TP			
Site 38-44 London Road				Plant Used: 8t Tracked Excavator		Scale 1:20			
Location Purbrook, Waterlooville						Logged By BG			
Ground Level (mAOD): DNS		Co-ords: DNS		Date(s) 09/01/2018					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Dark grey slightly sandy slightly gravelly SILT with rare cobbles and boulders of concrete. Gravel comprises fine, medium and coarse; angular to sub-angular flint, brick and concrete.	0.40	(0.40)						
									
		Dark grey silty to very silty SAND with rare fine, medium and coarse; sub-angular to sub-rounded flint.	0.65	(0.95)					
	Firm becoming stiff light grey mottled orangish brown slightly sandy silty CLAY.	1.60							
	End of Trial Pit at 1.600m								
2									
3									
4									

Remarks:					Pit Stability: Stable				
Technical Notes (where applicable): Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.					Groundwater: Not encountered				

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				TRIAL PIT LOG			Trial Pit No. TP09 Sheet 1 of 1		
Client McCarthy & Stone Retirement Lifestyles		Depth (m): 1.80	Dimensions (m): 2.60 0.65	Lab Ref. 18-89861		Hole Type TP			
Site 38-44 London Road				Plant Used: 8t Tracked Excavator		Scale 1:20			
Location Purbrook, Waterlooville						Logged By BG			
Ground Level (mAOD): DNS		Co-ords: DNS		Date(s) 09/01/2018					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Dark grey gravelly very silty SAND with rare cobbles. A gravelly sandy SILT in places. Gravel comprises fine, medium and coarse; angular to sub-rounded flint, brick, chalk and glass.	0.75	(0.75)						
	Firm to stiff light greyish green mottled orangish brown slightly sandy clayey SILT. Rare medium to coarse; sub-angular to sub-rounded flint gravel at top of unit.		(1.05)						
2	End of Trial Pit at 1.800m	1.80							
3									
4									

Remarks:		Pit Stability: Partial side collapse within Made Ground.
Technical Notes (where applicable): Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.		Groundwater: Not encountered



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TRIAL PIT LOG

Trial Pit No.

TP10

Sheet 1 of 1

Client	McCarthy & Stone Retirement Lifestyles	Depth (m):	1.60	Dimensions (m):	2.80 0.70	Lab Ref.	18-89861	Hole Type	TP
Site	38-44 London Road					Plant Used:	8t Tracked Excavator	Scale	1:20
Location	Purbrook, Waterlooville							Logged By	BG
Ground Level (mAOD):	DNS	Co-ords:	DNS			Date(s)	09/01/2018		

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
1	MADE GROUND. Brownish grey mottled cream gravelly silty to very silty SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint, brick chalk and concrete.	0.60	(0.60)						
	Dark grey silty to very silty SAND with rare fine, medium and coarse; sub-angular to sub-rounded flint.		(0.40)						
	Firm becoming stiff greyish green mottled orangish brown slightly sandy silty CLAY.		(0.60)						
	End of Trial Pit at 1.600m	1.60							
2									
3									
4									

Remarks:

Pit Stability: Stable

Technical Notes (where applicable):

Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Chalk descriptions in accordance with CIRIA C574.

Groundwater: Not encountered

APPENDIX D

Chemical Analysis Results

▶ 18-08082-01



Certificate of Analysis

Certificate Number : 18-08082-Issue 1-Page: 1

Report Fao: GEO RESULTS
Site Address: Purbrook - London Road
Client Order No: 18-89861
Date of Sampling: 09/01/2018
Date Received: 10/01/2018
Report Date: 29/01/2018

Please find your certificates of test attached for your samples received in the laboratory on 10/01/2018 under our laboratory reference 18-08082.

Remarks:

None

Results reviewed by:



David Redfern Technical Supervisor

Test Certificates approved by:



Chris Love Operations Manager

*Any opinions or interpretations indicated are outside the scope of our UKAS accreditation.
This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.
Excel copies of reports are valid only when accompanied by this PDF certificate.
Client's Sample Description / ACS Material Description are noted for reference only.*

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Registered in England and
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**Quality Testing & Materials Consultancy
to the
Construction Industry**

ACSE Sample Number Sample ID	33480 381934 - 18-89861	33481 381935 - 18-89861	33482 381936 - 18-89861
Clients Sample Ref.	TP01	TP02	TP02
Location / Sample Depth (m)	0.40m	0.20m	1.00m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes	f	f	f
Client's Sample Description			
ACS Testing Material Description	Greyish brown sandy gravelly clay CLAY	Brownish red mottled grey silty gravelly sand GRAVEL	Grey mottled orangish brown silty sand SILT
ACSE Material Description (Principal Matrix - As Received)			

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon									
Soil Organic Matter	%	MT/ACSE/102	AR	1.29		1.58		0.13	
FOC	%	MT/ACSE/102	AR	0.0075		0.0092		0.0007	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	11.4	*	14.8	*	13.3	*#
Cadmium	mg/kg	MT/ACSE/201	AD	< 1.00	*	< 1.00	*	< 1.00	*#
Chromium	mg/kg	MT/ACSE/201	AD	34.2	*	41.7	*	25.3	*#
Copper	mg/kg	MT/ACSE/201	AD	15.2	*	22.1	*	3.72	*#
Mercury	mg/kg	MT/ACSE/202	AD	0.41	*#	0.28	*	0.02	*
Nickel	mg/kg	MT/ACSE/201	AD	7.80	*	13.1	*	7.04	*#
Lead	mg/kg	MT/ACSE/201	AD	146	*	94.3	*	6.85	*#
Selenium	mg/kg	MT/ACSE/201	AD	< 5.00	*	< 5.00	*	< 5.00	*#
Zinc	mg/kg	MT/ACSE/201	AD	111	*	181	*	14.2	*#
Chromium III	mg/kg	NAM/ACSE/X11	AD	34.2		41.7		25.3	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00	
pH and Conductivity									
pH (@ 20 °C)	units	MT/ACSE/301	AD	9.0	*	9.7	*	8.6	*
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.20	*	0.24	*	< 0.10	*#
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.13	*	0.11	*	< 0.10	*#
Acenaphthene	mg/kg	MT/ACSE/106	AD	0.19	*	0.11	*	< 0.10	*#
Fluorene	mg/kg	MT/ACSE/106	AD	0.14	*	0.10	*	< 0.10	*#
Phenanthrene	mg/kg	MT/ACSE/106	AD	0.92	*	0.58	*	0.40	*#
Anthracene	mg/kg	MT/ACSE/106	AD	0.55	*	0.27	*	0.19	*#
Fluoranthene	mg/kg	MT/ACSE/106	AD	1.46	*	0.82	*	0.58	*#
Pyrene	mg/kg	MT/ACSE/106	AD	1.48	*	0.80	*	0.44	*#
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	0.81	*	0.38	*	0.19	*#
Chrysene	mg/kg	MT/ACSE/106	AD	0.73	*	0.31	*	0.16	*#
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	1.06	*	0.49	*	0.19	*#
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	0.44	*	0.20	*	< 0.10	*#
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	0.91	*	0.42	*	0.17	*#
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	0.57	*	0.23	*	< 0.10	*#
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	0.15	*	< 0.10	*	< 0.10	*#
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	0.67	*	0.30	*	< 0.10	*#
Total PAH	mg/kg	MT/ACSE/106	AD	10.4	*	5.38	*	2.32	*#
Speciated BTEX									
MTBE	mg/kg	NAM/ACSE/X12	AR	< 0.05		< 0.05		0.06	
Hexane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Octane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Benzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Toluene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
o-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	

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**Quality Testing & Materials Consultancy
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Construction Industry**

ACSE Sample Number Sample ID	33480 381934 - 18-89861	33481 381935 - 18-89861	33482 381936 - 18-89861
Clients Sample Ref.	TP01	TP02	TP02
Location / Sample Depth (m)	0.40m	0.20m	1.00m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes Client's Sample Description	f	f	f

ACS Testing Material Description	Greyish brown sandy gravelly clay CLAY	Brownish red mottled grey silty gravelly sand GRAVEL	Grey mottled orangish brown silty sand SILT
ACSE Material Description (Principal Matrix - As Received)			

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Total BTEX	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		0.06	
Speciated Petroleum Hydrocarbons									
C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
Subcontracted Analysis									
Asbestos Fibre ID	SC	SC	SC	----		Attached		----	
VOC (Volatile Organic Compounds)	SC	SC	SC	----		----		----	

ACSE Sample Number Sample ID	33483 381937 - 18-89861	33484 381938 - 18-89861	33485 381939 - 18-89861
Clients Sample Ref.	TP03	TP03	TP04
Location / Sample Depth (m)	0.45m	0.70m	0.20m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes	f	f	f
Client's Sample Description			
ACS Testing Material Description	Grey gravelly silty sand	Light grey mottled orangish brown sandy silt	Grey sandy gravelly silt
ACSE Material Description (Principal Matrix - As Received)	GRAVEL	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon									
Soil Organic Matter	%	MT/ACSE/102	AR	1.46		0.15		2.04	
FOC	%	MT/ACSE/102	AR	0.0085		0.0009		0.0118	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	14.1	*	19.3	*#	< 10.0	*#
Cadmium	mg/kg	MT/ACSE/201	AD	< 1.00	*	< 1.00	*#	< 1.00	*#
Chromium	mg/kg	MT/ACSE/201	AD	42.0	*	38.0	*#	38.6	*#
Copper	mg/kg	MT/ACSE/201	AD	28.0	*	3.27	*#	12.3	*#
Mercury	mg/kg	MT/ACSE/202	AD	0.40	*	0.02	*	0.17	*
Nickel	mg/kg	MT/ACSE/201	AD	16.1	*	10.8	*#	7.09	*#
Lead	mg/kg	MT/ACSE/201	AD	128	*	9.86	*#	56.4	*#
Selenium	mg/kg	MT/ACSE/201	AD	< 5.00	*	< 5.00	*#	< 5.00	*#
Zinc	mg/kg	MT/ACSE/201	AD	124	*	20.4	*#	50.2	*#
Chromium III	mg/kg	NAM/ACSE/X11	AD	42.0		38.0		38.6	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00	
pH and Conductivity									
pH (@ 20 °C)	units	MT/ACSE/301	AD	8.6	*	8.0	*	10.8	*
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.25	*	< 0.10	*#	< 0.10	*#
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.15	*	< 0.10	*#	< 0.10	*#
Acenaphthene	mg/kg	MT/ACSE/106	AD	0.16	*	< 0.10	*#	< 0.10	*#
Fluorene	mg/kg	MT/ACSE/106	AD	0.17	*	< 0.10	*#	< 0.10	*#
Phenanthrene	mg/kg	MT/ACSE/106	AD	1.16	*	0.23	*#	0.33	*#
Anthracene	mg/kg	MT/ACSE/106	AD	0.66	*	< 0.10	*#	0.16	*#
Fluoranthene	mg/kg	MT/ACSE/106	AD	2.00	*	0.23	*#	0.54	*#
Pyrene	mg/kg	MT/ACSE/106	AD	1.91	*	0.16	*#	0.45	*#
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	0.98	*	0.11	*#	0.27	*#
Chrysene	mg/kg	MT/ACSE/106	AD	0.81	*	< 0.10	*#	0.24	*#
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	1.10	*	0.11	*#	0.36	*#
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	0.56	*	< 0.10	*#	0.16	*#
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	1.01	*	< 0.10	*#	0.32	*#
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	0.60	*	< 0.10	*#	0.18	*#
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	0.18	*	< 0.10	*#	< 0.10	*#
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	0.72	*	< 0.10	*#	0.22	*#
Total PAH	mg/kg	MT/ACSE/106	AD	12.4	*	< 2.00	*#	3.23	*#
Speciated BTEX									
MTBE	mg/kg	NAM/ACSE/X12	AR	< 0.05		< 0.05		< 0.05	
Hexane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Octane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Benzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Toluene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	

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ACSE Sample Number Sample ID	33483 381937 - 18-89861	33484 381938 - 18-89861	33485 381939 - 18-89861
Clients Sample Ref.	TP03	TP03	TP04
Location / Sample Depth (m)	0.45m	0.70m	0.20m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes Client's Sample Description	f	f	f
ACS Testing Material Description	Grey gravelly silty sand	Light grey mottled orangish brown sandy silt	Grey sandy gravelly silt
ACSE Material Description (Principal Matrix - As Received)	GRAVEL	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
o-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Speciated Petroleum Hydrocarbons									
C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
Subcontracted Analysis									
Asbestos Fibre ID	SC	SC	SC	Attached		----		----	
VOC (Volatile Organic Compounds)	SC	SC	SC	----		----		----	

ACSE Sample Number Sample ID	33486 381940 - 18-89861	33487 381941 - 18-89861	33488 381942 - 18-89861
Clients Sample Ref.	TP05	TP05	TP06
Location / Sample Depth (m)	0.30m	1.10m	0.50m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes	f	f	f
Client's Sample Description			
ACS Testing Material Description	Grey silty gravelly sand	Greyish green mottled orangish brown silty sand	Grey silty gravelly sand
ACSE Material Description (Principal Matrix - As Received)	SILT	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon									
Soil Organic Matter	%	MT/ACSE/102	AR	1.46		0.12		6.59	
FOC	%	MT/ACSE/102	AR	0.0085		0.0007		0.0382	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	< 10.0	*#	< 10.0	*#	16.2	*#
Cadmium	mg/kg	MT/ACSE/201	AD	< 1.00	*#	< 1.00	*#	< 1.00	*#
Chromium	mg/kg	MT/ACSE/201	AD	28.1	*#	28.7	*#	22.3	*#
Copper	mg/kg	MT/ACSE/201	AD	20.0	*#	1.24	*#	88.2	*#
Mercury	mg/kg	MT/ACSE/202	AD	0.12	*	< 0.01	*	0.49	*
Nickel	mg/kg	MT/ACSE/201	AD	10.4	*#	5.43	*#	16.1	*#
Lead	mg/kg	MT/ACSE/201	AD	72.7	*#	7.53	*#	248	*#
Selenium	mg/kg	MT/ACSE/201	AD	< 5.00	*#	< 5.00	*#	< 5.00	*#
Zinc	mg/kg	MT/ACSE/201	AD	50.8	*#	10.5	*#	106	*#
Chromium III	mg/kg	NAM/ACSE/X11	AD	28.1		28.7		22.3	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00	
pH and Conductivity									
pH (@ 20 °C)	units	MT/ACSE/301	AD	8.8	*	7.0	*	8.0	*
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.38	*#	< 0.10	*#	0.20	*#
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.75	*#	< 0.10	*#	0.17	*#
Acenaphthene	mg/kg	MT/ACSE/106	AD	0.34	*#	< 0.10	*#	< 0.10	*#
Fluorene	mg/kg	MT/ACSE/106	AD	0.61	*#	< 0.10	*#	< 0.10	*#
Phenanthrene	mg/kg	MT/ACSE/106	AD	4.14	*#	0.18	*#	0.56	*#
Anthracene	mg/kg	MT/ACSE/106	AD	2.86	*#	< 0.10	*#	0.33	*#
Fluoranthene	mg/kg	MT/ACSE/106	AD	7.50	*#	0.25	*#	1.26	*#
Pyrene	mg/kg	MT/ACSE/106	AD	6.95	*#	0.14	*#	0.98	*#
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	3.73	*#	< 0.10	*#	0.69	*#
Chrysene	mg/kg	MT/ACSE/106	AD	3.21	*#	< 0.10	*#	0.67	*#
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	4.20	*#	< 0.10	*#	0.99	*#
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	1.60	*#	< 0.10	*#	0.45	*#
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	3.99	*#	< 0.10	*#	0.81	*#
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	1.88	*#	< 0.10	*#	0.46	*#
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	0.60	*#	< 0.10	*#	0.14	*#
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	2.16	*#	< 0.10	*#	0.56	*#
Total PAH	mg/kg	MT/ACSE/106	AD	44.9	*#	< 2.00	*#	8.27	*#
Speciated BTEX									
MTBE	mg/kg	NAM/ACSE/X12	AR	< 0.05		< 0.05		< 0.05	
Hexane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Octane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Benzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Toluene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	

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ACSE Sample Number Sample ID	33486 381940 - 18-89861	33487 381941 - 18-89861	33488 381942 - 18-89861
Clients Sample Ref.	TP05	TP05	TP06
Location / Sample Depth (m)	0.30m	1.10m	0.50m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes Client's Sample Description	f	f	f
ACS Testing Material Description	Grey silty gravelly sand	Greyish green mottled orangish brown silty sand	Grey silty gravelly sand
ACSE Material Description (Principal Matrix - As Received)	SILT	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
o-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Speciated Petroleum Hydrocarbons									
C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		22.2	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		22.2	
Subcontracted Analysis									
Asbestos Fibre ID	SC	SC	SC	----		----		Attached	
VOC (Volatile Organic Compounds)	SC	SC	SC	----		----		----	

ACSE Sample Number Sample ID	33489 381943 - 18-89861	33490 381944 - 18-89861	33491 381945 - 18-89861
Clients Sample Ref.	TP07	TP08	TP09
Location / Sample Depth (m)	0.50m	0.30m	0.40m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes	f	f	f
Client's Sample Description			
ACS Testing Material Description	Grey gravelly silty sand	Grey sandy gravelly silt	Grey gravelly sandy silt
ACSE Material Description (Principal Matrix - As Received)	SILT	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon									
Soil Organic Matter	%	MT/ACSE/102	AR	4.45		3.88		6.16	
FOC	%	MT/ACSE/102	AR	0.0258		0.0225		0.0357	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	18.9	*#	< 10.0	*#	24.8	*#
Cadmium	mg/kg	MT/ACSE/201	AD	< 1.00	*#	< 1.00	*#	1.12	*#
Chromium	mg/kg	MT/ACSE/201	AD	36.9	*#	26.8	*#	127	*#
Copper	mg/kg	MT/ACSE/201	AD	60.9	*#	20.6	*#	108	*#
Mercury	mg/kg	MT/ACSE/202	AD	0.75	*	0.24	*	0.97	*
Nickel	mg/kg	MT/ACSE/201	AD	22.2	*#	10.7	*#	24.0	*#
Lead	mg/kg	MT/ACSE/201	AD	347	*#	127	*#	1210	*#
Selenium	mg/kg	MT/ACSE/201	AD	< 5.00	*#	< 5.00	*#	< 5.00	*#
Zinc	mg/kg	MT/ACSE/201	AD	251	*#	167	*#	1020	*#
Chromium III	mg/kg	NAM/ACSE/X11	AD	36.9		26.8		127	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00	
pH and Conductivity									
pH (@ 20 °C)	units	MT/ACSE/301	AD	7.9	*	7.6	*	8.5	*
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.38	*#	0.23	*#	0.47	*#
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.40	*#	0.11	*#	0.18	*#
Acenaphthene	mg/kg	MT/ACSE/106	AD	0.13	*#	< 0.10	*#	0.13	*#
Fluorene	mg/kg	MT/ACSE/106	AD	0.14	*#	< 0.10	*#	< 0.10	*#
Phenanthrene	mg/kg	MT/ACSE/106	AD	1.14	*#	0.67	*#	1.00	*#
Anthracene	mg/kg	MT/ACSE/106	AD	0.87	*#	0.28	*#	0.74	*#
Fluoranthene	mg/kg	MT/ACSE/106	AD	2.77	*#	1.32	*#	2.88	*#
Pyrene	mg/kg	MT/ACSE/106	AD	2.44	*#	1.08	*#	2.56	*#
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	1.60	*#	0.66	*#	1.81	*#
Chrysene	mg/kg	MT/ACSE/106	AD	1.32	*#	0.60	*#	1.39	*#
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	1.93	*#	0.88	*#	1.75	*#
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	0.96	*#	0.34	*#	0.81	*#
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	1.97	*#	0.73	*#	1.67	*#
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	1.21	*#	0.42	*#	0.82	*#
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	0.32	*#	0.12	*#	0.27	*#
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	1.46	*#	0.53	*#	0.92	*#
Total PAH	mg/kg	MT/ACSE/106	AD	19.0	*#	7.95	*#	17.4	*#
Speciated BTEX									
MTBE	mg/kg	NAM/ACSE/X12	AR	< 0.05		0.09		< 0.05	
Hexane	mg/kg	NAM/ACSE/X06	AR	< 0.05		0.07		< 0.05	
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Octane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Benzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Toluene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	

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ACSE Sample Number Sample ID	33489 381943 - 18-89861	33490 381944 - 18-89861	33491 381945 - 18-89861
Clients Sample Ref.	TP07	TP08	TP09
Location / Sample Depth (m)	0.50m	0.30m	0.40m
Date Sampled Time Sampled	09/01/2018	09/01/2018	09/01/2018
Sample deviating codes Client's Sample Description	f	f	f
ACS Testing Material Description	Grey gravelly silty sand	Grey sandy gravelly silt	Grey gravelly sandy silt
ACSE Material Description (Principal Matrix - As Received)	SILT	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
o-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	< 0.05		0.16		< 0.05	
Speciated Petroleum Hydrocarbons									
C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		18.6		< 10.0	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	16.9		15.9		< 10.0	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	16.9		34.5		< 10.0	
Subcontracted Analysis									
Asbestos Fibre ID	SC	SC	SC	----		----		----	
VOC (Volatile Organic Compounds)	SC	SC	SC	Attached		Attached		Attached	

ACSE Sample Number	33492	33493
Sample ID	381946 - 18-89861	381947 - 18-89861
Clients Sample Ref.	TP10	TP10
Location / Sample Depth (m)	0.30m	0.70m
Date Sampled	09/01/2018	09/01/2018
Time Sampled		
Sample deviating codes	f	f
Client's Sample Description		
ACS Testing Material Description	Grey mottled cream gravelly silty sand	Grey silty sand
ACSE Material Description (Principal Matrix - As Received)	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon									
Soil Organic Matter	%	MT/ACSE/102	AR	3.86		4.25			
FOC	%	MT/ACSE/102	AR	0.0224		0.0246			
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	11.8	*#	11.9	*#		
Cadmium	mg/kg	MT/ACSE/201	AD	< 1.00	*#	< 1.00	*#		
Chromium	mg/kg	MT/ACSE/201	AD	24.2	*#	78.9	*#		
Copper	mg/kg	MT/ACSE/201	AD	23.7	*#	31.4	*#		
Mercury	mg/kg	MT/ACSE/202	AD	0.20	*	0.32	*		
Nickel	mg/kg	MT/ACSE/201	AD	12.7	*#	13.2	*#		
Lead	mg/kg	MT/ACSE/201	AD	127	*#	135	*#		
Selenium	mg/kg	MT/ACSE/201	AD	< 5.00	*#	< 5.00	*#		
Zinc	mg/kg	MT/ACSE/201	AD	124	*#	116	*#		
Chromium III	mg/kg	NAM/ACSE/X11	AD	24.2		78.9			
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00			
pH and Conductivity									
pH (@ 20 °C)	units	MT/ACSE/301	AD	8.3	*	7.6	*		
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.24	*#	0.26	*#		
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.11	*#	0.15	*#		
Acenaphthene	mg/kg	MT/ACSE/106	AD	< 0.10	*#	< 0.10	*#		
Fluorene	mg/kg	MT/ACSE/106	AD	< 0.10	*#	< 0.10	*#		
Phenanthrene	mg/kg	MT/ACSE/106	AD	0.44	*#	0.32	*#		
Anthracene	mg/kg	MT/ACSE/106	AD	0.23	*#	0.24	*#		
Fluoranthene	mg/kg	MT/ACSE/106	AD	0.86	*#	0.94	*#		
Pyrene	mg/kg	MT/ACSE/106	AD	0.71	*#	0.70	*#		
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	0.44	*#	0.47	*#		
Chrysene	mg/kg	MT/ACSE/106	AD	0.42	*#	0.52	*#		
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	0.56	*#	0.71	*#		
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	0.27	*#	0.35	*#		
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	0.47	*#	0.69	*#		
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	0.25	*#	0.39	*#		
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	< 0.10	*#	0.12	*#		
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	0.29	*#	0.47	*#		
Total PAH	mg/kg	MT/ACSE/106	AD	5.29	*#	6.34	*#		
Speciated BTEX									
MTBE	mg/kg	NAM/ACSE/X12	AR	< 0.05		< 0.05			
Hexane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Octane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Benzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Toluene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			

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 Registered in England and
 Wales No. 6000065

Quality Testing & Materials Consultancy
 to the
 Construction Industry

ACSE Sample Number	33492	33493
Sample ID	381946 - 18-89861	381947 - 18-89861
Clients Sample Ref.	TP10	TP10
Location / Sample Depth (m)	0.30m	0.70m
Date Sampled	09/01/2018	09/01/2018
Time Sampled		
Sample deviating codes	f	f
Client's Sample Description		

ACS Testing Material Description	Grey mottled cream gravelly silty sand	Grey silty sand
ACSE Material Description (Principal Matrix - As Received)	SILT	SILT

Determination	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
o-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Total BTEX	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05			
Speciated Petroleum Hydrocarbons									
C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10			
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10			
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10			
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10			
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0			
Subcontracted Analysis									
Asbestos Fibre ID	SC	SC	SC	Attached		----			
VOC (Volatile Organic Compounds)	SC	SC	SC	Attached		----			

Technical Information for Analytical Results

Analysis

* - denotes analysis covered by our UKAS accreditation
- denotes analysis covered by our MCERTS certification
AD = Sample tested in air dried condition.
AR = Sample tested in as-received condition.
D = Sample tested in dry condition.
L = Laboratory prepared leachate
SC = sub contracted
All MCERTS certified test values reported on a dry weight basis.

Where results are less than the limit of detection, the value of 0 is used in calculations.

Deviating Codes

Deviating Samples

The use of any of the following symbols indicates that the sample was deviating and it is possible therefore that the results provided may not be representative of the sample taken.

- a – The date and /or time of sampling has not been provided, therefore it is not known if the time lapse between sampling and analysis has exceeded the acceptable holding time(s)*.
- b – The test item was received in a container which has not been recommended*.
- c – On receipt, the temperature of the sample received was found to fall outside the recommendations of BS ISO 18512:2007, Soil Quality. Guidance on long and short term storage of soil samples*.
- d – The sample was received in a container that had not been filled as recommended*.
- e – The delay between sampling and sample receipt is greater than the recommended holding time for the analyte of interest in this matrix*.
- f – The delay between sampling and analysis is greater than the recommended holding time for the analyte of interest in this matrix*.

*In accordance with the requirements of Technical Policy Statement TPS 63; UKAS Policy on Deviating Samples, all UKAS accredited testing laboratories are required to notify their clients that calibration or test results may be invalid where samples are found to be deviating. It is the opinion of ACSE that the term invalid should be interpreted as 'not fully representative of the sample taken at source'.

The following Additional Deviating Sample Codes may also be used.

- I/S – Insufficient sample mass/volume received for accurate quantification of this analyte.
- U/S – The sample received was deemed unsuitable for accurate determination of this analyte using the Test Methods available.

Deviating Methods

- Z – A minor deviation from the Test Method was necessary but this is deemed to have had no impact on the Test Result, the legitimacy of the method validation or the Accreditation Status of the Test Method.
- Y – A significant deviation from the Test Method was necessary which is deemed to have had no impact on the Test Result, however, due to a lack of sufficient supporting validation, the Accreditation Status of the Method has been removed.
- W – The normal LOD of the instrument/method could not be attained, thus an elevated LOD or LOQ has been applied to the Test Data, however, the data reported meets the requirements of the Client and does not affect compliance with the specification limit (where applicable).
- V – One of the QA/QC parameters failed, however, the increased implied Uncertainty associated with the Test Result meets the requirements of the Client and does not affect compliance with the specification limit (where applicable) (Quality Manual, Section 18.2.9).
- U – The precision acceptance criteria associated with the Test Method could not be met but the Test Result fulfils the Client's objectives and the elevated Uncertainty does not affect compliance with the specification limit (where applicable) (Quality Manual, Section 18.8.10).
- T – The Test Method used was supplied by the Client and involved a simple modification of a Test Method for which ACSE holds accreditation (Quality Manual, Section 18.3.8).

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to the
Construction Industry**



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 18-15691

Issue: 1

Date of Issue: 17/01/2018

Contact: Edward Davies

Customer Details: ACS Environmental testing Ltd
Unit 14b Blackhill Road West
Holton heath Trading park
Poole
DorsetBH16 6LE

Quotation No: Q17-00877

Order No: E/18-08082/1815

Customer Reference: 18-08082

Date Received: 15/01/2018

Date Approved: 17/01/2018

Details: Purbrook - London Road

Approved by: 

Mike Varley, Technical Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 18-15691

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
123329	33481	09/01/2018	15/01/2018		
123330	33483	09/01/2018	15/01/2018		
123331	33488	09/01/2018	15/01/2018		
123332	33489	09/01/2018	15/01/2018	Silty loam	
123333	33490	09/01/2018	15/01/2018	Sandy silty loam	
123334	33491	09/01/2018	15/01/2018	Sandy silty loam	
123335	33492	09/01/2018	15/01/2018	Silty loam	

Results Summary

Report No.: 18-15691

ELAB Reference				123332	123333	123334	123335
Customer Reference							
Sample ID							
Sample Type				SOIL	SOIL	SOIL	SOIL
Sample Location				TP07	TP08	TP09	TP10
Sample Depth (m)				0.5	0.3	0.4	0.3
Sampling Date				09/01/2018	09/01/2018	09/01/2018	09/01/2018
Determinand	Codes	Units	LOD				
VOC							
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,2-dichloroethene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0
VOC TIC							
Various	N	ug/kg	10	None Detected	None Detected	None Detected	None Detected



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Results Summary
Report No.: 18-15691

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
123329	0.2	TP02	Brown soil with stones,brick,clinker,concrete	No asbestos detected	n/t	n/t	n/t	n/t
123330	0.45	TP03	Brown soil with stones,brick,clinker	No asbestos detected	n/t	n/t	n/t	n/t
123331	0.5	TP06	Brown soil with stones and clinker	No asbestos detected	n/t	n/t	n/t	n/t
123335	0.3	TP10	Brown/Grey soil with stones,brick,clinker,chalk	Chrysotile (Cement)	n/t	n/t	n/t	n/t



Method Summary

Report No.: 18-15691

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
VOC in solids	M	As submitted sample	17/01/2018		GC-MS
Asbestos identification	U	As submitted sample	17/01/2018	PMAN	Microscopy

Report Information

Report No.: 18-15691

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

APPENDIX E

Assessment Criteria and CLEA Model Output Sheets



Assessment Criteria

Contaminant	Modified Assessment Criteria (mg/kg)	Source of Assessment Criteria
	1% SOM	
Heavy Metals		
Arsenic	363	Modified LQM/CIEH S4UL
Cadmium	155	Modified LQM/CIEH S4UL
Chromium III	8060	Modified LQM/CIEH S4UL
Chromium VI	30.8	Modified LQM/CIEH S4UL
Nickel	922	Modified LQM/CIEH S4UL
Lead	1481	Modified C4SL
Mercury (elemental)	0.266	Modified LQM/CIEH S4UL
Mercury (inorganic)	726	Modified LQM/CIEH S4UL
Mercury (methyl)	35.9	Modified LQM/CIEH S4UL
Selenium	7860	Modified LQM/CIEH S4UL
Copper	56300	Modified LQM/CIEH S4UL
Zinc	473000	Modified LQM/CIEH S4UL
Polycyclic Aromatic Hydrocarbon		
Acenaphthene	6050 (56.7 sol)	Modified LQM/CIEH S4UL
Acenaphthylene	6160 (85.5 sol)	Modified LQM/CIEH S4UL
Anthracene	141000 (1.17 vap)	Modified LQM/CIEH S4UL
Benz(a)anthracene	51.2	Modified LQM/CIEH S4UL
Benzo(a)pyrene	18.9	Modified LQM/CIEH S4UL
Benzo(b)fluoranthene	23.3	Modified LQM/CIEH S4UL
Benzo(g,h,i)perylene	2140	Modified LQM/CIEH S4UL
Benzo(k)fluoranthene	632	Modified LQM/CIEH S4UL
Chrysene	165	Modified LQM/CIEH S4UL
Dibenzo(ah)anthracene	1.81	Modified LQM/CIEH S4UL
Fluoranthene	9330	Modified LQM/CIEH S4UL
Fluorene	7770 (30.8 sol)	Modified LQM/CIEH S4UL
Indeno(1,2,3-cd)pyrene	261	Modified LQM/CIEH S4UL
Naphthalene	2.99	Modified LQM/CIEH S4UL
Phenanthrene	6330 (35.9 sol)	Modified LQM/CIEH S4UL
Pyrene	22300 (2.2 vap)	Modified LQM/CIEH S4UL
BTEX		
Benzene	0.4	Modified LQM/CIEH S4UL
Toluene	962 (835 vap)	Modified LQM/CIEH S4UL
Ethylbenzene	88.7	Modified LQM/CIEH S4UL
Xylene, o-	101	Modified LQM/CIEH S4UL
Xylene, m-	94.6	Modified LQM/CIEH S4UL
Xylene, p-	90.9	Modified LQM/CIEH S4UL
Total Petroleum Hydrocarbon (Aliphatic)		
C5 - <C6	61.2	Modified LQM/CIEH S4UL
C6 - <C8	134	Modified LQM/CIEH S4UL
C8 - <C10	32.5	Modified LQM/CIEH S4UL
C10 - <C12	159 (47.7 vap)	Modified LQM/CIEH S4UL
C12 - <C16	1320 (23.7 sol)	Modified LQM/CIEH S4UL
C16 - <C35	133000 (8.48 sol)	Modified LQM/CIEH S4UL
Total Petroleum Hydrocarbon (Aromatic)		
C5 - <C7	399	Modified LQM/CIEH S4UL
C7 - <C8	958 (835 vap)	Modified LQM/CIEH S4UL
C8 - <C10	56.2	Modified LQM/CIEH S4UL
C10 - <C12	307	Modified LQM/CIEH S4UL
C12 - <C16	3300 (168 sol)	Modified LQM/CIEH S4UL
C16 - <C21	11700	Modified LQM/CIEH S4UL
C21 - <C35	13500	Modified LQM/CIEH S4UL

Sol=GAC exceeds solubility saturation limit, (presented in brackets). Vap=GAC exceeds the vapour saturation limit (presented in brackets). Where derived assessment criteria exceed saturation limit but inhalation pathway not considered significant, derived assessment criteria is considered acceptable.



Contaminant	Generic Assessment Criteria (mg/kg)	Source of Assessment Criteria
	1% SOM	
VOC		
1,2-Dichloroethane	0.0092	LQM / CIEH S4UL
1,1,1-Trichloroethane	9.0	LQM / CIEH S4UL
1,1,2,2-Tetrachloroethane	3.9	LQM / CIEH S4UL
1,1,1,2-Tetrachloroethane	1.5	LQM / CIEH S4UL
Carbon tetrachloride	0.026	LQM / CIEH S4UL
Chloroform	1.2	LQM / CIEH S4UL
Vinyl chloride	0.00077	LQM / CIEH S4UL
1,2-Dichlorobenzene	24	LQM / CIEH S4UL
1,3-Dichlorobenzene	0.44	LQM / CIEH S4UL
1,4-Dichlorobenzene	61	LQM / CIEH S4UL
1,2,4-Trichlorobenzene	2.6	LQM / CIEH S4UL
1,2,3-Trichlorobenzene	1.5	LQM / CIEH S4UL
1,1,2-Trichloroethane	0.88	AGS/EIC
1,1-Dichloroethane	2.5	AGS/EIC
1,2,4-Trimethylbenzene	0.41	AGS/EIC
1,2-Dichloropropane	0.024	AGS/EIC
2,4-Dimethylphenol	210	AGS/EIC
2,4-Dinitrotoluene	170	AGS/EIC
2,6-Dinitotoluene	78	AGS/EIC
2-Chloronaphthalene	3.8	AGS/EIC
Biphenyl	220	AGS/EIC
Bis (2 – ethylexyl) phthalate	2700	AGS/EIC
Bromobenzene	0.91	AGS/EIC
Bromodichloromethane	0.019	AGS/EIC
Bromoform	5.2	AGS/EIC
Butyl benzyl phthalate	42000	AGS/EIC
Chloromethane	0.0085	AGS/EIC
Chloroethane	8.4	AGS/EIC
1,1-Dichloroethene	0.23	AGS/EIC
Dichloromethane	2.1	AGS/EIC
Trans-1,2-Dichloroethylene	0.19	AGS/EIC
Styrene	35	AGS/EIC
Isopropylbenzene	11	AGS/EIC
n-Propylbenzene	40	AGS/EIC
MTBE	73	AGS/EIC

Highlighted cells indicate an exceedance of the soil saturation concentration. Soil concentrations above soil saturation may indicate that NAPL is present. Risks from NAPL may need to be considered separately.

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		Assessment Criterion (mg kg ⁻¹)			Ratio of ADE to HCV			Saturation Limit (mg kg ⁻¹)	50% rule?	
		oral	inhalation	combined	oral	inhalation	combined		Oral	Inhal
1	Aliphatic 5-6 (S4UL)	2.26E+06	6.12E+01	6.12E+01	0.00	1.00	1.00	3.68E+02 (sol)	Yes	Yes
2	Aliphatic 6-8 (S4UL)	2.26E+06	1.34E+02	1.34E+02	0.00	1.00	1.00	1.57E+02 (sol)	Yes	Yes
3	Aliphatic 8-10 (S4UL)	4.51E+04	3.26E+01	3.25E+01	0.00	1.00	1.00	7.92E+01 (vap)	Yes	Yes
4	Aliphatic 10-12 (S4UL)	4.51E+04	1.59E+02	1.59E+02	0.00	1.00	1.00	4.77E+01 (vap)	Yes	Yes
5	Aliphatic 12-16 (S4UL)	4.51E+04	1.33E+03	1.32E+03	0.01	0.99	1.00	2.37E+01 (sol)	Yes	Yes
6	Aliphatic 16-35 (S4UL)	1.33E+05	NR	NR	1.00	NR	NR	8.48E+00 (sol)	Yes	No
7										
8										
9										
10	Aromatic 5-7 (S4UL)	2.01E+05	3.99E+02	3.99E+02	0.00	1.00	1.00	1.11E+03 (sol)	No	No
11	Aromatic 7-8 (S4UL)	2.01E+05	9.63E+02	9.58E+02	0.00	1.00	1.00	8.35E+02 (vap)	No	No
12	Aromatic 8-10 (S4UL)	1.81E+04	5.62E+01	5.62E+01	0.00	1.00	1.00	6.10E+02 (vap)	Yes	Yes
13	Aromatic 10-12 (S4UL)	1.81E+04	3.08E+02	3.07E+02	0.01	0.99	1.00	3.62E+02 (sol)	Yes	Yes
14	Aromatic 12-16 (S4UL)	1.81E+04	3.49E+03	3.30E+03	0.10	0.90	1.00	1.68E+02 (sol)	Yes	Yes
15	Aromatic 16-21 (S4UL)	1.17E+04	NR	NR	1.00	NR	NR	5.36E+01 (vap)	Yes	No
16	Aromatic 21-35 (S4UL)	1.35E+04	NR	NR	1.00	NR	NR	4.83E+00 (sol)	Yes	No
17										
18										
19	Benzene (S4UL)	2.62E+02	4.00E-01	4.00E-01	0.00	1.00	1.00	1.11E+03 (sol)	No	No
20	Toluene (S4UL)	2.01E+05	9.67E+02	9.62E+02	0.00	1.00	1.00	8.35E+02 (vap)	No	No

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