



SITE INVESTIGATION & CONTAMINATION APPRAISAL REPORT

CONTRACT: Hayling Billy Public House
117 Elm Grove
Hayling Island
Hampshire
PO11 9ED

PLANNING APP: APP/16/00568

CLIENT: McCarthy & Stone Retirement
Lifestyles Ltd
South West House
1 Embankment Way
Ringwood
Hampshire
BH24 1EU

FAO: Miss K Hill

REPORT NO: 16-73724/BG/SI&CAR

PREPARED BY:

B Graham BSc (Hons) MSc FGS

APPROVED BY:

R. J. Holloway BSc (Hons) MSc FGS CEnv MCIWEM C.WEM

DATE: 7 July 2016

All rights, including Copyright, in this report belong to ACS Testing. The report shall be for the private and confidential use of the Client for whom it has been prepared and may not be reproduced, in whole or part, or relied upon by Third Parties without the express written authority of ACS Testing. © 2016

ACS Testing Ltd. Unit 14 Blackhill Road West, Holton Heath Trading Park, Poole, Dorset, BH16 6LE.
Ph 01202 622858 – Fax 01202 625045 – Email geo@acstesting.co.uk – www.acstesting.co.uk

REPORT CONTENTS

SECTION	Page
1.0 INTRODUCTION	1
2.0 REVIEW OF PREVIOUS REPORTS.....	5
3.0 ACS EXPLORATION & TESTING	7
4.0 GROUND CONDITIONS	9
5.0 GEOTECHNICAL, BASIC CHEMICAL & INFILTRATION RESULTS.....	12
6.0 ASSESSMENT FOR SOILS – HUMAN HEALTH.....	14
7.0 ASSESSMENT OUTCOME FOR SOILS.....	20
8.0 GEOTECHNICAL ASSESSMENT	22
9.0 CONTAMINATION ASSESSMENT	24
10.0 REVISED CONCEPTUAL SITE MODEL.....	25
11.0 CONSIDERATIONS & RECOMMENDATIONS.....	30
12.0 QUALITY STATEMENT.....	33

APPENDICES

- A SITE LOCATION PLAN – 15-67729/01
- B EXPLORATORY HOLE LOCATION PLAN – 16-73724/02
- C BOREHOLE LOGS – WS01-08
TRIAL PIT LOGS – SA01-02
- D GEOTECHNICAL LABORATORY TEST CERTIFICATES
 - ▶ ACST – 16-73724
- E INFILTRATION TEST CERTIFICATE
 - ▶ SA01
- F ENVIRONMENTAL LABORATORY TEST CERTIFICATES
 - ▶ ACSE – 16-05026-01
 - ▶ ACSE – 16-05026-01-WAC
 - ▶ CatWasteSoil – Output Sheets
- G CLEA MODEL OUTPUT SHEETS
 - ▶ Topsoil
 - ▶ Made Ground
 - ▶ Superficial Deposits
- H STATISTICAL ANALYSIS
 - ▶ Lead

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 in-situ and laboratory testing to enable the preparation of a Site Investigation & Contamination Appraisal Report for a site comprising the Hayling Billy Public House off Elm Grove, Hayling Island, Hampshire.
Proposal / Planning	Planning application APP/16/00568 has been submitted to Havant Borough Council for the following proposal; <i>Erection of 33no. retirement apartments (category II type) with communal facilities and car parking accessed from St Marys Road.</i>
Previous Reports	ACS Testing Ltd – Desk Study Report–15-67729 – 08/01/16.
Exploration, Laboratory Testing	Eight windowless lined boreholes to a maximum depth of 4.00m. Two trial pits excavated to a maximum of 2.40m. One infiltration test carried out within one of the trial pits (SA01). Ten samples were tested for a contaminant screening suite. Two samples were subjected to Waste Acceptance Criteria (WAC) testing. Six samples were tested for index properties comprising natural moisture content, liquid limit and plastic limit. Six samples were tested for pH and water soluble sulphate.
Findings (Geotechnical)	The intrusive ground investigation has revealed three different soil units. Topsoil and / or Made Ground was revealed in all exploratory holes to a maximum depth of 0.53m. The Topsoil was described as dark grey silty SAND. The Made Ground was revealed to be bituminous material overlying varying SAND or GRAVEL dominant layers. Brick, bitumen, wood and flint were noted within the Made Ground. The Made Ground was found to be overlying Superficial Deposits. The Superficial Deposits were proven to the maximum depth achieved in the investigation of 4.00m. The unit typically comprised a firm brown mottled grey silty sandy CLAY transitioning into a firm grey mottled orangish brown silty sandy CLAY, overlying a varying sequence of loose to medium dense SAND and very soft CLAY dominant units. The cohesive soils of the Superficial Deposits were found to have a low to medium shrinkage potential. The maximum water soluble sulphate concentration detected was 990mg/kg and the minimum pH detected was 6.6. Groundwater was struck in all eight boreholes between 2.10m and 2.73m with reduced levels strikes between 4.07mAOD and 4.72mAOD. Groundwater seepage was also noted within one of the two trial pits. Seepage was recorded in SA01 at 2.20m (4.60mAOD).

	The infiltration test revealed the soils underlying the site to have a low permeability and this combined with the high groundwater level would appear to indicate that soakaways will not be suitable for the proposed development.
Findings (Contamination)	The samples tested revealed elevated levels of lead within the Made Ground above the site specific assessment criteria. Statistical analysis revealed the true mean at a 95% confidence level to be above the acceptance criteria and therefore site wide remediation in relation to lead in the Made Ground is required. The WAC testing undertaken revealed the Made Ground to be Hazardous Waste and the Superficial Deposits to be classified as Inert Waste.
Recommendations (Geotechnical)	Based on the variable and low SPT N values and shallow groundwater recorded at typical founding depths for traditional foundations, it is considered that the ground conditions revealed are not suitable bearing strata for traditional foundations for the proposed building. It is recommended that a piled foundation solution is progressed. Due to the presence of shrinkable clay, it will be necessary for suspended / suspendable ground floor slabs to be utilised within the proposed building. Heave precautions for a pile and beam solution should be taken into consideration. Due to cohesive, low permeability, underlying conditions revealed in the investigation it is considered that the use of soakaways for surface water disposal is unlikely to be feasible. pH and water soluble sulphate testing classify the aggressive environment for concrete as Design Sulphate Class DS-2, and Aggressive Chemical Environment for Concrete AC-2. It is considered that the current Topsoil onsite will be suitable for future use onsite within the proposed soft landscaping.
Recommendations (Contamination)	A clean cover system comprising 400mm of clean validated Topsoil and Subsoil should be placed in all areas of proposed soft landscaping. An asbestos survey should be carried out on the existing building prior to demolition.
Further Investigation	A further investigation comprising deeper boreholes should be undertaken at an appropriate time. It is recommended that a minimum of three boreholes are sunk in the range of 25m-30m to provide geotechnical data for pile design. Further samples from the Made Ground should be collected and scheduled for Total TPH (C10-C40) and speciated PAH testing to allow the waste classification of the Made Ground to be re-evaluated.

1.0 INTRODUCTION

1.1 Instructions

- 1.1.1 ACS Testing Ltd. (ACS) were instructed by Miss K Hill of McCarthy & Stone Retirement Lifestyles Ltd. to carry out an intrusive investigation for a site comprising the Hayling Billy Public House off Elm Grove, Hayling Island, Hampshire.
- 1.1.2 The site is outlined in red on the Site Location Plan included as Appendix A.

1.2 Objectives

- 1.2.1 The objectives of this report are to document the intrusive investigation, in-situ testing and laboratory testing to identify potential constraints to the proposed development. The investigation will give details of the underlying ground conditions, provide parameters for foundation design and enable a Contamination Assessment to be carried out to give recommendations on remedial requirements (if required) with regards to contamination in relation to human health and controlled waters.

1.3 Proposed Development

- 1.3.1 The Client submitted a planning application to Havant Borough Council on 26/05/16. Planning application APP/16/00568 is currently pending a decision for the following proposal:

Erection of 33no. retirement apartments (category II type) with communal facilities and car parking accessed from St Marys Road.

1.4 Previous Reports

- 1.4.1 ACS were previously commissioned by the Client to prepare a Desk Study Report in October 2015 for the site. This report has been reviewed below in Section 2.0. Further reports may exist for the site, but at the time of writing ACS has no knowledge of any.

- ▶ ACS Testing Ltd – Desk Study Report – 15-67729 – 08/01/2016

1.5 Report Limitations

- 1.5.1 This report has been prepared in accordance with the instructions received from McCarthy & Stone Retirement Lifestyles Ltd. and includes the findings of a ground investigation and contamination assessment carried out by ACS.
- 1.5.2 The report is based upon the findings of an intrusive ground investigation which includes soil sampling, site testing, and laboratory testing for physical and chemical parameters. 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.

- 1.5.3 The information contained in this report is intended for the use of McCarthy & Stone Retirement Lifestyles Ltd. pursuant to the development described above. The recommendations contained herein may not be appropriate to other development proposals.
- 1.5.4 The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. 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.
- 1.5.5 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.

1.6 Legislation

- 1.6.1 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.
- 1.6.2 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.

- 1.6.3 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 governments 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.

- 1.6.4 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.

1.7 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+A1:2013. *Investigation of Potential Contaminated Sites. Code of Practice*. BSI 2011.
- BRE Digest (2016). *Soakaway Design*. BRE Press.
- BRE Special Digest 1:2005 (2005). *Concrete in aggressive ground*. BRE Press.
- 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*.
- 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*.
- Department for Environment, Food and Rural Affairs and the Environment Agency (2002). *Potential Contaminants for Assessment of Land. R&D Publication CLR 8*. Environment Agency 2002.
- 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.
- LQM, Land Quality Management (2014). *S4ULs for Human Health Risk Assessment*. (S4UL3023)
- NHBC (2016). *NHBC Standards, Part 4 Foundations*. NHBC

2.0 REVIEW OF PREVIOUS REPORTS

- 2.0.1 This section provides a summary of the ACS Desk Study Report, 16-67729 dated 08/01/16. The report was based upon a review of historical maps and information gained from an internet supplier of site specific environmental information. Other information was obtained from consultations with the Local Authority, Environment Agency website, a review of geological, hydrogeological and hydrological maps and a site walkover survey. Given the short time between the Desk Study and Site Investigation it is considered that the site conditions remain unchanged. For a complete site description the Desk Study Report should be reviewed in full.

2.1 Site Conditions

- 2.1.1 The site comprises a single building occupying the central north area of the site. Most of the remainder of the site is hard surfaced with macadam and is currently used as a car parking. Small grassed areas surround the car park beside the southeast, southwest and northwest boundaries.
- 2.1.2 The site is generally open on all sides and is not secured, the southern boundary is marked by a brick wall, beyond which is a public footpath. Several large trees are located on the site, several of which have Tree Protection Orders.

2.2 Site History

- 2.2.1 A review of historic mapping and internet information has found that from the earliest reviewed record (1866) the site was open land. In 1898 residential dwellings are first denoted on the site and remained until 1968 when a large building is shown in the north of the site, denoted the 'Hayling Billy Public House'. The remainder of the site is open land with trees noted sporadically through the plot.
- 2.2.2 The area surrounding the site, from the earliest reviewed record (1866), has been mostly residential with occasional industry having been small-scale including Smithies from 88m north and Allotment Gardens from 100m south-east. By 1979 the surrounding area was principally residential with only small plots with an industrial land use which includes NMA Car Sales 12m south of the site and Hayling Garage 121m north.

2.3 Environmental Setting

- 2.3.1 The underlying ground conditions on site were expected to comprise sand and gravel from superficial River Terrace Deposits overlying clay from the London Clay Formation.
- 2.3.2 The Environment Agency Groundwater Map shows the site being located above a Secondary (A) Aquifer within the superficial deposits and an Unproductive Strata within the bedrock rock geology.
- 2.3.3 A number of trees on site have existing Tree Protection Orders which should be confirmed as they may pose restrictions to future proposals onsite.

2.4 Potential Contamination Issues

2.4.1 On-Site

The use of the site as a residential dwelling and later as a Public House presents a limited potential for contamination from onsite sources.

The open land surrounding the buildings to the south and west of the site has been and is currently being used for vehicle parking (a further car park is additionally noted adjoining the site to the south-west), and Steam Engine has historically been noted on site in the southeast corner circa 1966. Vehicles parked on site can give rise to contaminants that may enter the ground beneath the site. Contaminants from this source will include Heavy Metals, PAH & TPH, through minor fuel and oil leaks and run off. The car park has macadam surfacing which will reduce the potential pollutant pathway into the soil. Although there is the potential for contamination from this source, any leaks or spills will be small scale and therefore the contaminative risk from onsite car parking is considered to be low.

Given the age of the current and former buildings on-site it is feasible that Asbestos Containing Materials may be present. Appropriate inspection by qualified Contractors will be required prior to demolition of the buildings.

2.4.2 Off-Site

There are seven electricity substations located within 250m of the site, the closest lying 32m east. The main contaminants of concern associated with substations are PCBs which are not particularly mobile. It is therefore considered very unlikely that contaminants will have migrated onto the study site and the risk posed is considered negligible.

NMA Car Centre Ltd. is noted 12m south and Hayling Garage is noted 121m north. Potential contaminants from garage activities may include PAH, TPH and Heavy Metals through fuel and oil, leaks and spillages. The garages both have concrete surfacing which would reduce the potential for pollution and migration onto the study site. Due to the distance of the site from these sources the risk to site from potential contaminants stemming from the Garage is considered negligible and very low from the NMA Car Centre.

2.5 Radon

- 2.5.1 The EnviroInsight report indicates that the site is within a Radon Affected Area as between 1% and 3% of properties are above the action level. However no radon protection measures are necessary for new properties or extensions.

2.6 Conclusions / Recommendations

- 2.6.1 It was recommended that an intrusive ground investigation should be undertaken at the appropriate time to determine the concentrations of potential contaminants beneath the proposed development which may impact identified receptors. The proposed ground investigation should include geotechnical considerations.

3.0 ACS EXPLORATION & TESTING

- 3.0.1 An intrusive investigation was undertaken by ACS in June 2016. Exploratory hole locations were selected by ACS to give good coverage of the site enabling decisions to be made in relation to contamination and to provide geotechnical information to aid with future foundation design.
- 3.0.2 Utility plans supplied to ACS by the Client were assessed prior to the intrusive works. A Cable Avoidance Tool (CAT) was used to confirm the location of services prior to drilling at each exploratory hole location. Hand dug pits were excavated to 1.00m as a precaution against unidentified buried services before drilling commenced.
- 3.0.3 An Exploratory Hole Location Plan showing the ACS investigation is included as Appendix B.

3.1 Windowless Lined Boreholes

- 3.1.1 Eight windowless boreholes were drilled using a Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig between 06/06/16 and 07/06/16. All the boreholes were drilled to a depth of 4.00m.
- 3.1.2 WS08 was originally intended to be drilled through a grass verge, however during the excavation of the starter pit a concrete slab was revealed. Anecdotal evidence has stated that a historic Steam Engine (Hayling Billy) was placed on top of the concrete slab. WS08 was therefore moved to the west beyond the grass verge.
- 3.1.3 A windowless lined sampling drilling method was used to form the boreholes to provide complete soil recovery. Samples were collected from the boreholes and scheduled for laboratory testing to provide geotechnical information and contaminant concentrations of the underlying soils.
- 3.1.4 Borehole Logs are included as Appendix C.

3.2 Geotechnical Testing

- 3.2.1 Standard Penetration Tests (SPT) were carried out in each borehole at 1.00m vertical intervals. The results of the tests are shown on the borehole logs and Figures 1 and 2 in Section 4.0 of this report.
- 3.2.2 Six samples were tested for natural moisture content, liquid limit and plastic limit. From these tests the plasticity indices can be calculated which can be used to determine the volume change potential of cohesive soils.
- 3.2.3 Six samples were tested for pH and water soluble sulphate in order to provide information for the specification of future buried concrete.
- 3.2.4 Laboratory test result certificates are included within Appendix D.

3.3 Infiltration Testing

- 3.3.1 Two trial pits were excavated on 06/06/16 to a maximum depth of 2.40m to allow for soakaway tests to be conducted in accordance with BRE Digest 365.
- 3.3.2 The geology revealed in the two trial pits was very similar therefore infiltration testing was only carried within one of the trial pits, SA01.
- 3.3.3 Trial pit logs are included as Appendix C and the infiltration test certificate is included as Appendix E.

3.4 Contamination Testing

- 3.4.1 Ten samples were tested for a suite of contaminants based on the site history. Samples scheduled for testing were collected from the Topsoil, Made Ground and indigenous ground. The screening suite comprised the following contaminants:
- ▶ 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
- 3.4.2 Waste Acceptance Criteria (WAC) testing was carried out on two samples, one from the Made Ground and one from the indigenous ground, to assist with waste classification for materials which may be necessary to dispose off-site.
- 3.4.3 All samples were dispatched to a UKAS accredited laboratory (ACS Environmental) under a chain of custody procedure, with details of the sample location and analysis requirements retained.
- 3.4.4 Laboratory test result certificates are included as Appendix F.

4.0 GROUND CONDITIONS

4.1 General Strata Encountered

- 4.1.1 Summarised ground conditions are outlined below. Full details are shown on the borehole and trial pit logs included as Appendix C.

Strata	Exploratory Holes Encountered in	Top of Stratum Depth (mbgl)	Thickness (m)
Topsoil	WS06	Ground Level	0.11
Made Ground	All	Ground Level – 0.11	0.17 - 0.53
Superficial Deposits	All	0.16 – 0.53	Proven to 4.0

Table 1: Summary of strata revealed from the intrusive investigation

4.1.2 Topsoil

Topsoil was only revealed in one of the exploratory hole locations proved to a maximum depth of 0.11m. The Topsoil was described as a dark grey silty SAND with abundant rootlets.

4.1.3 Made Ground

Made Ground was revealed in all eight boreholes and both trial pits to a maximum depth of 0.53m. The Made Ground was shown to be bituminous material overlying varying SAND or GRAVEL dominant layers. The Made Ground was shown to typically comprise a greyish brown / grey mottled reddish brown / brown gravelly SAND / silty sandy GRAVEL. Brick, flint, bitumen and wood was noted within the Made Ground onsite.

4.1.4 Superficial Deposits

Superficial Deposits were encountered in all exploratory holes proven to the maximum depth achieved in the investigation of 4.00m. The Superficial Deposits were typically shown to comprise a firm brown mottled grey silty sandy CLAY transitioning into a firm grey mottled orangish brown silty sandy CLAY. The clay was revealed to overlie a varying sequence of loose to medium dense SAND and very soft to firm CLAY dominant units.

4.2 Groundwater

4.2.1 Groundwater was struck in all eight boreholes. The strikes and standings levels are summarised in the Table below.

Client Reference	Water Strike (mbgl)	Standing Levels After 20 minutes (mbgl)	Standing Levels After 20 minutes (mAODI)
WS01	2.67	2.32	4.58
WS02	2.47	2.10	4.70
WS03	2.50	2.51	4.39
WS04	2.40	2.41	4.39
WS05	2.50	2.43	4.52
WS06	2.53	2.48	4.22
WS07	2.74	2.73	4.07
WS08	2.71	2.68	4.72

Table 2: Summary of water strikes and standing groundwater levels recorded during drilling.

4.2.2 Groundwater seepage was also recorded within SA01 at 2.20m (4.60mAOD). No groundwater was noted during the excavation of SA02.

4.3 SPT[N] Results

4.3.1 Figures 1 & 2, below, show the results of the in-situ SPT testing for WS01-03 & WS05-08.

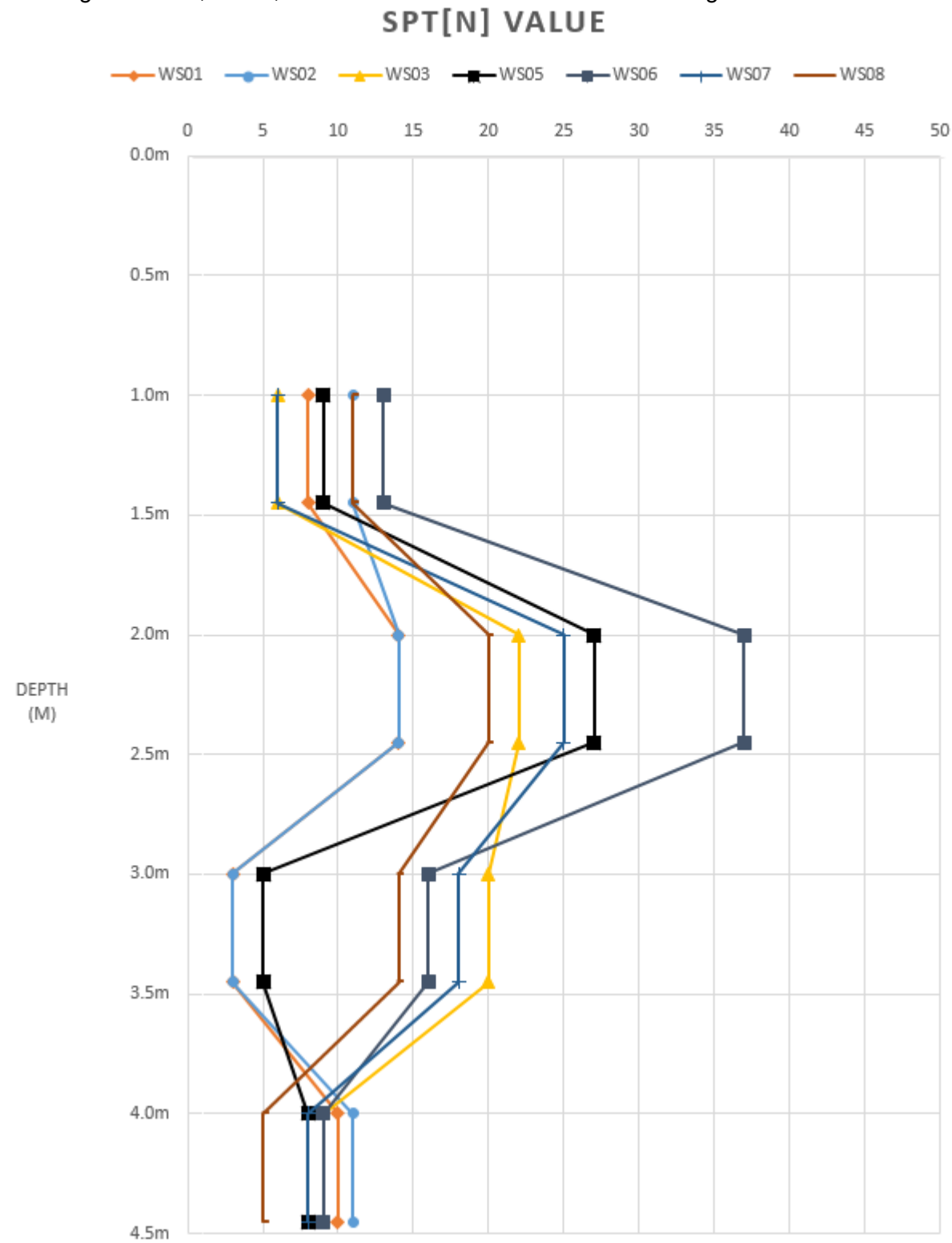


Figure 1: SPT[N] values against depth.

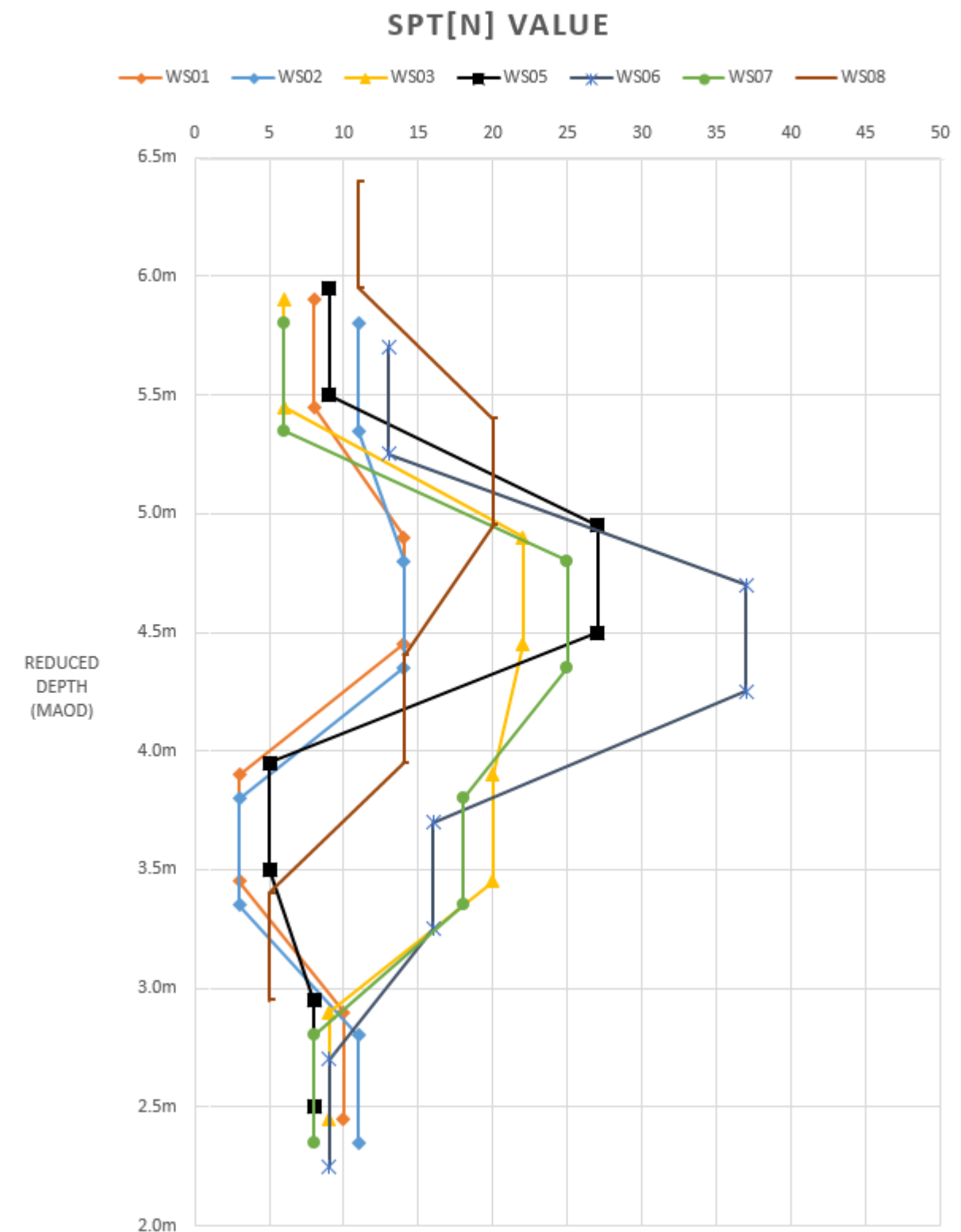


Figure 2: SPT[N] values against reduced level.

5.0 GEOTECHNICAL, BASIC CHEMICAL & INFILTRATION RESULTS

5.1 Index Properties - Moisture Content and Atterberg Limit testing (LL/PL/PI)

- 5.1.1 In accordance with NHBC 4.2 shrinkable soils are those containing more than 35% fine particles (60µm) and have a Modified Plasticity Index of 10% or greater. The Modified Plasticity Index is calculated as the Plasticity Index of the soil multiplied by the percentage of particles less than 425µm.
- 5.1.2 The Modified Plasticity Index can be used to determine the volume change potential of the underlying soil. The Table below summarises the volume change potential of a soils based on the Modified Plasticity Index.

Modified Plasticity Index	Volume Change Potential
40% and greater	High
20% to less than 40%	Medium
10% to less than 20%	Low

Table 3: Modified Plasticity Index relating to Volume Change Potential.

- 5.1.3 The results of the laboratory testing are shown in Table 4 below.

Reference (Depth m)	Stratum	Moisture Content %	Percentage passing 425µm sieve (%)	Plastic Limit (%)	Liquid Limit (%)	Plasticity Index (%)	Modified Plasticity Index (%)
WS03 (1.20-1.30)	Superficial Deposits	23	99	16	38	22	21.8
WS04 (1.10-1.20)		22	99	14	34	20	19.8
WS05 (1.90-2.00)		7.7	100	13	39	26	26
WS06 (1.00-1.10)		20	99	16	34	18	17.8
WS07 (0.53-1.00)		23	99	16	46	30	29.7
WS08 (0.37-1.00)		25	92	15	45	30	27.6
					Minimum		17.8
					Maximum		29.7

Table 4: Moisture content and Atterberg Limit testing results

5.1.4 Figure 3 below shows the results of the Atterberg Limit testing plotted on an A-Chart.

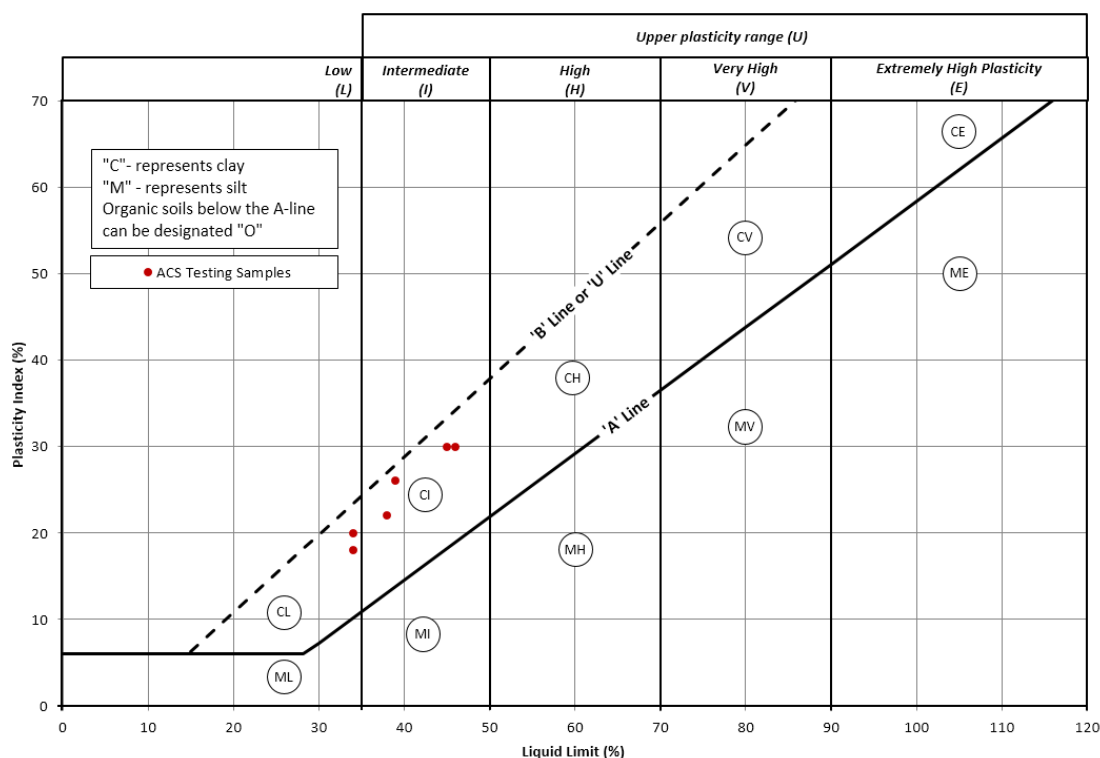


Figure 3: A-Chart plotting the results of Atterberg Limit testing

5.2 Aggressive Ground Chemical Suite

5.2.1 The results of pH and water soluble sulphate testing are shown in Table 5 below.

Reference	Depth (m)	Stratum	pH	Water Soluble Sulphate mg/l
WS03	0.30-0.45	Made Ground	9.2	605
WS04	1.00-1.10	Superficial Deposits	8.5	161
WS05	2.45-2.55	Superficial Deposits	8.7	4.80
WS06	0.28-1.00	Superficial Deposits	6.6	29.2
WS07	0.10-0.53	Made Ground	8.2	920
WS08	0.10-0.37	Made Ground	8.8	238
Minimum pH / Maximum Sulphate			6.6	920

Table 5: Aggressive ground chemical testing results

5.3 Infiltration Testing

5.3.1 Infiltration testing was unable to be carried out in line with best practice due to time constraints. An infiltration rate was unable to be calculated in accordance with BRE 365 as the trial pit did not empty to 25%. A fall in head of 530mm was recorded over the six hour test period. Based on the fall in head recorded, it would have taken eighteen hours for the test to reach 25% full.

6.0 ASSESSMENT FOR SOILS – HUMAN HEALTH

6.1 Background

- 6.1.1 All contaminants have been screened against LQM CIEH Suitable 4 Use Levels (S4ULs). For lead there is no S4UL value and therefore the Defra Category 4 Screening Level (C4SL) has been adopted.
- 6.1.2 S4ULs have been published 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.
- 6.1.3 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.
- 6.1.4 The units revealed during the intrusive investigation are considered to have markedly different properties, therefore assessment criteria have been modelled individually for each unit. The Topsoil has been modelled to determine if it is suitable for reuse within the soft landscaped areas of the proposed development.
- ▶ Topsoil: Silt Loam, pH 7.1 & SOM 6%
 - ▶ Made Ground: Sand, pH 8.6 & SOM 3.2%
 - ▶ Superficial Deposits: Silty clay, pH 8.3 & SOM 1%
- 6.1.5 The generic assumptions used to generate generic assessment criteria (GAC) such as LQM/CIEH S4UL and the C4SL assume Residential land use to be:
- ▶ Critical receptor female child aged 1-6
 - ▶ Exposure duration 6 years
 - ▶ Exposure pathways – direct soil and dust ingestion, skin contact with dust and soil, inhalation of dust and vapours
 - ▶ Building type – Small terraced house
- 6.1.6 The proposed end use of the site differs considerably from the conceptual site model used to derive the S4ULs as the proposed redevelopment is only available to elderly people. Site specific assessment criteria (SSAC) have therefore been derived using CLEA v1.06.

- 6.1.7 Table 6 below summarises the land use site specific input parameters that have been adopted for the sheltered residential land use:

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	15.6	USEPA, 2011
Living Space Height	2.40m	Standard McC&S building design for one unit.

Table 6. Summary of input parameters for deriving site specific assessment criteria (SSAC).

- 6.1.8 CLEA v1.06 spreadsheets used to derive SSAC are included as Appendix G.

6.2 Lead

- 6.2.1 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).

4.22 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)

For residential land use, the Integrated Exposure Uptake Biokinetic model (IEBUK) was used to estimate blood lead concentrations in children, with a blood lead level of 3.5 ug/dl used as the lower level of toxicological concern. C4SLs model a low level of risk; a higher level than the minimal risk approach adopted when deriving the S4ULs. In the absence of alternative data for lead, the use of low risk screening criteria within the planning regime are considered acceptable in this instance. As this does not take into account the modified age of the proposed receptors, this is considered a conservative approach.

6.3 Soil Organic Matter

- 6.3.1 Where contaminants are sensitive to soil organic matter, LQM/CIEH S4UL and CL:AIRE provide three values; 6%, 2.5% and 1% SOM. The average value of the Superficial Deposits has been calculated to be very low, at 0.36%. The Superficial Deposits on site will not be suitable to use in future soft landscaped areas and imported/recycled topsoil material will be required to act as a growing medium. This will lead to SOM at the surface being significantly increased. As this is the case, 1% SOM will be used for the Superficial Deposits. This is still considered to be a conservative value and maintains the robust approach to the risk assessment.

6.4 Soil Saturation/Vapour Saturation Limits

- 6.4.1 Within the CLEA model, assumptions are made regarding simple linear partitioning of a contaminant within the soil in its sorbed, dissolved and vapour phases. The upper bound of partitioning is represented by theoretical soil saturation or vapour saturation limits. When the theoretical soil saturation / vapour saturation limits are exceeded and the vapour inhalation pathway is considered significant (>10% contribution to exposure), within CLEA the cell is highlighted red and further consideration is required. Where no residual free phase is identified within the sample, it is unlikely that concentrations of the contaminant will be sufficient to result in an exceedance of the health criteria value. In deriving the S4ULs, LQM/CIEH have adopted an approach of where soil / vapour saturation limits are exceeded, the calculated SSAC is tabulated, with the soil / vapour saturation limit provided in brackets. Where contaminants are identified above the theoretical soil / vapour saturation limit, the risk assessor should make note of this and further discussion / consideration is required.

6.5 Inorganic Contaminants

6.5.1 The following table summarises the acceptance criteria for inorganic contaminants tested as part of the investigation for this site.

Contaminant	Modified Acceptance Criteria (mg/kg)			Source of Acceptance Criteria
	Topsoil	Made Ground	Superficial Deposits	
Arsenic	363	363	363	Modified S4UL
Cadmium	142	142	142	Modified S4UL
Chromium III	7022	7022	7022	Modified S4UL
Chromium VI	26.8	26.8	26.8	Modified S4UL
Nickel	804	804	804	Modified S4UL
Lead	310	310	310	C4SL
Mercury (elemental)	9.15	0.75	2.69	Modified S4UL
Mercury (inorganic)	722	722	722	Modified S4UL
Mercury (methyl)	83.0	62.3	39.9	Modified S4UL
Selenium	7852	7852	7852	Modified S4UL
Copper	51704	51704	51704	Modified S4UL
Zinc	472700	472700	472700	Modified S4UL

Table 7: Inorganic Contaminants Acceptance Criteria.

6.6 Organic Contaminants

6.6.1 Polycyclic Aromatic Hydrocarbons

The acceptance criteria for PAH contaminants is summarised in the Table below.

Contaminant	Modified Acceptance Criteria (mg/kg)			Source of Acceptance Criteria
	Topsoil	Made Ground	Superficial Deposits	
Acenaphthene	28276 (337) ^{sol}	13699 (232) ^{sol}	8271 (58.1) ^{sol}	Modified S4UL
Acenaphthylene	26374 (507) ^{sol}	13881 (270) ^{sol}	7260 (88.2) ^{sol}	Modified S4UL
Anthracene	211064 (6.97) ^{vap}	192877 (3.72) ^{vap}	119598 (1.18) ^{vap}	Modified S4UL
Benzo(a)anthracene	77.0	72.5	37.7	Modified S4UL
Benzo(a)pyrene	19.0	18.9	17.9	Modified S4UL
Benzo(b)fluoranthene	23.9	23.6	22.0	Modified S4UL
Benzo(g,h,i)perylene	2116	2109	2061	Modified S4UL
Benzo(k)fluoranthene	632	629	600	Modified S4UL
Chrysene	184	179	152	Modified S4UL
Dibenzo(ah)anthracene	1.88	1.86	1.71	Modified S4UL
Fluoranthene	9909	9832	8813 (19.0) ^{vap}	Modified S4UL
Fluorene	22266 (183) ^{sol}	15103 (97.7) ^{sol}	7838 (31.4) ^{sol}	Modified S4UL
Indeno(1,2,3-cd)pyrene	269	266	245	Modified S4UL
Naphthalene	82.4	8.05	18.6	Modified S4UL
Phenanthrene	8909 (215) ^{sol}	8325 (114) ^{sol}	5303 (36.3) ^{sol}	Modified S4UL
Pyrene	23769	23583	21077 (2.21) ^{vap}	Modified S4UL
Benzene	10.3	0.83	6.48	Modified S4UL
Toluene	28178 (4430) ^{vap}	2364	12884 (1030) ^{vap}	Modified S4UL
Ethylbenzene	3237 (2870) ^{vap}	232	1200 (566) ^{vap}	Modified S4UL
Xylene, o-	3717 (2640) ^{sol}	266	1348 (524) ^{sol}	Modified S4UL
Xylene, m-	3511 (3480) ^{vap}	250	1260 (678) ^{vap}	Modified S4UL
Xylene, p-	3354 (3190) ^{sol}	239	1216 (629) ^{sol}	Modified S4UL

Table 7. PAH Contaminants Acceptance Criteria. 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.

6.6.2 Total Petroleum Hydrocarbons

The acceptance criteria for TPH contaminants is summarised in the Table below.

Contaminant	Modified Acceptance Criteria (mg/kg)			Source of Acceptance Criteria
	Topsoil	Made Ground	Superficial Deposits	
Aliphatic				
C5-C6	1090	107	519 (285) ^{sol}	Modified S4UL
C6-C8	3639 (731) ^{sol}	311	1314 (140) ^{sol}	Modified S4UL
C8-C10	1071 (450) ^{vap}	87.2	347 (77.1) ^{vap}	Modified S4UL
C10-C12	5316 (283) ^{vap}	438 (151) ^{vap}	1719 (47.5) ^{vap}	Modified S4UL
C12-C16	30444 (142) ^{sol}	3616 (75.7) ^{sol}	13192 (23.7) ^{sol}	Modified S4UL
C16-C35	772608	293847 (27.1) ^{sol}	590614 (8.48) ^{sol}	Modified S4UL
Aromatic				
C5-C7	10161 (4930) ^{sol}	825	6418 (1690) ^{sol}	Modified S4UL
C7-C8	28073 (4430) ^{vap}	2354	12832 (1030) ^{vap}	Modified S4UL
C8-C10	1840	153	604	Modified S4UL
C10-C12	8301 (2150) ^{sol}	840	2843 (370) ^{sol}	Modified S4UL
C12-C16	17067 (1010) ^{sol}	8053 (536) ^{sol}	12757 (170) ^{sol}	Modified S4UL
C16-C21	13226	12781	11818	Modified S4UL
C21-C35	13497	13496	13484	Modified S4UL

Table 8. TPH Contaminants Acceptance Criteria. 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.

7.0 ASSESSMENT OUTCOME FOR SOILS

7.1 Inorganic Contaminants

- 7.1.1 From the samples tested none revealed concentrations above the site specific assessment criteria for inorganic contaminants from the Topsoil or Superficial Deposits. Two samples were however shown to exceed the assessment criteria from the Made Ground.

Client Reference (m)	Stratum	Contaminant	Acceptance Criteria (mg/kg)	Recorded Concentration (mg/kg)
WS07 0.10-0.53	Made Ground	Lead	310	328
WS08 0.10-0.37				497

Table 9: Summary of samples that failed the acceptance criteria for inorganic contaminants

7.2 Organic Contaminants

- 7.2.1 The samples tested from the Topsoil, Made Ground or Superficial Deposits did not reveal any concentrations of organic contaminants above the assessment criteria.

7.3 Theoretical Saturation Limit

- 7.3.1 One sample from the Made Ground has revealed an organic contaminant to exceed the theoretical soil / vapour saturation limit but did not exceed the site specific assessment criteria, however the vapour inhalation pathway is considered significant. The sample identified to exceed the theoretical saturation limit is summarised below.

Client Reference (m)	Stratum	Contaminant	Acceptance Criteria (mg/kg)	Recorded Concentration (mg/kg)
WS03 0.08-0.30	Made Ground	TPH Aliphatic C21-C35	32449 (8.48) ^{sol}	103

Table 10: Exceedance of theoretical soil / vapour saturation limits of organic contaminants where the vapour inhalation pathway is considered significant

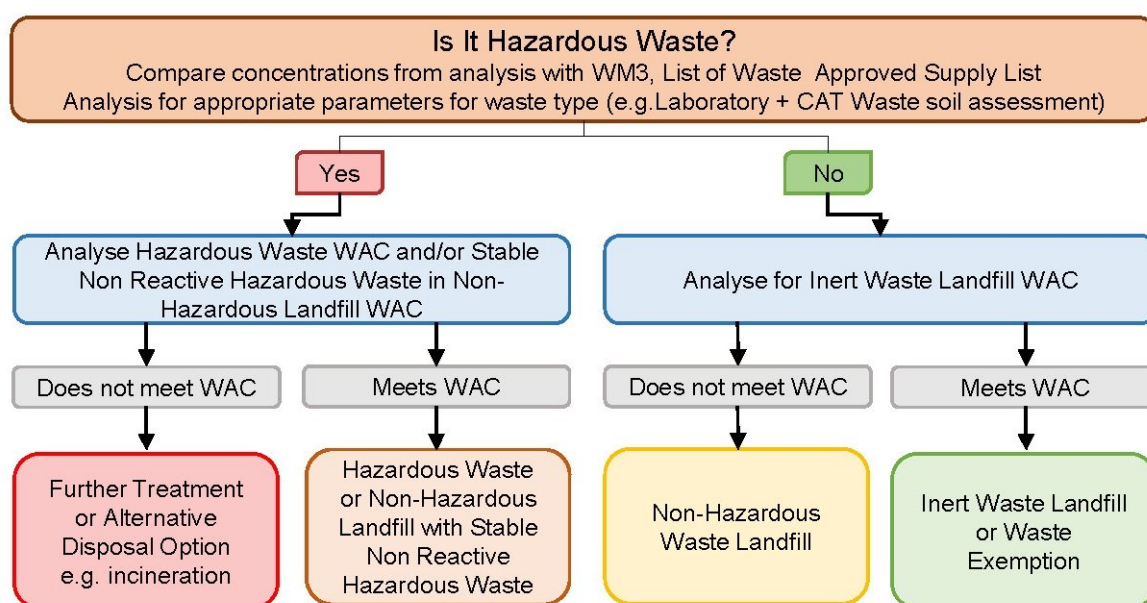
- 7.3.2 It should be noted that the soil / vapour saturation limit for some contaminants is lower than the laboratory limit of detection. Where this is the case no comparison can be made.

7.4 Waste Classification

7.4.1 Two samples were tested for Waste Acceptance Criteria to classify materials that may require removal from site as waste. WAC testing comprises two parts:

- I. Testing of the solid soil fraction to determine if the sample has hazardous properties using CAT Waste assessment software.
- II. Preparation and testing of a leachate (+ solid component) for comparison against published WAC Criteria.

7.4.2 The flow diagram below outlines the process of waste classification.



7.4.3 WS03 – 0.08-0.30 – Made Ground – Brown silty sandy GRAVEL

The results from the contamination testing on the Made Ground was entered into the CatWasteSoil software. The sample exhibits Hazardous Properties due to elevated mineral oil. The result of the WAC test shows that the sample has mineral oil concentrations above the acceptance criteria for inert waste. Therefore this Made Ground is classified as Stable Non-Reactive Hazardous Waste suitable to be disposed of in a non-hazardous landfill.

7.4.4 WS03 – 1.10-1.20m – Superficial Deposits – Brown silty sandy CLAY

The result from the contamination testing on the indigenous clay was entered into the CatWasteSoil software. The sample does not exhibit Hazardous Properties. The results for the WAC test reveal no concentrations above the inert waste acceptance criteria, therefore the Superficial Deposits would be classified as Inert Waste.

8.0 GEOTECHNICAL ASSESSMENT

8.1 Ground Conditions

8.1.1 The ACS investigation has revealed three units during the intrusive works. The units found in the investigation are generally consistent with what is shown on online geological maps and described in the Desk Study Report. A description of the units revealed and their parameters are discussed below.

8.1.2 Topsoil

Topsoil was only revealed in one of the exploratory hole locations proved to a maximum depth of 0.11m. The Topsoil was described as a dark grey silty SAND with abundant rootlets.

8.1.3 Made Ground

Made Ground was encountered in all exploratory holes to a maximum depth of 0.53m. The Made Ground was typically shown to be bituminous material overlying either SAND or GRAVEL dominant units. Three samples from the Made Ground were scheduled for pH and sulphate. The results revealed pH values between 8.2 and 9.2 and water soluble sulphate between 238mg/l and 920mg/l.

8.1.4 Superficial Deposits

Superficial Deposits were shown to be underlying the Made Ground in all the exploratory holes proven to the maximum depth of the investigation of 4.00m. The unit was typically shown to be a firm silty sandy CLAY overlying varying sand and clay dominant layers.

The results of the Atterberg Limit testing has revealed the cohesive Superficial Deposits to have a Modified Plasticity Index between 17.8% and 29.7%, resulting in a shrinkage potential of low and medium. SPT[N] values between 3 and 37 were recorded in the Superficial Deposits. N values were shown to peak at approximately 2.0m with values between 13 and 37 recorded, however beyond this depth at 3.00m and 4.00m N values were recorded between 3 and 20. Therefore due to the varying N values and groundwater levels it is considered the Superficial Deposits are not a suitable bearing stratum for traditional foundations for the proposed development. Testing has revealed pH values between 6.6 and 8.7 and water soluble sulphate between 4.80mg/l and 161mg/l.

Parameter	Minimum	Maximum
Moisture Content %	7.7	25
Plastic Limit %	13	16
Liquid Limit %	34	46
Plasticity Index %	18	30
Modified Plasticity Index %	17.8	29.7
Volume Change Potential	Low	Medium
SPT[N] Value	3	37
pH	6.6	8.7
Water Soluble Sulphate mg/l	4.80	161

Table 11: Summary of Superficial Deposits parameters.

8.2 Groundwater

- 8.2.1 Groundwater was struck in all eight boreholes with resting levels recorded between 2.73m and 2.10, with reduced levels between 4.72mAOD and 4.07mAOD. Groundwater seepage was also noted within SA01 at 2.20m, it is therefore unlikely that groundwater will be encountered in shallow excavations for drainage etc.

8.3 Volume Change Potential

- 8.3.1 Six samples from the cohesive units of the Superficial Deposits underwent testing to determine index properties including Atterberg Limits. The results from this testing have shown the Modified Plasticity Index to exhibit a low to medium volume change potential, in accordance with "NHBC 4.2 Building Near Trees". For a robust approach a medium volume change potential should be adopted.
- 8.3.2 Shrinkable soils are subject to change in volumes as their moisture content is altered. Soil moisture contents vary seasonally and are influenced by a number of factors including the action of tree roots. The resulting shrinkage or swelling of the soil can cause subsidence or heave damage to foundations, the structures they support and services. It will be required that all floor slabs are suspended to allow for the ground to heave. Heave protection will also be required beneath and beside ground-beams, if a piled foundation solution is used.

8.4 Specification of Buried Concrete

- 8.4.1 Results from soil samples have determined a minimum pH of 6.6 and a maximum water soluble sulphate value of 920mg/kg. It is considered that groundwater is mobile as it was struck within all the boreholes. In accordance with BRE Special Digest 1:2005 (Concrete in aggressive ground), the pH and water sulphate results for the site would classify the aggressive environment for concrete Design Sulphate Class DS-2, and Aggressive Chemical Environment for Concrete AC-2.

8.5 Drainage

- 8.5.1 The infiltration test carried out revealed the underlying soils to be of low permeability therefore it is unlikely for the use as soakaways as surface water drainage to be feasible for the proposed development.

9.0 CONTAMINATION ASSESSMENT

9.1 *Inorganic Contaminants*

- 9.1.1 From the samples tested concentrations of lead from the Made Ground were revealed to exceed the site specific assessment criteria.
- 9.1.2 Two of the five samples tested from the Made Ground revealed elevated concentrations of lead. Statistical analysis has revealed that the true mean at a 95% confidence level is equal to or above the acceptance criteria. Therefore site wide remediation is required in relation to the elevated lead in the Made Ground.
- 9.1.3 Statistical analysis was only carried out on the five samples collected from the Made Ground. Further samples could be collected to generate a larger data set, potentially negating the need for site wide remediation, subject to test results.
- 9.1.4 A copy of the statistical analysis spreadsheet is included within Appendix H.

9.2 *Organic Contaminants*

- 9.2.1 From the samples tested no concentrations were recorded above the site specific assessment criteria for organic contaminants.

9.3 *Saturation Limits*

- 9.3.1 From the samples tested for a suite of contaminants it was revealed that one sample from the Made Ground has an exceedance of the theoretical soil / vapour saturation limit, but did not exceed the derived site specific assessment criteria.
- 9.3.2 The sample from WS03 exceeds the theoretical soil / vapour saturation limit for TPH Aliphatic C21-C35. This means that there is a possibility of free phase contaminants within the soil. There was no visual or olfactory evidence of free phase contamination from the WS03 sample. Due to the low volatility of the TPH band there is considered to be minimal risk of harm from the vapour inhalation pathway. It is therefore considered that there is not a potential risk to human health and further assessment of TPH is not required.

9.4 *Waste Acceptance Criteria*

- 9.4.1 The sample scheduled for WAC testing has revealed the material from the Made Ground to be Hazardous Waste and the indigenous superficial deposits to be classified as Inert Waste.
- 9.4.2 It should be noted that none of the other samples from the Made Ground revealed hazardous properties when put through the CatWasteSoil program. Therefore further testing may allow the Made Ground to be reclassified.

10.0 REVISED CONCEPTUAL SITE MODEL

10.1 Potential Sources

- 10.1.1 The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a contaminant as:

“A substance which is in, on or under the land which has the potential to cause harm or cause pollution of controlled waters”

- 10.1.2 Based on the reviewed information and site inspection, the following potential sources of contamination have been identified:

- ▶ Lead within Made Ground
- ▶ Potential ACM within current buildings

10.2 Potential Pathways

- 10.2.1 The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a Pathway as:

“A route by which a receptor might be affected by contamination”

- 10.2.2 Following preliminary site assessment it is considered that a number of potential pathways are present that could cause receptors to become exposed to contaminants. ACS considers the following pathways to be present:

- ▶ Direct soil and dust ingestion
- ▶ Inhalation of dust
- ▶ Inhalation of free fibres

10.3 Potential Receptors

- 10.3.1 The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a receptor as:

“Something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property or controlled waters”

- 10.3.2 Following a preliminary site assessment, the following receptors are considered present:

- ▶ Site workers during demolition and construction
- ▶ Future site occupiers

10.4 Pollutant Linkage

- 10.4.1 The term pollutant linkage is the connection between a contaminant, a pathway and a receptor. Each element may exist in isolation and pose no environmental risk. It is only when all three elements are linked to each other that a pollutant linkage is present.

10.5 Risk Classification

- 10.5.1 The risk posed by a given pollutant linkage is classified based upon the severity of the consequence should that linkage be realised, compared with the likelihood of the linkage being realised. The definition of terms regarding the classification of consequence is given in the table below:

Classification	Category	Definition	Examples
Severe Short-term (acute) risks only	Human	Short term (acute) risks likely resulting in significant possibility of significant harm as defined by Part 2A of the Environmental Protection Act (1990).	High concentration of cyanide on the surface of an informal recreation area.
	Controlled Waters	Short-term risk of pollution of a sensitive water resource.	Major spillage of contaminants from a site into controlled waters
	Property	Catastrophic damage/destruction of property.	Explosion causing building collapse (can equate to short-term health risk if buildings collapse.)
	Ecological System	A short-term risk to a particular ecosystem, or organism forming part of such ecosystem	
Medium Chronic (long-term) risks; "significant harm"	Humans	Long term (chronic) risks likely to result in significant possibility of significant harm as defined by Part 2A of the Environmental Protection Act (1990)	Concentrations of contaminants within soil exceed GAC or SSAC
	Controlled Waters	Pollution of sensitive water resource	Leaching of contaminants from a site into a Principal or Secondary Aquifer
	Ecosystem	A significant change in a particular ecosystem	
Mild Chronic (long-term) risks; less sensitive receptors	Controlled Waters	Pollution of non-sensitive water resources	Pollution of non-classified groundwater
	Property	Significant damage to buildings structures and services. Damage to sensitive buildings/structures/services	Damage to a building rendering it unsafe to occupy (e.g. foundation damage resulting in instability)
Minor Chronic (long term) risks; mild	Financial / project	Harm, although not necessarily significant harm which may result in financial loss, or expenditure to resolve	
	Humans	Non-permanent health effects to human health (easily prevented by means such as PPE etc.)	The presence of contaminants at such concentration that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings, structures and services	The loss of plants in a landscaping scheme. Discolouration of concrete

Table 12: Classification of consequence of hazard (CIRIA 552, 2001)

10.5.2 The definition of terms regarding probability is summarised in Table 13 below:

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

Table 13: Classification of likelihood of hazard (CIRIA 552, 2001)

10.5.3 Once the risk consequence and likelihood have been assessed, it is possible to classify the overall risk to the site from that specific pollutant linkage. The table below provides a useful matrix. Once classification has been assigned this should be reality checked to ensure it is an accurate assessment.

Risk Classification Matrix					
Probability		Severe	Medium	Mild	Minor
	High Likelihood	Very High	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Table 14: Risk Classification Matrix (CIRIA 552, 2001).

10.5.4 A description of each risk classification is given in Table 15 below:

Classification	Definition
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not already undertaken) and remediation is likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not already undertaken) is required and remedial works may be necessary in the short term and are likely over the long term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table 15: Definition of risk classification categories (CIRIA 552, 2001)

10.6 Revised Conceptual Site Model

10.6.1 A revised conceptual site model based on the current findings from the intrusive investigation is included in Table 15 below.

Source	Potential contaminants of concern	Potential Pathways	Receptors	Consequence of risk being realised	Probability of risk being realised	Comments	Risk Classification
Made Ground	Lead	Direct soil and dust ingestion (indoor and outdoor)	Future site Occupiers	Medium	Unlikely	End users will effectively be isolated from impacted soils by the proposed building. A clean cover system is required in all soft landscaped areas, isolating future occupiers.	Low
		Inhalation of dust (indoor and outdoor)	Site works during demolition and construction	Medium	Unlikely		Low
Potential Asbestos within current buildings	(ACM) Asbestos Containing Materials	Inhalation of free fibres	Future site occupiers / Site workers during demolition	Medium	Unlikely	ACM possible onsite, refurbishment / demolition survey required prior to demolition in accordance with Control of Asbestos Regulations 2012. If ACM is revealed it will be removed by suitably qualified contractors.	Low

Table 16: Revised conceptual site model

11.0 CONSIDERATIONS & RECOMMENDATIONS

11.1 Foundation Design Recommendations

- 11.1.1 The selection and design of foundations and ground-floor slab construction is beyond the scope of current instructions and is the responsibility of the designers of the proposed building. The following recommendations, deriving from observations made during the investigation and testing are provided to assist the design process.
- 11.1.2 Based on the variable and low SPT[N] values recorded in the Superficial Deposits and groundwater recorded at typical founding depths for traditional foundations; it is considered that the ground conditions are not suitable as a bearing stratum for traditional foundations for the proposed development. It should be acknowledged that demolition of the existing building will further disturb the upper layers.
- 11.1.3 It is therefore recommended that an alternative foundation solution is pursued. It is considered that this will likely comprise piling into competent strata to a greater depth than achieved in the boreholes drilled to date.

11.2 Ground Floor Construction

- 11.2.1 Due to the presence of shrinkable clay, it will be necessary for suspended / suspendable ground floor slabs to be utilised within the proposed buildings. Any organic material should be removed from beneath the proposed buildings.
- 11.2.2 Heave can take place in a shrinkable soil when it takes up moisture and swells after the felling or removal of tress and hedgerows. Heave precautions for a pile and beam solution should be taken into consideration.
- 11.2.3 Trees / shrubs should be planted in accordance with NHBC 4.2 or similar guidance due to the presence of shrinkable soils.

11.3 Pavement Design

- 11.3.1 Based on the plasticity indexes recorded, it is estimated that California Bearing Ratio (CBR) values would be between 3% and 4%. It is recommended that Plate Bearing Tests are undertaken at formation level at the appropriate time to fully determine CBR values.

11.4 Drainage

- 11.4.1 Due to the cohesive nature of the ground revealed at shallow depths and the results of the infiltration testing carried out it is considered that the use of soakaways for surface water drainage is unlikely to be feasible. Enquires should be made regarding the possibility of connecting surface water to the public sewer system.

- 11.4.2 Much of the existing site is covered with the building and hardstanding which appears to effectively drain. It will be necessary for the existing drainage networks to be assessed prior to demolition. Subject to the necessary authorisations it may be possible to re-use some of the existing drainage for future surface water disposal.

11.5 Specification of Buried Concrete

- 11.5.1 In accordance with BRE Special Digest 1:2005 (Concrete in aggressive ground), the pH and water soluble sulphate results for all units encountered during the site investigation would classify the aggressive environment for concrete as Design Sulphate Class DS-2, and Aggressive Chemical Environment for Concrete AC-2.

11.6 Clean Cover System

- 11.6.1 Give the presence of Made Ground impacted by lead and the potential this contaminant has on identified receptors. The Made Ground could be removed from site however due to the thickness in areas this may not be practical. Alternatively a provision for a clean cover system will be required as part of the redevelopment.
- 11.6.2 Should the clean cover system be selected, it will be necessary for a capping layer of 400mm of validated clean subsoil / topsoil to be placed in soft landscaped areas. The 400mm capping layer depth proposed is considered suitable for the proposed development as the soft landscaped areas are communal areas where the growth of crop plants is not permitted and gardening is carried out by external contractors. BS3882:2015 suggests that subsoil is used below 300mm as it is structurally more robust and will settle less after placement.

11.7 Soil Disposal

- 11.7.1 Materials that are to be removed from site should be disposed of in accordance with the Landfill Regulations 2005. Waste Acceptance Criteria (WAC) test results should be provided to hauliers and landfill operators, to ensure that the materials are disposed of correctly. Should materials be revealed during site works that appear to be different to those tested, additional testing may be required, prior to disposal of such materials.

11.8 Site Won Material

- 11.8.1 The Topsoil sample tested had concentrations below the adopted assessment criteria, it is therefore considered that the Topsoil will be suitable for re-use in future soft landscaped areas. It is recommended that the Topsoil is stripped and stockpiled ready for future use.
- 11.8.2 If the quantities of Topsoil on site are not sufficient, imported Topsoil may be required. To ensure this material is fit for its intended purpose, this material should be subject to chemical analysis at a ratio of 1 sample per 50m³. Chemical analysis should then be compared with the assessment criteria included within Section 7 of this report.

11.9 Radon

- 11.9.1 The study site is within a Radon Affect Area as between 1% and 3% of the properties are above the action level however Radon Protection Measures are not necessary for new properties or extensions to existing ones.

11.10 Asbestos

- 11.10.1 Given the age of the buildings present onsite there is the potential for asbestos containing material (ACM). An asbestos survey should be carried out on the existing buildings prior to demolition.

11.11 Health & Safety Issues

- 11.11.1 Contractors working on site should be warned that there is a residual risk of contamination within the soils. Therefore appropriate protection measures should be adopted to guarantee their health and safety. Guidelines detailed in the HSE publication "Protection of workers and the general public during the development of contaminated land" should be followed, including:
- ▶ Avoid direct contact with the skin and personal clothing by use of protective gloves, eye protection, etc.
 - ▶ Washing facilities should be provided and properly used, particularly before eating
 - ▶ Dust control measures may be required under some circumstances, particularly to minimize risk of accidental ingestion and spread of contamination.
- 11.11.2 Further advice should be sought from HSE and the Local Authority

11.12 Unidentified Contamination

- 11.12.1 Should areas of contamination be revealed or suspected during the course of the site development, additional investigation and testing may be required and it is recommended that the Consultant is contacted immediately.

11.13 Further Investigation

- 11.13.1 At the appropriate time, further investigation comprising deeper boreholes should be conducted to a suitable depth to provide geotechnical parameters for pile design. It is recommended that this investigation should comprise at least three boreholes to a minimum depth of 5m greater than the expected pile length. At this stage it is considered that boreholes in the range of 25-30m deep will be required to provide suitable geotechnical parameters.
- 11.13.2 It is recommended that further samples from the Made Ground are collected and scheduled for Total TPH (C10-C40) and speciated PAH testing. If concentrations are revealed to not be hazardous then it is considered that Made Ground could be reclassified as Non-Hazardous Waste.

12.0 QUALITY STATEMENT

- 12.1 We confirm that in preparing this report we have exercised reasonable skill and care in order to produce accurate details.
- 12.2 We confirm that testing has been conducted in accordance with relevant Standards, as requested by the Client, with reference to the Organisation's Quality Manual Procedures.
- 12.3 The results and contents of this report are based upon in-situ analysis and/or the laboratory testing of specimens or sample material submitted to the laboratory.
- 12.4 Consequently, comments contained herein are derived from the determination of the results from the analysed material and that of any additional information, drawings, plans or similar such data as supplied by the Client.
- 12.5 ACS Testing warrants only the accuracy of the test result and information contracted to be supplied to the Client but will accept no liability in respect of the use to which the Client puts such information or the purpose for which such information was requested.
- 12.6 Unless specifically assigned and confirmed in writing within the terms of the Agreement/Written Order the Organisation asserts and retains all Copyright and other Intellectual Property rights, in and over the report and its contents.

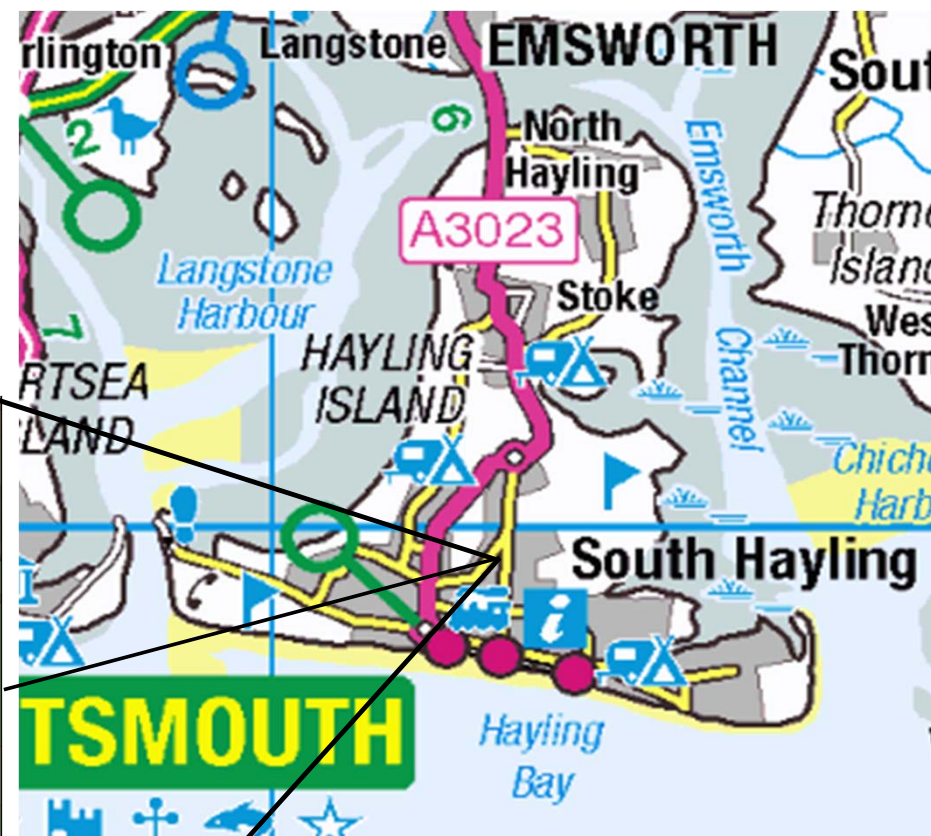
APPENDIX A

SITE LOCATION PLAN – 15-67729/01



Drawing Title: Site Location Plan

Drawing Number: 15-67729/01



N DO NOT SCALE

APPENDIX B

EXPLORATORY HOLE LOCATION PLAN – 16-73724/02





ACS TESTING LTD
UNIT 14 BLACKHILL ROAD WEST
HOLTON HEATH TRADING PARK
POOLE, DORSET
BH16 6LE
T: 01202 628647
E: geo@acstesting.co.uk

DO NOT SCALE

KEY:



- Borehole



- Trial Pit

REV	DESCRIPTION	BY	CHK	APP	DATE

CLIENT:

McCarthy & Stone Retirement Lifestyles Ltd

SITE:

Hayling Billy Public House

DRAWING TITLE:

Exploratory Hole Location Plan

SCALE:

@

JOB NO.

16-73724

DRAWING NO.

16-73724/02

REVISION.

A

NOTES:

APPENDIX C

BOREHOLE LOGS – WS01-08
TRIAL PIT LOGS – SA01-02



 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk			BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS01 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd			Lab. Ref: 16-72919				Hole Type WLS	
Contract: Hayling Billy Public House			Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25	
Location: 117 Elm Grove, Hayling Island							Logged By BG	
Ground Level (mAOD): 6.90		Co-ords: DNS		Date(s): 07-06-2016				

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing		Drill Run
								Depth	Type	
	BOUND MACADAM.	0.08 (6.82)					0.08 (ES)			
	MADE GROUND. Greyish brown gravelly SAND with abundant brick.		(0.37)				0.45			
	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	0.45 (6.45)								Hand Dug Pit
1			(1.35)					1.00	SPT(S)	N=8 (1,2/1,2,2,3)
	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	1.80 (5.10)								(117mm dia) TCR=100%
2	Medium dense grey occasionally mottled brown silty to very silty slightly gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-rounded flint. (SUPERFICIAL DEPOSITS)	2.00 (4.90)	(0.50)					2.00	SPT(S)	N=14 (2,3/3,4,4,3)
	Brown very silty SAND. (SUPERFICIAL DEPOSITS)	2.50 (4.40)	(0.50)							(102mm dia) TCR=100%
3	Very soft greyish brown very sandy SILT. (SUPERFICIAL DEPOSITS)	3.00 (3.90)	(0.45)					3.00	SPT(C)	N=3 (1,0/0,0,1,2)
	Loose to medium dense brown very silty SAND. (SUPERFICIAL DEPOSITS)	3.45 (3.45)	(0.55)							(75mm dia) TCR=100%
4	End of Borehole at 4.000m	4.00 (2.90)						4.00	SPT(C)	N=10 (2,1/2,2,3,3)
5										

General Remarks:					Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.					Date	Strike	Casing	Time Elapsed	Standing	Remarks
					07-06-2016	2.67m	0.00m	20mins	2.32m	

		ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS02 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 16-72919				Hole Type WLS			
Contract: Hayling Billy Public House		Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25			
Location: 117 Elm Grove, Hayling Island						Logged By BG			
Ground Level (mAOD): 6.80		Co-ords: DNS		Date(s): 07-06-2016					

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing		Drill Run	
								Depth	Type		Results
	BOUND MACADAM.	0.06 (6.74)									
	MADE GROUND. Grey and brown slightly sandy GRAVEL with rare cobbles. Gravel comprises fine, medium and coarse angular to sub-rounded flint.	0.31 (6.49)									
	MADE GROUND. Grey mottled reddish brown gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular brick and flint.	0.52 (6.28)								Hand Dug Pit	
1	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)		(1.28)					1.00	SPT(S)	N=11 (1,1/2,2,3,4)	(117mm dia) TCR=100%
	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	1.80 (5.00)	(0.45)					2.00	SPT(S)	N=14 (3,2/2,4,3,5)	
2	Soft purplish grey silty very sandy CLAY. (SUPERFICIAL DEPOSITS)	2.25 (4.55)									
	Very loose greenish grey silty SAND. (SUPERFICIAL DEPOSITS)	2.50 (4.30)									(102mm dia) TCR=100%
	Grey mottled brown silty SAND. (SUPERFICIAL DEPOSITS)	2.70 (4.10)	(0.90)					3.00	SPT(S)	N=3 (3,2/1,1,0,1)	
3	Soft to firm greyish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	3.60 (3.20)	(0.40)								(87mm dia) TCR=100%
4	End of Borehole at 4.000m	4.00 (2.80)						4.00	SPT(C)	N=11 (1,1/2,2,3,4)	
5											

General Remarks: 1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.				Groundwater Observations:			
Date	Strike	Casing	Time Elapsed	Standing	Remarks		
07-06-2016	2.47m	0.00m	20mins	2.10m			

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk				BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS03 Sheet 1 of 1									
Client: McCarthy & Stone Retirement Lifestyles Ltd				Lab. Ref: 16-72919				Hole Type WLS									
Contract: Hayling Billy Public House				Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25									
Location: 117 Elm Grove, Hayling Island								Logged By BG									
Ground Level (mAOD): 6.90		Co-ords: DNS		Date(s): 06-06-2016													
All units = (m) 1 2 3 4 5	Stratum Description		Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing		Drill Run						
									Depth	Type		Results					
	BOUND MACADAM.		0.08 (6.82)						0.08 (ES)				Hand Dug Pit				
	MADE GROUND. Brown silty sandy GRAVEL. Gravel comprises fine, medium and coarse; angular to sub-rounded flint and brick.		0.30 (6.60)					0.30									
	MADE GROUND. Greyish brown gravelly SAND with abundant brick.		0.45 (6.45)														
	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)			(1.35)					1.10 (ES) 1.20 (D) 1.30	1.00		SPT(S)	N=6 (1,1/1,1,2,2)	(117mm dia) TCR=100%			
	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)		1.80 (5.10)	(0.65)						2.00		SPT(S)	N=22 (1,2/4,6,6,6)	(102mm dia) TCR=100%			
	Grey occasionally mottled brown silty SAND. (SUPERFICIAL DEPOSITS)		2.45 (4.45)	(0.55)										(87mm dia) TCR=100%			
Medium dense becoming loose grey occasionally mottled brown silty gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint. (SUPERFICIAL DEPOSITS)		3.00 (3.90)	(1.00)						3.00	SPT(C)	N=20 (2,2/4,4,6,6)	(87mm dia) TCR=100%					
End of Borehole at 4.000m		4.00 (2.90)							4.00	SPT(C)	N=9 (2,1/2,1,3,3)						
General Remarks:												Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.												Date	Strike	Casing	Time Elapsed	Standing	Remarks
												06-06-2016	2.50m	0.00m	20mins	2.51m	

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG WINDOWLESS SAMPLING		Borehole No. WS04 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 16-72919		Hole Type WLS	
Contract: Hayling Billy Public House		Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig		Scale 1:25	
Location: 117 Elm Grove, Hayling Island				Logged By BG	
Ground Level (mAOD): 6.80		Co-ords: DNS		Date(s): 06-06-2016	

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing			Drill Run	
								Depth	Type	Results		
1	BOUND MACADAM.	0.08 (6.72)	(0.36)								Hand Dug Pit	
	MADE GROUND. Grey mottled brown slightly silty sandy GRAVEL.											
	MADE GROUND. Brown silty SAND with abundant wood noted.	0.44 (6.36)										
		0.52 (6.28)										
	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)											
	2	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	1.70 (5.10)	(0.60)								(117mm dia) TCR=100%
	3	Grey mottled orangish brown silty gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint. (SUPERFICIAL DEPOSITS)	2.30 (4.50)	(0.80)								(102mm dia) TCR=100%
4	Greenish grey silty SAND. (RIVER TERRACE DEPOSITS)	2.60 (4.20)	(0.60)							(87mm dia) TCR=100%		
5	Brownish grey very gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint. (SUPERFICIAL DEPOSITS)	3.40 (3.40)	(0.60)									
		4.00 (2.80)										
End of Borehole at 4.000m												

General Remarks:				Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Ground level has been inferred from topographical map.				Date	Strike	Casing	Time Elapsed	Standing	Remarks
				06-06-2016	2.40m	0.00m	20mins	2.41m	

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk			BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS05 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd			Lab. Ref: 16-72919				Hole Type WLS	
Contract: Hayling Billy Public House			Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25	
Location: 117 Elm Grove, Hayling Island							Logged By BG	
Ground Level (mAOD): 6.95		Co-ords: DNS		Date(s): 06-06-2016				

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing			Drill Run
								Depth	Type	Results	
	PAVING SLAB. CONCRETE.	0.06 (6.89)									Hand Dug Pit
	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	0.16 (6.79)									
1			(1.69)					1.00	SPT(S)	N=9 (0,0/2,1,3,3)	(117mm dia) TCR=100%
2	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	1.85 (5.10)	(0.60)				1.90 (D) 2.00	2.00	SPT(S)	N=27 (1,2/2,6,10,9)	
	Grey silty gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint. (SUPERFICIAL DEPOSITS)	2.45 (4.50)					2.55 (ES) 2.65				(102mm dia) TCR=100%
3	Loose greenish grey mottled brown silty SAND. (SUPERFICIAL DEPOSITS)	2.70 (4.25)	(0.90)					3.00	SPT(C)	N=5 (2,2/2,1,1,1)	
	Soft to firm brown mottled purplish grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	3.60 (3.35)	(0.40)								(87mm dia) TCR=100%
4	End of Borehole at 4.000m	4.00 (2.95)						4.00	SPT(C)	N=8 (2,1/1,2,2,3)	
5											

General Remarks:					Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.					Date	Strike	Casing	Time Elapsed	Standing	Remarks
					06-06-2016	2.50m	0.00m	20mins	2.43m	

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS06 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 16-72919				Hole Type WLS	
Contract: Hayling Billy Public House		Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25	
Location: 117 Elm Grove, Hayling Island						Logged By BG	
Ground Level (mAOD): 6.70		Co-ords: DNS		Date(s): 06-06-2016			

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing			Drill Run	
								Depth	Type	Results		
	TOPSOIL. Dark grey silty SAND with abundant rootlets.						0.00 (ES)					
	MADE GROUND. Greyish brown gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-rounded flint and brick. Rare rootlets noted.	0.11 (6.59)					0.11 (ES)					
	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	0.28 (6.42)					0.28 (ES)					
1			(1.47)				1.00 (D)	1.10	1.00	SPT(S)	N=13 (2,2/3,4,4)	Hand Dug Pit
	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	1.75 (4.95)	(0.65)						2.00	SPT(S)	N=37 (3,7/10,11,9,7)	(117mm dia) TCR=100%
	Grey silty gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint. (SUPERFICIAL DEPOSITS)	2.40 (4.30)										(102mm dia) TCR=100%
	Medium dense greenish grey SAND. (SUPERFICIAL DEPOSITS)	2.65 (4.05)	(0.55)						3.00	SPT(C)	N=16 (1,2/4,4,4,4)	
	Medium dense greyish brown very gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-angular flint. (SUPERFICIAL DEPOSITS)	3.20 (3.50)	(0.60)									(87mm dia) TCR=100%
	Soft dark grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	3.80 (2.90)							4.00	SPT(C)	N=9 (2,1/1,2,2,4)	
4	End of Borehole at 4.000m	4.00 (2.70)										
5												

General Remarks:					Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.					Date	Strike	Casing	Time Elapsed	Standing	Remarks
					06-06-2016	2.53m	0.00m	20mins	2.48m	

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS07 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 16-72919				Hole Type WLS	
Contract: Hayling Billy Public House		Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25	
Location: 117 Elm Grove, Hayling Island						Logged By BG	
Ground Level (mAOD): 6.80		Co-ords: DNS		Date(s): 07-06-2016			

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing			Drill Run
								Depth	Type	Results	
	BOUND MACADAM.	0.10 (6.70)					0.10 (ES)				Hand Dug Pit
	MADE GROUND. Grey mottled reddish brown gravelly SAND. Gravel comprises fine, medium and coarse; angular to sub-rounded brick, flint and bitumen.	0.53 (6.27)	(0.43)				0.53 (ES)				
1	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	1.70 (5.10)	(1.17)				1.00	1.00	SPT(S)	N=6 (1,1/1,1,2,2)	(117mm dia) TCR=100%
	Firm grey mottled orangish brown silty sandy CLAY. (SUPERFICIAL DEPOSITS)	2.00 (4.80)	(0.65)					2.00	SPT(C)	N=25 (4,4/7,7,6,5)	
2	Soft grey mottled brown silty sandy very gravelly CLAY. Gravel comprises fine, medium and coarse; angular to rounded flint. (SUPERFICIAL DEPOSITS)	2.65 (4.15)									(102mm dia) TCR=100%
	Grey occasionally mottled brown slightly silty SAND. (SUPERFICIAL DEPOSITS)	2.75 (4.05)	(0.55)								
3	Medium dense greenish grey occasionally mottled orangish brown SAND. Brown sand between 3.30m-3.60m. (SUPERFICIAL DEPOSITS)	3.30 (3.50)	(0.40)					3.00	SPT(C)	N=18 (3,3/5,4,4,5)	(87mm dia) TCR=100%
	Brown slightly gravelly SAND. SUPERFICIAL DEPOSITS	3.60 (3.20)									
4	Loose greenish grey occasionally mottled orangish brown gravelly SAND with rare cobbles noted. Gravel comprises fine, medium and coarse; angular to sub-rounded flint. (SUPERFICIAL DEPOSITS)	4.00 (2.80)						4.00	SPT(C)	N=8 (1,1/2,1,2,3)	
5	End of Borehole at 4.000m										

General Remarks:					Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.					Date	Strike	Casing	Time Elapsed	Standing	Remarks
					07-06-2016	2.74m	0.00m	20mins	2.73m	

 ACS Testing Ltd Tel: 01202 622858 Fax: 01202 625045 Email: testing@acstesting.co.uk www.acstesting.co.uk		BOREHOLE LOG WINDOWLESS SAMPLING				Borehole No. WS08 Sheet 1 of 1	
Client: McCarthy & Stone Retirement Lifestyles Ltd		Lab. Ref: 16-72919				Hole Type WLS	
Contract: Hayling Billy Public House		Drilling Equipment: Dando Terrier Heavy Duty Tracked Dynamic Percussion Rig				Scale 1:25	
Location: 117 Elm Grove, Hayling Island						Logged By BG	
Ground Level (mAOD): 7.40		Co-ords: DNS		Date(s): 07-06-2016			

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing		Drill Run
								Depth	Type	
	BOUND MACADAM.	0.10 (7.30)					0.10 (ES)			
	MADE GROUND. Grey mottled reddish brown silty sandy GRAVEL. Gravel comprised fine, medium and coarse; angular to sub-angular flint and brick. Pockets of sandy gravelly SILT noted.	0.37 (7.03)					0.37 (D)			Hand Dug Pit
1	Firm brown mottled grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)		(1.23)				1.00	1.00	SPT(S)	N=11 (2,5/3,3,2,3)
	Soft grey mottled orangish brown silty sandy gravelly CLAY. Gravel comprises fine, medium and coarse; angular to rounded flint. Very gravelly in places. (SUPERFICIAL DEPOSITS)	1.60 (5.80)	(0.40)							(117mm dia) TCR=100%
2	Medium dense grey silty very gravelly SAND. Gravel comprises fine, medium and coarse; angular to rounded flint. (SUPERFICIAL DEPOSITS)	2.00 (5.40)	(0.40)					2.00	SPT(C)	N=20 (8,9/6,4,6,4)
	Grey mottled brown SILT and SAND. (SUPERFICIAL DEPOSITS)	2.40 (5.00)								(102mm dia) TCR=100%
	Brown silty SAND. (SUPERFICIAL DEPOSITS)	2.65 (4.75)								
3	Very soft dark grey silty sandy CLAY. (SUPERFICIAL DEPOSITS)	2.90 (4.50)	(0.80)					3.00	SPT(C)	N=14 (3,8/6,3,3,2)
	Very soft purplish grey mottled grey silty sandy gravelly CLAY. Gravel comprises fine, medium and coarse; angular to sub-rounded flint. (SUPERFICIAL DEPOSITS)	3.70 (3.70)								(87mm dia) TCR=100%
4	End of Borehole at 4.000m	4.00 (3.40)						4.00	SPT(C)	N=5 (1,1/1,1,1,2)
5										

General Remarks:				Groundwater Observations:					
1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Coarse grained soil densities are based on SPT N Values. Ground level has been inferred from topographical map.				Date	Strike	Casing	Time Elapsed	Standing	Remarks
				07-06-2016	2.71m	0.00m	20mins	2.68m	



ACS Testing Ltd
Tel: 01202 622858
Fax: 01202 625045
Email: testing@acstesting.co.uk
www.acstesting.co.uk

TRIAL PIT LOG

Trial Pit No.

SA01

Sheet 1 of 1

Client	McCarthy & Stone Retirement Lifestyles Ltd	Depth (m):	2.40	Dimensions (m):	1.60 0.40	Lab Ref.	16-72919	Hole Type	TP
Site	Hayling Billy Public House					Plant Used:	JCB 3CX Excavator	Scale	1:20
Location	117 Elm Grove, Hayling Island							Logged By	BG
Ground Level (mAOD):	6.80	Co-ords:	DNS			Date(s)	06-06-2016		

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
	BOUND MACADAM.	0.07 (6.73)							
	MADE GROUND. Grey and brown gravelly SAND with rare brick cobbles. Gravel comprises brick and flint.		(0.33)						
	Soft to firm grey mottled brown sandy silty CLAY. Becoming less sandy with depth. (SUPERFICIAL DEPOSITS)	0.40 (6.40)							
1			(1.70)						
2	Light grey silty SAND. (SUPERFICIAL DEPOSITS)	2.10 (4.70)			▼				
	End of Trial Pit at 2.400m	2.40 (4.40)							
3									
4									

Groundwater: Seepage at 2.20m

Pit Stability: Stable

Remarks:

1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Infiltration testing undertaken within trial pit. Ground level has been inferred from topographical map.



ACS Testing Ltd
Tel: 01202 622858
Fax: 01202 625045
Email: testing@acstesting.co.uk
www.acstesting.co.uk

TRIAL PIT LOG

Trial Pit No.

SA02

Sheet 1 of 1

Client	McCarthy & Stone Retirement Lifestyles Ltd	Depth (m):	2.20	Dimensions (m):	1.80 0.40	Lab Ref.	16-72919	Hole Type	TP
Site	Hayling Billy Public House					Plant Used:	JCB 3CX Excavator	Scale	1:20
Location	117 Elm Grove, Hayling Island							Logged By	BG
Ground Level (mAOD):	6.80	Co-ords:	DNS			Date(s)	06-06-2016		

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Sample (Type) Depth	Testing		
							Depth	Type	Results
	BOUND MACADAM.								
	MADE GROUND. Brown very gravelly CLAY. Gravel comprises fine, medium and coarse; angular to sub-rounded flint.	0.12 (6.68)							
	MADE GROUND. Grey and brown gravelly SAND with rare brick cobbles. Gravel comprises brick and flint.	0.22 (6.58)							
	Soft to firm grey mottled brown sandy silty CLAY. Becoming less sandy with depth. (SUPERFICIAL DEPOSITS)	0.40 (6.40)							
1			(1.70)						
2	Light grey silty SAND. (SUPERFICIAL DEPOSITS)	2.10 (4.70)							
	End of Trial Pit at 2.200m	2.20 (4.60)							
3									
4									

Groundwater: Not encountered

Pit Stability: Stable

Remarks:

1. Fine grained soil consistencies have been determined by hand worked field tests as described in BS5930:2015. Ground level has been inferred from topographical map.

APPENDIX D

GEOTECHNICAL LABORATORY TEST CERTIFICATES

ACST – 16-73724



**CERTIFICATE OF TEST - DETERMINATION OF MOISTURE CONTENT
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CL 3.2.3.2**

Laboratory reference no(s) :	16-73724 - 271113	Head Office Certificate No :	271113-16-73724-S2
Client :	McCarthy & Stone Retirement Lifestyles Limited		
Certificate address :	4th Floor, 100 Holdenhurst Road Bournemouth, Dorset, BH8 8AQ		
Contract :	Hayling Island - Hayling Billy Pub		
Source of material (as indicated by client) :	in-situ		
Client reference/data :	WS03		
Location of sample on site :	1.20-1.30m		
Borehole/pit no / depth :	N/A @ N/A m		
Date sampled :	07/06/2016		
Sampled by :			
Date received :	10/06/2016		
Material description :	Brown silty sandy CLAY		
Total mass received :	1.94 kg		
Method of preparation :	BS 1377 : Part 1 & Part 2 : 1990		
Variation from test procedure :	None		
Location & orientation of test specimen within original sample :	N/A		
Sampling certificate :	No - None Submitted		
Client's indicated specification(s) :			

The test specimen was oven dried at : **108** °C

Moisture content : **23** %

Remarks : **NONE**

Tested by : **SAS** Date tested : **11.06.2016** Approved : *Andy Bates* **Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention

Any statement of compliance with a given specification relates only to the test covered by this certificate.

Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation

This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



**CERTIFICATE OF TEST - DETERMINATION OF LIQUID/PLASTIC LIMIT, PLASTICITY/LIQUIDITY INDEX
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CLAUSE 4.3 & 5.0**

Laboratory reference no(s) : **16-73724 - 271113** Head Office Certificate No : **271113-16-73724-S4**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
Certificate address : **4th Floor, 100 Holdenhurst Road
Bournemouth
Dorset
BH8 8AQ**

Contract : **Hayling Island - Hayling Billy Pub**
Source of material (as indicated by client) : **in-situ**
Client reference/data : **WS03**
Location of sample on site : **1.20-1.30m**
Borehole/pit no / depth : **N/A @ N/A m**
Date sampled : **07/06/2016**
Sampled by :
Date received : **10/06/2016**
Material description : **Brown silty sandy CLAY**
Total mass received : **1.94 kg**
Method of preparation : **BS 1377 : Part 1 & Part 2**
Variation from test procedure : **None**
Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
Client's indicated specification(s) : **Data not supplied**

Soil tested in natural condition (BS 1377:Part 2:1990 Clause 4.2.3)

Proportion of material retained on 425 µm test sieve	:	1	%
Proportion of material passing 425 µm test sieve	:	99	%
Plastic limit	:	16	%
Liquid limit	:	38	%
Plasticity index	:	22	%
Liquidity index	:	0.329	

Remarks : **No compliance statement given as no client's indicated specification details submitted.**

Tested by : **DHMJKSAS** Date tested : **15.06.2016** Approved : **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention
Any statement of compliance with a given specification relates only to the test covered by this certificate.
Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation
This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



**Quality Testing & Materials Consultancy
to the
Construction Industry**



CERTIFICATE OF TEST - DETERMINATION OF MOISTURE CONTENT
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CL 3.2.3.2

Laboratory reference no(s) :	16-73724 - 271114	Head Office Certificate No :	271114-16-73724-S2
Client :	McCarthy & Stone Retirement Lifestyles Limited		
Certificate address :	4th Floor, 100 Holdenhurst Road Bournemouth, Dorset, BH8 8AQ		
Contract :	Hayling Island - Hayling Billy Pub		
Source of material (as indicated by client) :	in-situ		
Client reference/data :	WS04		
Location of sample on site :	1.10-1.20m		
Borehole/pit no / depth :	N/A @ N/A m		
Date sampled :	07/06/2016		
Sampled by :			
Date received :	10/06/2016		
Material description :	Brown silty sandy CLAY		
Total mass received :	2.16 kg		
Method of preparation :	BS 1377 : Part 1 & Part 2 : 1990		
Variation from test procedure :	None		
Location & orientation of test specimen within original sample :	N/A		
Sampling certificate :	No - None Submitted		
Client's indicated specification(s) :			

The test specimen was oven dried at : **108** °C

Moisture content : **22** %

Remarks : **NONE**

Tested by : **DHSAS** Date tested : **11.06.2016** Approved :  **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention

Any statement of compliance with a given specification relates only to the test covered by this certificate.

Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation

This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



**CERTIFICATE OF TEST - DETERMINATION OF LIQUID/PLASTIC LIMIT, PLASTICITY/LIQUIDITY INDEX
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CLAUSE 4.3 & 5.0**

Laboratory reference no(s) : **16-73724 - 271114** Head Office Certificate No : **271114-16-73724-S4**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
Certificate address : **4th Floor, 100 Holdenhurst Road
Bournemouth
Dorset
BH8 8AQ**

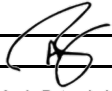
Contract : **Hayling Island - Hayling Billy Pub**
Source of material (as indicated by client) : **in-situ**
Client reference/data : **WS04**
Location of sample on site : **1.10-1.20m**
Borehole/pit no / depth : **N/A @ N/A m**
Date sampled : **07/06/2016**
Sampled by :
Date received : **10/06/2016**
Material description : **Brown silty sandy CLAY**
Total mass received : **2.16 kg**
Method of preparation : **BS 1377 : Part 1 & Part 2**
Variation from test procedure : **None**
Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
Client's indicated specification(s) : **Data not supplied**

Soil tested in natural condition (BS 1377:Part 2:1990 Clause 4.2.3)

Proportion of material retained on 425 µm test sieve	:	1	%
Proportion of material passing 425 µm test sieve	:	99	%
Plastic limit	:	14	%
Liquid limit	:	34	%
Plasticity index	:	20	%
Liquidity index	:	0.411	

Remarks : **No compliance statement given as no client's indicated specification details submitted.**

Tested by : **DHDPAMJKSAS** Date tested : **15.06.2016** Approved :  **Andy Bates Laboratory Manager** Date : **28/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention
Any statement of compliance with a given specification relates only to the test covered by this certificate.
Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation
This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



CERTIFICATE OF TEST - DETERMINATION OF MOISTURE CONTENT
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CL 3.2.3.1

Laboratory reference no(s) : **16-73724 - 271115** Head Office Certificate No : **271115-16-73724-S2**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
 Certificate address : **4th Floor, 100 Holdenhurst Road
 Bournemouth, Dorset, BH8 8AQ**

Contract : **Hayling Island - Hayling Billy Pub**
 Source of material (as indicated by client) : **in-situ**
 Client reference/data : **WS05**
 Location of sample on site : **1.90-2.00m**
 Borehole/pit no / depth : **N/A @ N/A m**
 Date sampled : **07/06/2016**
 Sampled by :
 Date received : **10/06/2016**
 Material description : **Grey silty sandy CLAY**
 Total mass received : **1.98 kg**
 Method of preparation : **BS 1377 : Part 1 & Part 2 : 1990**
 Variation from test procedure : **None**
 Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
 Client's indicated specification(s) :

The test specimen was oven dried at : **108** °C

Moisture content : **7.7** %

Remarks : **NONE**

Tested by : **DHSAS** Date tested : **16.06.2016** Approved : 
 Andy Bates Laboratory Manager Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention

Any statement of compliance with a given specification relates only to the test covered by this certificate.

Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation

This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Testing Limited
 Registered in England and
 Wales No. 4639658



*Quality Testing & Materials Consultancy
 to the
 Construction Industry*



**CERTIFICATE OF TEST - DETERMINATION OF LIQUID/PLASTIC LIMIT, PLASTICITY/LIQUIDITY INDEX
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CLAUSE 4.3 & 5.0**

Laboratory reference no(s) : **16-73724 - 271115** Head Office Certificate No : **271115-16-73724-S4**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
Certificate address : **4th Floor, 100 Holdenhurst Road
Bournemouth
Dorset
BH8 8AQ**

Contract : **Hayling Island - Hayling Billy Pub**
Source of material (as indicated by client) : **in-situ**
Client reference/data : **WS05**
Location of sample on site : **1.90-2.00m**
Borehole/pit no / depth : **N/A @ N/A m**
Date sampled : **07/06/2016**
Sampled by :
Date received : **10/06/2016**
Material description : **Grey silty sandy CLAY**
Total mass received : **1.98 kg**
Method of preparation : **BS 1377 : Part 1 & Part 2**
Variation from test procedure : **None**
Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
Client's indicated specification(s) : **Data not supplied**

Soil tested in natural condition (BS 1377:Part 2:1990 Clause 4.2.3)

Proportion of material retained on 425 µm test sieve	:	0	%
Proportion of material passing 425 µm test sieve	:	100	%
Plastic limit	:	13	%
Liquid limit	:	39	%
Plasticity index	:	26	%
Liquidity index	:	-0.204	

Remarks : **No compliance statement given as no client's indicated specification details submitted.**

Tested by : **DHDPAMJK** Date tested : **15.06.2016** Approved : **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention
Any statement of compliance with a given specification relates only to the test covered by this certificate.
Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation
This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



**Quality Testing & Materials Consultancy
to the
Construction Industry**



CERTIFICATE OF TEST - DETERMINATION OF MOISTURE CONTENT
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CL 3.2.3.2

Laboratory reference no(s) :	16-73724 - 271116	Head Office Certificate No :	271116-16-73724-S2
Client :	McCarthy & Stone Retirement Lifestyles Limited		
Certificate address :	4th Floor, 100 Holdenhurst Road Bournemouth, Dorset, BH8 8AQ		
Contract :	Hayling Island - Hayling Billy Pub		
Source of material (as indicated by client) :	in-situ		
Client reference/data :	WS06		
Location of sample on site :	1.00-1.10m		
Borehole/pit no / depth :	N/A @ N/A m		
Date sampled :	07/06/2016		
Sampled by :			
Date received :	10/06/2016		
Material description :	Brown silty sandy CLAY		
Total mass received :	1.80 kg		
Method of preparation :	BS 1377 : Part 1 & Part 2 : 1990		
Variation from test procedure :	None		
Location & orientation of test specimen within original sample :	N/A		
Sampling certificate :	No - None Submitted		
Client's indicated specification(s) :			

The test specimen was oven dried at : **108** °C

Moisture content : **20** %

Remarks : **NONE**

Tested by : **DHSAS** Date tested : **11.06.2016** Approved :  **Andy Bates Laboratory Manager** Date : **28/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention

Any statement of compliance with a given specification relates only to the test covered by this certificate.

Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation

This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



**CERTIFICATE OF TEST - DETERMINATION OF LIQUID/PLASTIC LIMIT, PLASTICITY/LIQUIDITY INDEX
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CLAUSE 4.3 & 5.0**

Laboratory reference no(s) : **16-73724 - 271116** Head Office Certificate No : **271116-16-73724-S4**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
Certificate address : **4th Floor, 100 Holdenhurst Road
Bournemouth
Dorset
BH8 8AQ**

Contract : **Hayling Island - Hayling Billy Pub**
Source of material (as indicated by client) : **in-situ**
Client reference/data : **WS06**
Location of sample on site : **1.00-1.10m**
Borehole/pit no / depth : **N/A @ N/A m**
Date sampled : **07/06/2016**
Sampled by :
Date received : **10/06/2016**
Material description : **Brown silty sandy CLAY**
Total mass received : **1.80 kg**
Method of preparation : **BS 1377 : Part 1 & Part 2**
Variation from test procedure : **None**
Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
Client's indicated specification(s) : **Data not supplied**

Soil tested in natural condition (BS 1377:Part 2:1990 Clause 4.2.3)

Proportion of material retained on 425 µm test sieve	:	1	%
Proportion of material passing 425 µm test sieve	:	99	%
Plastic limit	:	16	%
Liquid limit	:	34	%
Plasticity index	:	18	%
Liquidity index	:	0.233	

Remarks : **No compliance statement given as no client's indicated specification details submitted.**

Tested by : **DHDPAMJKSAS** Date tested : **15.06.2016** Approved : **Andy Bates Laboratory Manager** Date : **28/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention
Any statement of compliance with a given specification relates only to the test covered by this certificate.
Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation
This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



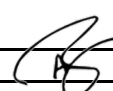
CERTIFICATE OF TEST - DETERMINATION OF MOISTURE CONTENT
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CL 3.2.3.2

Laboratory reference no(s) :	16-73724 - 271117	Head Office Certificate No :	271117-16-73724-S2
Client :	McCarthy & Stone Retirement Lifestyles Limited		
Certificate address :	4th Floor, 100 Holdenhurst Road Bournemouth, Dorset, BH8 8AQ		
Contract :	Hayling Island - Hayling Billy Pub		
Source of material (as indicated by client) :	in-situ		
Client reference/data :	WS07		
Location of sample on site :	0.53-1.00m		
Borehole/pit no / depth :	N/A @ N/A m		
Date sampled :	07/06/2016		
Sampled by :			
Date received :	10/06/2016		
Material description :	Brown silty sandy CLAY		
Total mass received :	1.57 kg		
Method of preparation :	BS 1377 : Part 1 & Part 2 : 1990		
Variation from test procedure :	None		
Location & orientation of test specimen within original sample :	N/A		
Sampling certificate :	No - None Submitted		
Client's indicated specification(s) :			

The test specimen was oven dried at : **108** °C

Moisture content : **23** %

Remarks : **NONE**

Tested by : **DHSAS** Date tested : **11.06.2016** Approved :  **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention

Any statement of compliance with a given specification relates only to the test covered by this certificate.

Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation

This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



**CERTIFICATE OF TEST - DETERMINATION OF LIQUID/PLASTIC LIMIT, PLASTICITY/LIQUIDITY INDEX
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CLAUSE 4.3 & 5.0**

Laboratory reference no(s) : **16-73724 - 271117** Head Office Certificate No : **271117-16-73724-S4**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
Certificate address : **4th Floor, 100 Holdenhurst Road
Bournemouth
Dorset
BH8 8AQ**

Contract : **Hayling Island - Hayling Billy Pub**
Source of material (as indicated by client) : **in-situ**
Client reference/data : **WS07**
Location of sample on site : **0.53-1.00m**
Borehole/pit no / depth : **N/A @ N/A m**
Date sampled : **07/06/2016**
Sampled by :
Date received : **10/06/2016**
Material description : **Brown silty sandy CLAY**
Total mass received : **1.57 kg**
Method of preparation : **BS 1377 : Part 1 & Part 2**
Variation from test procedure : **None**
Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
Client's indicated specification(s) : **Data not supplied**

Soil tested in natural condition (BS 1377:Part 2:1990 Clause 4.2.3)

Proportion of material retained on 425 µm test sieve	:	1	%
Proportion of material passing 425 µm test sieve	:	99	%
Plastic limit	:	16	%
Liquid limit	:	46	%
Plasticity index	:	30	%
Liquidity index	:	0.241	

Remarks : **No compliance statement given as no client's indicated specification details submitted.**

Tested by : **DHMJKSAS** Date tested : **15.06.2016** Approved : **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention
Any statement of compliance with a given specification relates only to the test covered by this certificate.
Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation
This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



**Quality Testing & Materials Consultancy
to the
Construction Industry**



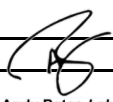
CERTIFICATE OF TEST - DETERMINATION OF MOISTURE CONTENT
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CL 3.2.3.2

Laboratory reference no(s) :	16-73724 - 271118	Head Office Certificate No :	271118-16-73724-S2
Client :	McCarthy & Stone Retirement Lifestyles Limited		
Certificate address :	4th Floor, 100 Holdenhurst Road Bournemouth, Dorset, BH8 8AQ		
Contract :	Hayling Island - Hayling Billy Pub		
Source of material (as indicated by client) :	in-situ		
Client reference/data :	WS08		
Location of sample on site :	0.37-1.00m		
Borehole/pit no / depth :	N/A @ N/A m		
Date sampled :	07/06/2016		
Sampled by :			
Date received :	10/06/2016		
Material description :	Brown silty sandy CLAY		
Total mass received :	1.68 kg		
Method of preparation :	BS 1377 : Part 1 & Part 2 : 1990		
Variation from test procedure :	None		
Location & orientation of test specimen within original sample :	N/A		
Sampling certificate :	No - None Submitted		
Client's indicated specification(s) :			

The test specimen was oven dried at : **108** °C

Moisture content : **25** %

Remarks : **NONE**

Tested by : **SAS** Date tested : **11.06.2016** Approved :  **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention

Any statement of compliance with a given specification relates only to the test covered by this certificate.

Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation

This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Testing Limited
Registered in England and
Wales No. 4639658



*Quality Testing & Materials Consultancy
to the
Construction Industry*



**CERTIFICATE OF TEST - DETERMINATION OF LIQUID/PLASTIC LIMIT, PLASTICITY/LIQUIDITY INDEX
TESTED IN ACCORDANCE WITH B.S. 1377 : PART 2 : 1990 : CLAUSE 4.3 & 5.0**

Laboratory reference no(s) : **16-73724 - 271118** Head Office Certificate No : **271118-16-73724-S4**

Client : **McCarthy & Stone Retirement Lifestyles Limited**
 Certificate address : **4th Floor, 100 Holdenhurst Road
 Bournemouth
 Dorset
 BH8 8AQ**

Contract : **Hayling Island - Hayling Billy Pub**
 Source of material (as indicated by client) : **in-situ**
 Client reference/data : **WS08**
 Location of sample on site : **0.37-1.00m**
 Borehole/pit no / depth : **N/A @ N/A m**
 Date sampled : **07/06/2016**
 Sampled by :
 Date received : **10/06/2016**
 Material description : **Brown silty sandy CLAY**
 Total mass received : **1.68 kg**
 Method of preparation : **BS 1377 : Part 1 & Part 2**
 Variation from test procedure : **None**
 Location & orientation of test specimen within original sample : **N/A**

Sampling certificate : **No - None Submitted**
 Client's indicated specification(s) : **Data not supplied**

Soil washed through 425 µm test sieve (B.S. 1377 : Part 2 : 1990 Clause 4.2.4)

Proportion of material retained on 425 µm test sieve	:	8	%
Proportion of material passing 425 µm test sieve	:	92	%

Plastic limit	:	15	%
Liquid limit	:	45	%
Plasticity index	:	30	%
Liquidity index	:	0.406	

Remarks : **No compliance statement given as no client's indicated specification details submitted.**

Tested by : **DHMJKSAS** Date tested : **22.06.2016** Approved : **Andy Bates Laboratory Manager** Date : **23/06/2016**

Bulk samples will be retained for a minimum of 21 days from date of receipt unless a written instruction is received within 14 days of receipt requesting sample retention
 Any statement of compliance with a given specification relates only to the test covered by this certificate.
 Opinions and interpretations, if stated, are not within the scope of our UKAS accreditation
 This report shall not be reproduced, except in full, without prior written approval of the laboratory

Page 1 of 1

Head Office

Unit 14
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE

Tel 01202 622858
Fax 01202 626046

Registered Office

Unit 14
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Testing Limited
 Registered in England and
 Wales No. 4639658



Quality Testing & Materials Consultancy
 to the
Construction Industry



APPENDIX E

INFILTRATION TEST CERTIFICATE

SA01



SOIL INFILTRATION RATE

In accordance with BRE Digest 365 "Soakaway Design"

Job Reference : 16-72919

Client : McCarthy & Stone Retirement Lifestyles Ltd

Client Reference : SA01

Site : Hayling Billy Public House

Test Number : 1

Location : 117 Elm Grove, Hayling Island

Date Tested :

06/06/2016

Technician :

BG

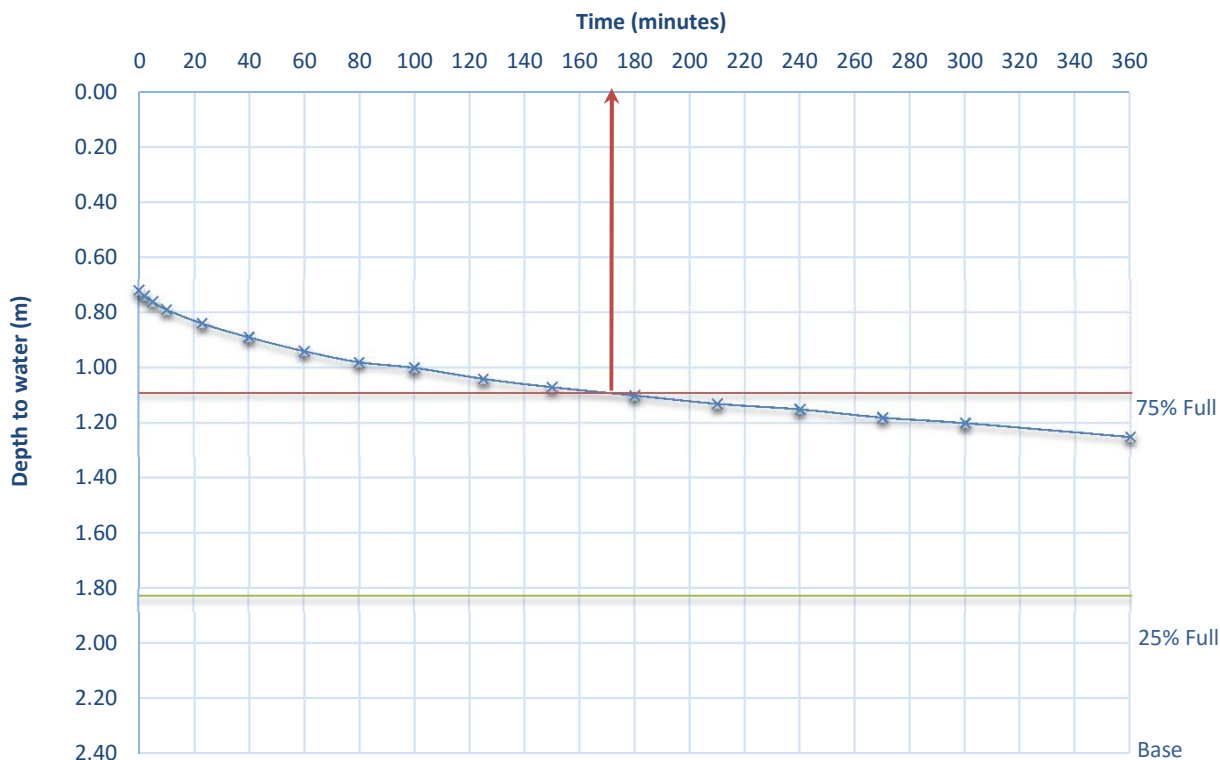
Weather :

Sunny

Parameters	
Length	1.60 m
Breadth	0.40 m
Depth	2.20 m
Water Level	0.72 m
Max Eff. Depth	1.48 m
V_{p75-25}	0.47 m ³
a_{p50}	3.60 m ²
t_{p75-25}	n/a s
p75%	1.09 m
p25%	1.83 m

Time Elapsed		Depth to Water (m)
Minutes	Seconds	
0	0	0.72
2	120	0.74
5	300	0.76
10	600	0.79
23	1380	0.84
40	2400	0.89
60	3600	0.94
80	4800	0.98
100	6000	1.00
125	7500	1.04
150	9000	1.07
180	10800	1.10
210	12600	1.13
240	14400	1.15
270	16200	1.18
300	18000	1.20
360	21600	1.25

Time to drain	Minutes	Seconds
75%	n/a	n/a
25%	n/a	n/a



Remarks:

Infiltration rate unable to be calculated due to 25% full not being reached.

Soil Infiltration Rate

=

X ms⁻¹

Approved by: R J Holloway Principal Geo-Environmental Engineer

Date : 07/07/2016



APPENDIX F

ENVIRONMENTAL LABORATORY TEST CERTIFICATES

ACSE – 16-05026-01
ACSE – 16-05026-01-WAC
CatWasteSoil – Output Sheets



Certificate of Analysis

Certificate Number : 16-05026-Issue 1-Page: 1

Report Fao: GEO RESULTS
Site Address: Hayling Island - Hayling Billy Pub
Client Order No: 16-73724
Date of Sampling: 07/06/2016
Date Received: 10/06/2016
Report Date: 23/06/2016

Please find your certificates of test attached for your samples received in the laboratory on 10/06/2016 under our laboratory reference 16-05026.

Remarks:

None

Results reviewed by:



David Redfern Technical Supervisor

Test Certificates approved by:



Mark Rowley Laboratory 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.*

Head Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 628680
Fax 01202 628642

Registered Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

**Quality Testing & Materials Consultancy
to the
Construction Industry**

ACSE Sample Number Sample ID	22740 271097 - 16-73724	22741 271098 - 16-73724	22742 271099 - 16-73724
Clients Sample Ref.	WS01	WS03	WS03
Location / Sample Depth (m)	0.08-0.45m	0.08-0.30m	1.10-1.20m
Date Sampled Time Sampled	07/06/2016	06/06/2016	06/06/2016
Sample deviating codes	g	g	g
Client's Sample Description			
ACS Testing Material Description	Grey/brown gravelly SAND GRAVEL	Brown silty sandy GR AVEL GRAVEL	Brown silty sandy CL AY CLAY
Principal Matrix (as received)			

Determination	Units	Method	Result	AS	Result	AS	Result	AS
Anions								
Water Soluble Sulphate	mg/l	MT/ACSE/204	AD	-----	-----		-----	
BTEX								
Benzene	mg/kg	MT/ACSE/101	AR	-----	< 0.10	*g	< 0.10	*g
Ethylbenzene	mg/kg	MT/ACSE/101	AR	-----	< 0.10	*g	< 0.10	*g
m+p-xylene	mg/kg	MT/ACSE/101	AR	-----	< 0.19	*g	< 0.19	*g
o-xylene	mg/kg	MT/ACSE/101	AR	-----	< 0.10	*g	< 0.10	*g
Toluene	mg/kg	MT/ACSE/101	AR	-----	< 0.10	*g	< 0.10	*g
Total BTEX	mg/kg	MT/ACSE/101	AR	-----	< 0.50	*g	< 0.50	*g
Carbon								
FOC	%	MT/ACSE/102	AR	0.0132		0.0034		0.0027
Soil Organic Matter	%	MT/ACSE/102	AR	2.28		0.59		0.47
TOC (Total Organic Carbon)	%	MT/ACSE/102	AR	-----		0.34	*	0.27
Loss on Ignition								
Loss on Ignition (440 °C)	%	MT/ACSE/302	AD	-----		2.3	*	1.6
Metals (Soil)								
Arsenic	mg/kg	MT/ACSE/201	AD	< 0.20	*	< 0.20	*	< 0.20
Cadmium	mg/kg	MT/ACSE/201	AD	< 0.01	*	0.07	*	< 0.01
Chromium	mg/kg	MT/ACSE/201	AD	22.9	*	115	*	36.4
Copper	mg/kg	MT/ACSE/201	AD	22.2	*	13.4	*	10.2
Mercury	mg/kg	MT/ACSE/202	AD	0.10	*	0.04	*	0.01
Nickel	mg/kg	MT/ACSE/201	AD	13.9	*	26.4	*	22.8
Lead	mg/kg	MT/ACSE/201	AD	269	*	27.6	*	12.6
Selenium	mg/kg	MT/ACSE/201	AD	< 0.40	*	< 0.40	*	< 0.40
Zinc	mg/kg	MT/ACSE/201	AD	126	*	66.0	*	41.1
Chromium III	mg/kg	NAM/ACSE/X11	AD	22.9		115		36.4
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00
Petroleum Hydrocarbons								
Total TPH (C10-C40)	mg/kg	MT/ACSE/105	AR	-----		1110	*g	< 50.0
pH and Conductivity								
pH (@ 20 °C)	units	MT/ACSE/301	AD	9.5	*g	8.5	*g	8.3
Poly Aromatic Hydrocarbons								
Naphthalene	mg/kg	MT/ACSE/106	AD	0.25	*g	0.20	*g	< 0.10
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.77	*g	< 0.10	*g	< 0.10
Acenaphthene	mg/kg	MT/ACSE/106	AD	0.46	*g	0.19	*g	< 0.10
Fluorene	mg/kg	MT/ACSE/106	AD	0.85	*g	0.21	*g	< 0.10
Phenanthrene	mg/kg	MT/ACSE/106	AD	8.03	*g	0.89	*g	0.27
Anthracene	mg/kg	MT/ACSE/106	AD	2.65	*g	0.43	*g	< 0.10
Fluoranthene	mg/kg	MT/ACSE/106	AD	14.6	*g	1.15	*g	0.33
Pyrene	mg/kg	MT/ACSE/106	AD	14.0	*g	0.78	*g	0.22
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	10.2	*g	0.51	*g	0.17
Chrysene	mg/kg	MT/ACSE/106	AD	7.68	*g	0.41	*g	0.11
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	8.94	*g	0.51	*g	0.12
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	3.62	*g	0.19	*g	< 0.10

Head Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 Tel 01202 628680
 Fax 01202 628680

Registered Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

**Quality Testing & Materials Consultancy
 to the
 Construction Industry**

ACSE Sample Number Sample ID	22740 271097 - 16-73724	22741 271098 - 16-73724	22742 271099 - 16-73724
Clients Sample Ref.	WS01	WS03	WS03
Location / Sample Depth (m)	0.08-0.45m	0.08-0.30m	1.10-1.20m
Date Sampled Time Sampled	07/06/2016	06/06/2016	06/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Grey/brown gravelly SAND GRAVEL	Brown silty sandy GR AVEL GRAVEL	Brown silty sandy CL AY CLAY

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	6.67	*g	0.26	*g	< 0.10	*g
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	3.35	*g	0.19	*g	< 0.10	*g
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	0.46	*g	< 0.10	*g	< 0.10	*g
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	3.81	*g	0.22	*g	< 0.10	*g
Total PAH	mg/kg	MT/ACSE/106	AD	86.4	*g	6.16	*g	< 2.00	*g

Polychlorinated Biphenyls (PCBs)

PCB (7 Congeners)	mg/kg	MT/ACSE/104	AD	-----		< 1.00	*	< 1.00	*
-------------------	-------	-------------	----	-------	--	--------	---	--------	---

Speciated BTEX

MTBE	mg/kg	NAM/ACSE/X12	AR	0.06		< 0.05		0.08	
Hexane	mg/kg	NAM/ACSE/X06	AR	0.11		0.06		0.15	
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	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	0.16		0.06		0.23	

Speciated Petroleum Hydrocarbons

C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	0.11		< 0.10		0.15	
>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		103		< 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	12.5		< 10.0		< 10.0	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	65.0		< 10.0		< 10.0	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	366		303		63.5	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	443		405		63.7	

ACSE Sample Number Sample ID	22743 271100 - 16-73724	22744 271101 - 16-73724	22745 271102 - 16-73724
Clients Sample Ref.	WS04	WS05	WS06
Location / Sample Depth (m)	0.52-1.00m	2.55-2.65m	0.00-0.11m
Date Sampled Time Sampled	06/06/2016	06/06/2016	06/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Brown silty sandy CL AY CLAY	Grey silty gravelly SAND SAND	TOPSOIL Grey silty S AND LOAM

Determination	Units	Method	Result	AS	Result	AS	Result	AS
Anions								
Water Soluble Sulphate	mg/l	MT/ACSE/204	AD	----	----	----	----	----
BTEX								
Benzene	mg/kg	MT/ACSE/101	AR	----	----	----	----	----
Ethylbenzene	mg/kg	MT/ACSE/101	AR	----	----	----	----	----
m+p-xylene	mg/kg	MT/ACSE/101	AR	----	----	----	----	----
o-xylene	mg/kg	MT/ACSE/101	AR	----	----	----	----	----
Toluene	mg/kg	MT/ACSE/101	AR	----	----	----	----	----
Total BTEX	mg/kg	MT/ACSE/101	AR	----	----	----	----	----
Carbon								
FOC	%	MT/ACSE/102	AR	0.0022		0.0000		0.0593
Soil Organic Matter	%	MT/ACSE/102	AR	0.38		< 0.01		10.2
TOC (Total Organic Carbon)	%	MT/ACSE/102	AR	----		----		----
Loss on Ignition								
Loss on Ignition (440 °C)	%	MT/ACSE/302	AD	----		----		----
Metals (Soil)								
Arsenic	mg/kg	MT/ACSE/201	AD	< 0.20	*	< 0.20	*#	21.9
Cadmium	mg/kg	MT/ACSE/201	AD	0.27	*	< 0.01	*#	0.37
Chromium	mg/kg	MT/ACSE/201	AD	49.2	*	9.26	*#	62.4
Copper	mg/kg	MT/ACSE/201	AD	12.5	*	1.05	*#	68.0
Mercury	mg/kg	MT/ACSE/202	AD	0.03	*#	< 0.01	*#	0.05
Nickel	mg/kg	MT/ACSE/201	AD	25.8	*	1.66	*#	15.2
Lead	mg/kg	MT/ACSE/201	AD	19.3	*	4.64	*#	107
Selenium	mg/kg	MT/ACSE/201	AD	< 0.40	*	1.10	*#	< 0.40
Zinc	mg/kg	MT/ACSE/201	AD	51.3	*	5.63	*#	204
Chromium III	mg/kg	NAM/ACSE/X11	AD	49.2		9.26		62.4
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00
Petroleum Hydrocarbons								
Total TPH (C10-C40)	mg/kg	MT/ACSE/105	AR	----		----		----
pH and Conductivity								
pH (@ 20 °C)	units	MT/ACSE/301	AD	8.1	*g	8.8	*g	7.1
Poly Aromatic Hydrocarbons								
Naphthalene	mg/kg	MT/ACSE/106	AD	0.14	*g	< 0.10	*#g	0.37
Acenaphthylene	mg/kg	MT/ACSE/106	AD	< 0.10	*g	< 0.10	*#g	< 0.10
Acenaphthene	mg/kg	MT/ACSE/106	AD	< 0.10	*g	< 0.10	*#g	< 0.10
Fluorene	mg/kg	MT/ACSE/106	AD	< 0.10	*g	< 0.10	*#g	< 0.10
Phenanthrene	mg/kg	MT/ACSE/106	AD	0.49	*g	< 0.10	*#g	0.21
Anthracene	mg/kg	MT/ACSE/106	AD	0.24	*g	< 0.10	*#g	0.11
Fluoranthene	mg/kg	MT/ACSE/106	AD	1.48	*g	0.14	*#g	0.66
Pyrene	mg/kg	MT/ACSE/106	AD	1.14	*g	< 0.10	*#g	0.47
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	0.95	*g	< 0.10	*#g	0.48
Chrysene	mg/kg	MT/ACSE/106	AD	0.58	*g	< 0.10	*#g	0.32
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	0.97	*g	0.11	*#g	0.59

Head Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 Tel 01202 628680
 Fax 01202 628680

Registered Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

Quality Testing & Materials Consultancy
 to the
 Construction Industry

ACSE Sample Number Sample ID	22743 271100 - 16-73724	22744 271101 - 16-73724	22745 271102 - 16-73724
Clients Sample Ref.	WS04	WS05	WS06
Location / Sample Depth (m)	0.52-1.00m	2.55-2.65m	0.00-0.11m
Date Sampled Time Sampled	06/06/2016	06/06/2016	06/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Brown silty sandy CL AY CLAY	Grey silty gravelly SAND SAND	TOPSOIL Grey silty S AND LOAM

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	0.39	*g	< 0.10	*#g	0.20	*#g
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	0.33	*g	< 0.10	*#g	0.38	*#g
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	0.38	*g	< 0.10	*#g	0.26	*#g
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	< 0.10	*g	< 0.10	*#g	< 0.10	*#g
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	0.41	*g	< 0.10	*#g	0.30	*#g
Total PAH	mg/kg	MT/ACSE/106	AD	7.49	*g	< 2.00	*#g	4.35	*#g

Polychlorinated Biphenyls (PCBs)

PCB (7 Congeners)	mg/kg	MT/ACSE/104	AD	----		----		----	
-------------------	-------	-------------	----	------	--	------	--	------	--

Speciated BTEX

MTBE	mg/kg	NAM/ACSE/X12	AR	0.06		< 0.05		0.06	
Hexane	mg/kg	NAM/ACSE/X06	AR	0.11		0.09		0.11	
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		0.07	
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	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	0.17		0.09		0.25	

Speciated Petroleum Hydrocarbons

C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	0.11		< 0.10		0.11	
>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	42.3		27.5		38.8	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	42.4		27.5		38.9	

ACSE Sample Number Sample ID	22746 271103 - 16-73724	22747 271104 - 16-73724	22748 271105 - 16-73724
Clients Sample Ref.	WS06	WS07	WS07
Location / Sample Depth (m)	0.11-0.28m	0.10-0.53m	0.53-1.00m
Date Sampled Time Sampled	06/06/2016	06/06/2016	07/06/2016
Sample deviating codes	g	g	g
Client's Sample Description			
ACS Testing Material Description	Grey brown gravelly SAND LOAM	Grey / reddish brown gravelly SAND SAND	Brown silty sandy CL AY CLAY
Principal Matrix (as received)			

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Anions									
Water Soluble Sulphate	mg/l	MT/ACSE/204	AD	----		----		----	
BTEX									
Benzene	mg/kg	MT/ACSE/101	AR	----		----		----	
Ethylbenzene	mg/kg	MT/ACSE/101	AR	----		----		----	
m+p-xylene	mg/kg	MT/ACSE/101	AR	----		----		----	
o-xylene	mg/kg	MT/ACSE/101	AR	----		----		----	
Toluene	mg/kg	MT/ACSE/101	AR	----		----		----	
Total BTEX	mg/kg	MT/ACSE/101	AR	----		----		----	
Carbon									
FOC	%	MT/ACSE/102	AR	0.0325		0.0183		0.0034	
Soil Organic Matter	%	MT/ACSE/102	AR	5.60		3.15		0.59	
TOC (Total Organic Carbon)	%	MT/ACSE/102	AR	----		----		----	
Loss on Ignition									
Loss on Ignition (440 °C)	%	MT/ACSE/302	AD	----		----		----	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	10.6	*#	< 0.20	*#	< 0.20	*
Cadmium	mg/kg	MT/ACSE/201	AD	0.23	*#	< 0.01	*#	0.32	*
Chromium	mg/kg	MT/ACSE/201	AD	43.7	*#	26.2	*#	44.8	*
Copper	mg/kg	MT/ACSE/201	AD	54.1	*#	78.5	*#	14.2	*
Mercury	mg/kg	MT/ACSE/202	AD	0.05	*#	0.18	*#	0.03	*#
Nickel	mg/kg	MT/ACSE/201	AD	13.8	*#	15.6	*#	21.0	*
Lead	mg/kg	MT/ACSE/201	AD	84.4	*#	328	*#	45.1	*
Selenium	mg/kg	MT/ACSE/201	AD	< 0.40	*#	< 0.40	*#	< 0.40	*
Zinc	mg/kg	MT/ACSE/201	AD	138	*#	206	*#	60.8	*
Chromium III	mg/kg	NAM/ACSE/X11	AD	43.7		26.2		44.8	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		< 1.00		< 1.00	
Petroleum Hydrocarbons									
Total TPH (C10-C40)	mg/kg	MT/ACSE/105	AR	----		----		----	
pH and Conductivity									
pH (@ 20°C)	units	MT/ACSE/301	AD	7.4	*g	8.2	*g	8.1	*g
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.34	*#g	0.29	*#g	0.17	*g
Acenaphthylene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	< 0.10	*#g	< 0.10	*g
Acenaphthene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	0.16	*#g	< 0.10	*g
Fluorene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	0.16	*#g	< 0.10	*g
Phenanthrene	mg/kg	MT/ACSE/106	AD	0.16	*#g	0.36	*#g	0.29	*g
Anthracene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	0.26	*#g	< 0.10	*g
Fluoranthene	mg/kg	MT/ACSE/106	AD	0.37	*#g	0.99	*#g	0.26	*g
Pyrene	mg/kg	MT/ACSE/106	AD	0.28	*#g	0.74	*#g	0.17	*g
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	0.30	*#g	0.51	*#g	< 0.10	*g
Chrysene	mg/kg	MT/ACSE/106	AD	0.19	*#g	0.39	*#g	< 0.10	*g
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	0.34	*#g	0.76	*#g	< 0.10	*g

Head Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 Tel 01202 628680
 Fax 01202 628680

Registered Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

**Quality Testing & Materials Consultancy
 to the
 Construction Industry**

ACSE Sample Number Sample ID	22746 271103 - 16-73724	22747 271104 - 16-73724	22748 271105 - 16-73724
Clients Sample Ref.	WS06	WS07	WS07
Location / Sample Depth (m)	0.11-0.28m	0.10-0.53m	0.53-1.00m
Date Sampled Time Sampled	06/06/2016	06/06/2016	07/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Grey brown gravelly SAND LOAM	Grey / reddish brown gravelly SAND SAND	Brown silty sandy CL AY CLAY

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	0.21	*#g	< 0.10	*g
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	0.18	*#g	0.47	*#g	< 0.10	*g
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	0.23	*#g	< 0.10	*g
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	< 0.10	*#g	< 0.10	*g
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	0.26	*#g	< 0.10	*g
Total PAH	mg/kg	MT/ACSE/106	AD	2.16	*#g	5.79	*#g	< 2.00	*g

Polychlorinated Biphenyls (PCBs)

PCB (7 Congeners)	mg/kg	MT/ACSE/104	AD	----		----		----	
-------------------	-------	-------------	----	------	--	------	--	------	--

Speciated BTEX

MTBE	mg/kg	NAM/ACSE/X12	AR	0.06		0.05		0.05	
Hexane	mg/kg	NAM/ACSE/X06	AR	0.09		0.09		0.10	
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	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	0.15		0.14		0.15	

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	104		129		65.1	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	104		129		65.1	

ACSE Sample Number Sample ID	22749 271106 - 16-73724	22750 271107 - 16-73724	22751 271108 - 16-73724
Clients Sample Ref.	WS08	WS03	WS04
Location / Sample Depth (m)	0.10-0.37m	0.30-0.45m	1.00-1.10m
Date Sampled Time Sampled	07/06/2016	07/06/2016	07/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Grey / reddish brown gravelly SAND SILT	Grey/brown gravelly SAND CLAY	Brown silty sandy CL AY CLAY

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Anions									
Water Soluble Sulphate	mg/l	MT/ACSE/204	AD	----		605	*	161	*
BTEX									
Benzene	mg/kg	MT/ACSE/101	AR	----		----		----	
Ethylbenzene	mg/kg	MT/ACSE/101	AR	----		----		----	
m+p-xylene	mg/kg	MT/ACSE/101	AR	----		----		----	
o-xylene	mg/kg	MT/ACSE/101	AR	----		----		----	
Toluene	mg/kg	MT/ACSE/101	AR	----		----		----	
Total BTEX	mg/kg	MT/ACSE/101	AR	----		----		----	
Carbon									
FOC	%	MT/ACSE/102	AR	0.0244		----		----	
Soil Organic Matter	%	MT/ACSE/102	AR	4.21		----		----	
TOC (Total Organic Carbon)	%	MT/ACSE/102	AR	----		----		----	
Loss on Ignition									
Loss on Ignition (440 °C)	%	MT/ACSE/302	AD	----		----		----	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	3.37	*#	----		----	
Cadmium	mg/kg	MT/ACSE/201	AD	0.12	*#	----		----	
Chromium	mg/kg	MT/ACSE/201	AD	50.3	*#	----		----	
Copper	mg/kg	MT/ACSE/201	AD	68.2	*#	----		----	
Mercury	mg/kg	MT/ACSE/202	AD	0.24	*	----		----	
Nickel	mg/kg	MT/ACSE/201	AD	21.2	*#	----		----	
Lead	mg/kg	MT/ACSE/201	AD	497	*#	----		----	
Selenium	mg/kg	MT/ACSE/201	AD	< 0.40	*#	----		----	
Zinc	mg/kg	MT/ACSE/201	AD	347	*#	----		----	
Chromium III	mg/kg	NAM/ACSE/X11	AD	50.3		----		----	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	< 1.00		----		----	
Petroleum Hydrocarbons									
Total TPH (C10-C40)	mg/kg	MT/ACSE/105	AR	----		----		----	
pH and Conductivity									
pH (@ 20 °C)	units	MT/ACSE/301	AD	9.4	*g	9.2	*g	8.5	*g
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	0.25	*#g	----		----	
Acenaphthylene	mg/kg	MT/ACSE/106	AD	0.14	*#g	----		----	
Acenaphthene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	----		----	
Fluorene	mg/kg	MT/ACSE/106	AD	0.11	*#g	----		----	
Phenanthrene	mg/kg	MT/ACSE/106	AD	0.70	*#g	----		----	
Anthracene	mg/kg	MT/ACSE/106	AD	0.27	*#g	----		----	
Fluoranthene	mg/kg	MT/ACSE/106	AD	1.49	*#g	----		----	
Pyrene	mg/kg	MT/ACSE/106	AD	1.15	*#g	----		----	
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	1.02	*#g	----		----	
Chrysene	mg/kg	MT/ACSE/106	AD	0.64	*#g	----		----	
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	1.29	*#g	----		----	

Head Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 Tel 01202 628680
 Fax 01202 628680

Registered Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

**Quality Testing & Materials Consultancy
 to the
 Construction Industry**

ACSE Sample Number Sample ID	22749 271106 - 16-73724	22750 271107 - 16-73724	22751 271108 - 16-73724
Clients Sample Ref.	WS08	WS03	WS04
Location / Sample Depth (m)	0.10-0.37m	0.30-0.45m	1.00-1.10m
Date Sampled Time Sampled	07/06/2016	07/06/2016	07/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Grey / reddish brown gravelly SAND SILT	Grey/brown gravelly SAND CLAY	Brown silty sandy CL AY CLAY

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	0.35	*#g	----		----	
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	0.68	*#g	----		----	
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	0.45	*#g	----		----	
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	< 0.10	*#g	----		----	
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	0.52	*#g	----		----	
Total PAH	mg/kg	MT/ACSE/106	AD	9.07	*#g	----		----	

Polychlorinated Biphenyls (PCBs)

PCB (7 Congeners)	mg/kg	MT/ACSE/104	AD	----		----		----	
-------------------	-------	-------------	----	------	--	------	--	------	--

Speciated BTEX

MTBE	mg/kg	NAM/ACSE/X12	AR	0.08		----		----	
Hexane	mg/kg	NAM/ACSE/X06	AR	0.14		----		----	
Heptane	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
Octane	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
Benzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
Toluene	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
o-xylene	mg/kg	NAM/ACSE/X06	AR	< 0.05		----		----	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	0.22		----		----	

Speciated Petroleum Hydrocarbons

C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	0.14		----		----	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		----		----	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		----		----	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 0.10		----		----	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	< 10.0		----		----	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	73.7		----		----	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	73.9		----		----	

Head Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 628680
Fax 01202 628680

Registered Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

**Quality Testing & Materials Consultancy
to the
Construction Industry**

ACSE Sample Number Sample ID	22752 271109 - 16-73724	22753 271110 - 16-73724	22754 271111 - 16-73724
Clients Sample Ref.	WS05	WS06	WS07
Location / Sample Depth (m)	2.45-2.55m	0.28-1.00m	0.10-0.53m
Date Sampled Time Sampled	07/06/2016	07/06/2016	07/06/2016
Sample deviating codes	g	g	g
Client's Sample Description			
ACS Testing Material Description	Grey silty gravelly SAND SAND	Brown silty sandy CL AY CLAY	Grey / reddish brown gravelly SAND SAND
Principal Matrix (as received)			

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Anions									
Water Soluble Sulphate	mg/l	MT/ACSE/204	AD	4.80	*	29.2	*	920	*
BTEX									
Benzene	mg/kg	MT/ACSE/101	AR	----		----		----	
Ethylbenzene	mg/kg	MT/ACSE/101	AR	----		----		----	
m+p-xylene	mg/kg	MT/ACSE/101	AR	----		----		----	
o-xylene	mg/kg	MT/ACSE/101	AR	----		----		----	
Toluene	mg/kg	MT/ACSE/101	AR	----		----		----	
Total BTEX	mg/kg	MT/ACSE/101	AR	----		----		----	
Carbon									
FOC	%	MT/ACSE/102	AR	----		----		----	
Soil Organic Matter	%	MT/ACSE/102	AR	----		----		----	
TOC (Total Organic Carbon)	%	MT/ACSE/102	AR	----		----		----	
Loss on Ignition									
Loss on Ignition (440 °C)	%	MT/ACSE/302	AD	----		----		----	
Metals (Soil)									
Arsenic	mg/kg	MT/ACSE/201	AD	----		----		----	
Cadmium	mg/kg	MT/ACSE/201	AD	----		----		----	
Chromium	mg/kg	MT/ACSE/201	AD	----		----		----	
Copper	mg/kg	MT/ACSE/201	AD	----		----		----	
Mercury	mg/kg	MT/ACSE/202	AD	----		----		----	
Nickel	mg/kg	MT/ACSE/201	AD	----		----		----	
Lead	mg/kg	MT/ACSE/201	AD	----		----		----	
Selenium	mg/kg	MT/ACSE/201	AD	----		----		----	
Zinc	mg/kg	MT/ACSE/201	AD	----		----		----	
Chromium III	mg/kg	NAM/ACSE/X11	AD	----		----		----	
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	----		----		----	
Petroleum Hydrocarbons									
Total TPH (C10-C40)	mg/kg	MT/ACSE/105	AR	----		----		----	
pH and Conductivity									
pH (@ 20°C)	units	MT/ACSE/301	AD	8.7	*g	6.6	*g	8.2	*g
Poly Aromatic Hydrocarbons									
Naphthalene	mg/kg	MT/ACSE/106	AD	----		----		----	
Acenaphthylene	mg/kg	MT/ACSE/106	AD	----		----		----	
Acenaphthene	mg/kg	MT/ACSE/106	AD	----		----		----	
Fluorene	mg/kg	MT/ACSE/106	AD	----		----		----	
Phenanthrene	mg/kg	MT/ACSE/106	AD	----		----		----	
Anthracene	mg/kg	MT/ACSE/106	AD	----		----		----	
Fluoranthene	mg/kg	MT/ACSE/106	AD	----		----		----	
Pyrene	mg/kg	MT/ACSE/106	AD	----		----		----	
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	----		----		----	
Chrysene	mg/kg	MT/ACSE/106	AD	----		----		----	
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	----		----		----	

Head Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 Tel 01202 628680
 Fax 01202 628680

Registered Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

Quality Testing & Materials Consultancy
 to the
 Construction Industry

ACSE Sample Number Sample ID	22752 271109 - 16-73724	22753 271110 - 16-73724	22754 271111 - 16-73724
Clients Sample Ref.	WS05	WS06	WS07
Location / Sample Depth (m)	2.45-2.55m	0.28-1.00m	0.10-0.53m
Date Sampled Time Sampled	07/06/2016	07/06/2016	07/06/2016
Sample deviating codes Client's Sample Description	g	g	g
ACS Testing Material Description Principal Matrix (as received)	Grey silty gravelly SAND SAND	Brown silty sandy CL AY CLAY	Grey / reddish brown gravelly SAND SAND

Determination	Units	Method		Result	AS	Result	AS	Result	AS
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106	AD	----		----		----	
Benzo (a) pyrene	mg/kg	MT/ACSE/106	AD	----		----		----	
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106	AD	----		----		----	
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106	AD	----		----		----	
Benzo(g h i)perylene	mg/kg	MT/ACSE/106	AD	----		----		----	
Total PAH	mg/kg	MT/ACSE/106	AD	----		----		----	
Polychlorinated Biphenyls (PCBs)									
PCB (7 Congeners)	mg/kg	MT/ACSE/104	AD	----		----		----	
Speciated BTEX									
MTBE	mg/kg	NAM/ACSE/X12	AR	----		----		----	
Hexane	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Heptane	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Octane	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Benzene	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Toluene	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Ethylbenzene	mg/kg	NAM/ACSE/X06	AR	----		----		----	
m+p-xylene	mg/kg	NAM/ACSE/X06	AR	----		----		----	
o-xylene	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Total BTEX	mg/kg	NAM/ACSE/X06	AR	----		----		----	
Speciated Petroleum Hydrocarbons									
C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07	AR	----		----		----	
Total Speciated TPH	mg/kg	NAM/ACSE/X07	AR	----		----		----	

ACSE Sample Number 22755
 Sample ID 271112 - 16-73724
 Clients Sample Ref. WS08
 Location / Sample Depth (m) 0.10-0.37m
 Date Sampled 07/06/2016
 Time Sampled
 Sample deviating codes g
 Client's Sample Description
 ACS Testing Material Description Grey / reddish brown
 Principal Matrix (as received) gravelly SAND
 SILT

Determination	Units	Method	Result	AS
Anions				
Water Soluble Sulphate	mg/l	MT/ACSE/204	AD	238 *
BTEX				
Benzene	mg/kg	MT/ACSE/101	AR	----
Ethylbenzene	mg/kg	MT/ACSE/101	AR	----
m+p-xylene	mg/kg	MT/ACSE/101	AR	----
o-xylene	mg/kg	MT/ACSE/101	AR	----
Toluene	mg/kg	MT/ACSE/101	AR	----
Total BTEX	mg/kg	MT/ACSE/101	AR	----
Carbon				
FOC	%	MT/ACSE/102	AR	----
Soil Organic Matter	%	MT/ACSE/102	AR	----
TOC (Total Organic Carbon)	%	MT/ACSE/102	AR	----
Loss on Ignition				
Loss on Ignition (440 °C)	%	MT/ACSE/302	AD	----
Metals (Soil)				
Arsenic	mg/kg	MT/ACSE/201	AD	----
Cadmium	mg/kg	MT/ACSE/201	AD	----
Chromium	mg/kg	MT/ACSE/201	AD	----
Copper	mg/kg	MT/ACSE/201	AD	----
Mercury	mg/kg	MT/ACSE/202	AD	----
Nickel	mg/kg	MT/ACSE/201	AD	----
Lead	mg/kg	MT/ACSE/201	AD	----
Selenium	mg/kg	MT/ACSE/201	AD	----
Zinc	mg/kg	MT/ACSE/201	AD	----
Chromium III	mg/kg	NAM/ACSE/X11	AD	----
Chromium Hexavalent	mg/kg	NAM/ACSE/X11	AD	----
Petroleum Hydrocarbons				
Total TPH (C10-C40)	mg/kg	MT/ACSE/105	AR	----
pH and Conductivity				
pH (@ 20 °C)	units	MT/ACSE/301	AD	8.8 *g
Poly Aromatic Hydrocarbons				
Naphthalene	mg/kg	MT/ACSE/106	AD	----
Acenaphthylene	mg/kg	MT/ACSE/106	AD	----
Acenaphthene	mg/kg	MT/ACSE/106	AD	----
Fluorene	mg/kg	MT/ACSE/106	AD	----
Phenanthrene	mg/kg	MT/ACSE/106	AD	----
Anthracene	mg/kg	MT/ACSE/106	AD	----
Fluoranthene	mg/kg	MT/ACSE/106	AD	----
Pyrene	mg/kg	MT/ACSE/106	AD	----
Benzo (a) anthracene	mg/kg	MT/ACSE/106	AD	----
Chrysene	mg/kg	MT/ACSE/106	AD	----
Benzo (b) fluoranthene	mg/kg	MT/ACSE/106	AD	----

Head Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 Tel 01202 628680
 Fax 01202 628680

Registered Office
 Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

**Quality Testing & Materials Consultancy
 to the
 Construction Industry**

ACSE Sample Number 22755
 Sample ID 271112 - 16-73724
 Clients Sample Ref. WS08
 Location / Sample Depth (m) 0.10-0.37m
 Date Sampled 07/06/2016
 Time Sampled
 Sample deviating codes g
 Client's Sample Description
 ACS Testing Material Description Grey / reddish brown
 Principal Matrix (as received) gravelly SAND
 SILT

Determination	Units	Method	Result	AS
Benzo (k) fluoranthene	mg/kg	MT/ACSE/106 AD	----	
Benzo (a) pyrene	mg/kg	MT/ACSE/106 AD	----	
Indeno (1 2 3-CD) pyrene	mg/kg	MT/ACSE/106 AD	----	
Dibenzo(a h)anthracene	mg/kg	MT/ACSE/106 AD	----	
Benzo(g h i)perylene	mg/kg	MT/ACSE/106 AD	----	
Total PAH	mg/kg	MT/ACSE/106 AD	----	

Polychlorinated Biphenyls (PCBs)

PCB (7 Congeners)	mg/kg	MT/ACSE/104 AD	----	
-------------------	-------	----------------	------	--

Speciated BTEX

MTBE	mg/kg	NAM/ACSE/X12 AR	----	
Hexane	mg/kg	NAM/ACSE/X06 AR	----	
Heptane	mg/kg	NAM/ACSE/X06 AR	----	
Octane	mg/kg	NAM/ACSE/X06 AR	----	
Benzene	mg/kg	NAM/ACSE/X06 AR	----	
Toluene	mg/kg	NAM/ACSE/X06 AR	----	
Ethylbenzene	mg/kg	NAM/ACSE/X06 AR	----	
m+p-xylene	mg/kg	NAM/ACSE/X06 AR	----	
o-xylene	mg/kg	NAM/ACSE/X06 AR	----	
Total BTEX	mg/kg	NAM/ACSE/X06 AR	----	

Speciated Petroleum Hydrocarbons

C5-C6 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
>C6-C8 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
>C8-C10 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
>C10-C12 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
>C12-C16 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
>C16-C21 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
>C21-C35 Aliphatic	mg/kg	NAM/ACSE/X07 AR	----	
C6-C7 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
C7-C8 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
>C8-C10 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
>C10-C12 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
>C12-C16 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
>C16-C21 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
>C21-C35 Aromatic	mg/kg	NAM/ACSE/X07 AR	----	
Total Speciated TPH	mg/kg	NAM/ACSE/X07 AR	----	

WAC

2:1 pH (@ 20 °C)	units	MT/ACSE/301 L	----	
2:1 Conductivity	mS/m	MT/ACSE/303 L	----	
Chromium LS10	mg/kg	MT/ACSE/205 L	----	
Chromium LS2	mg/kg	MT/ACSE/205 L	----	
Copper LS10	mg/kg	MT/ACSE/205 L	----	
Cadmium LS10	mg/kg	MT/ACSE/205 L	----	
Copper LS2	mg/kg	MT/ACSE/205 L	----	
Nickel LS2	mg/kg	MT/ACSE/205 L	----	

Head Office

Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE

Tel 01202 628680
 Fax 01202 628680

Registered Office

Unit 14B
 Blackhill Road West
 Holton Heath Trading Park
 Poole
 Dorset BH16 6LE
 ACS Environmental Testing Limited
 Registered in England and
 Wales No. 6000065

**Quality Testing & Materials Consultancy
 to the
 Construction Industry**

ACSE Sample Number 22755
Sample ID 271112 - 16-73724
Clients Sample Ref. WS08
Location / Sample Depth (m) 0.10-0.37m
Date Sampled 07/06/2016
Time Sampled
Sample deviating codes g
Client's Sample Description
ACS Testing Material Description Grey / reddish brown
Principal Matrix (as received) gravelly SAND
SILT

Determination	Units	Method	Result	AS
Cadmium LS2	mg/kg	MT/ACSE/205	L	----
Sulphate LS2	mg/kg	MT/ACSE/204	L	----
Sulphate LS10	mg/kg	MT/ACSE/204	L	----
Fluoride LS10	mg/kg	MT/ACSE/204	L	----
Fluoride LS2	mg/kg	MT/ACSE/204	L	----
Chloride LS2	mg/kg	MT/ACSE/204	L	----
Chloride LS10	mg/kg	MT/ACSE/204	L	----
Nickel LS10	mg/kg	MT/ACSE/205	L	----
2:1 Arsenic	mg/l	MT/ACSE/205	L	----
Barium LS10	mg/kg	MT/ACSE/205	L	----
Arsenic LS2	mg/kg	MT/ACSE/205	L	----
Molybdenum LS2	mg/kg	MT/ACSE/205	L	----
Molybdenum LS10	mg/kg	MT/ACSE/205	L	----
Barium LS2	mg/kg	MT/ACSE/205	L	----
Arsenic LS10	mg/kg	MT/ACSE/205	L	----
Dissolved Solids LS2	mg/kg	MT/ACSE/304	L	----
Dissolved Solids LS10	mg/kg	MT/ACSE/304	L	----
Lead LS10	mg/kg	MT/ACSE/205	L	----
Lead LS2	mg/kg	MT/ACSE/205	L	----
Phenol LS2	mg/kg	MT/ACSE/107	L	----
Phenol LS10	mg/kg	MT/ACSE/107	L	----
Antimony LS10	mg/kg	MT/ACSE/205	L	----
Antimony LS2	mg/kg	MT/ACSE/205	L	----
DOC LS10	mg/kg	MT/ACSE/103	L	----
DOC LS2	mg/kg	MT/ACSE/103	L	----
Selenium LS10	mg/kg	MT/ACSE/205	L	----
Selenium LS2	mg/kg	MT/ACSE/205	L	----
Zinc LS10	mg/kg	MT/ACSE/205	L	----
Mercury LS10	mg/kg	MT/ACSE/205	L	----
Mercury LS2	mg/kg	MT/ACSE/205	L	----
Zinc LS2	mg/kg	MT/ACSE/205	L	----
2:1 Barium	mg/l	MT/ACSE/205	L	----
2:1 Cadmium	mg/l	MT/ACSE/205	L	----
2:1 Chromium	mg/l	MT/ACSE/205	L	----
2:1 Copper	mg/l	MT/ACSE/205	L	----
2:1 Mercury	mg/l	MT/ACSE/202	L	----
2:1 Molybdenum	mg/l	MT/ACSE/205	L	----
2:1 Nickel	mg/l	MT/ACSE/205	L	----
2:1 Antimony	mg/l	MT/ACSE/205	L	----
2:1 Lead	mg/l	MT/ACSE/205	L	----
2:1 Selenium	mg/l	MT/ACSE/205	L	----
2:1 Zinc	mg/l	MT/ACSE/205	L	----
2:1 Chloride	mg/l	MT/ACSE/204	L	----
2:1 Fluoride	mg/l	MT/ACSE/204	L	----
2:1 Sulphate	mg/l	MT/ACSE/204	L	----
2:1 Dissolved Solids	mg/l	MT/ACSE/304	L	----

Head Office
Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
Tel 01202 628680
Fax 01202 628680

Registered Office
Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

**Quality Testing & Materials Consultancy
to the
Construction Industry**

ACSE Sample Number 22755
 Sample ID 271112 - 16-73724
 Clients Sample Ref. WS08
 Location / Sample Depth (m) 0.10-0.37m
 Date Sampled 07/06/2016
 Time Sampled
 Sample deviating codes g
 Client's Sample Description
 ACS Testing Material Description Grey / reddish brown
 Principal Matrix (as received) gravelly SAND
 SILT

Determination	Units	Method	Result	AS
2:1 Phenol (4 specific phenols)	mg/l	MT/ACSE/107	L	----
2:1 DOC	mg/l	MT/ACSE/103	L	----
8:1 pH (@ 20°C)	units	MT/ACSE/301	L	----
8:1 Conductivity	mS/m	MT/ACSE/303	L	----
8:1 Arsenic	mg/l	MT/ACSE/205	L	----
8:1 Barium	mg/l	MT/ACSE/205	L	----
8:1 Cadmium	mg/l	MT/ACSE/205	L	----
8:1 Chromium	mg/l	MT/ACSE/205	L	----
8:1 Copper	mg/l	MT/ACSE/205	L	----
8:1 Mercury	mg/l	MT/ACSE/202	L	----
8:1 Molybdenum	mg/l	MT/ACSE/205	L	----
8:1 Nickel	mg/l	MT/ACSE/205	L	----
8:1 Lead	mg/l	MT/ACSE/205	L	----
8:1 Antimony	mg/l	MT/ACSE/205	L	----
8:1 Selenium	mg/l	MT/ACSE/205	L	----
8:1 Zinc	mg/l	MT/ACSE/205	L	----
8:1 Chloride	mg/l	MT/ACSE/204	L	----
8:1 Fluoride	mg/l	MT/ACSE/204	L	----
8:1 Sulphate	mg/l	MT/ACSE/204	L	----
8:1 Dissolved Solids	mg/l	MT/ACSE/304	L	----
8:1 Phenol (4 specific phenols)	mg/l	MT/ACSE/107	L	----
8:1 DOC	mg/l	MT/ACSE/103	L	----

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

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). It is possible that some deterioration may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.
- b – No sampling time given (waters only) unable to confirm if samples are within acceptable holding times.
- c – This Test Item was received in an inappropriate container; it is possible that sample and/or analyte integrity has not been maintained and that the results are non-representative of the original sample taken.
- d – On receipt, the temperature of the sample received was found to fall outside the recommendations of EN ISO 18512:2007 Soils & Granular Wastes.
- e – The sample was received in a container that had been filled incorrectly which may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.
- f – The delay between Sampling and Sample Receipt is greater than the recommended holding time for the analyte of interest in this matrix. It is possible that some deterioration may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.
- g – The delay between Sampling and Analysis is greater than the recommended holding time for the analyte of interest in this matrix. It is possible that some deterioration may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.

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).

Head Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 628680
Fax 01202 628680

Registered Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

**Quality Testing & Materials Consultancy
to the
Construction Industry**

Certificate of Analysis Landfill Waste Acceptance Criteria (WAC)

Certificate Number : 16-05026-Issue 1-Page: 1

Report Fao: GEO RESULTS
Site Address: Hayling Island - Hayling Billy Pub
Customer Order No: 16-73724
Date of Sampling: 06/06/2016
Date Received: 10/06/2016
Report Date: 23/06/2016

Please find your certificates of test attached for your samples received in the laboratory on 10/06/2016 under our laboratory reference 16-05026.

Remarks:
None

Results reviewed by:



David Redfern Technical Supervisor

Results approved by:



Mark Rowley Laboratory 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.*

Head Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 628680

Fax 01202 628642

Registered Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

**Quality Testing & Materials Consultancy
to the
Construction Industry**



Certificate No. 16-05026-Issue 1-Page: 2
Site Address Hayling Island - Hayling Billy Pub



ACSE Sample Number 22741
Sample ID 271098 - 16-73724
Clients Sample Ref. WS03
Location / Sample Depth (m) 0.08-0.30m
Time Sampled
Date Sampled 06/06/2016
Sample Deviating Codes g
Client's Sample Description
ACS Testing Material Description Brown silty sandy GRAVEL
Principal Matrix (as received) GRAVEL

LANDFILL WASTE ACCEPTANCE CRITERIA (WAC)

TEST VALUES

Mass of Undried Test Portion (Mw)	176	g	Volume of Leachant Used (L2)	0.349	litres
Mass of Dried Test Portion (Mp)	175	g	Volume of Leachant Used (L8)	1.400	litres
Moisture Content Ratio (MC)	0.8	%	Volume of Eluate (VE1)	0.272	litres
Dry Matter Content (DR)	99.2	%	Volume of Eluate (VE2)	1.325	litres

SOLIDS ANALYSIS

Analyte	Method		Sample Condition for Analysis	Results
Total Organic Carbon (%)	MT/ACSE/102	*	As received	0.34
Loss on ignition (%)	MT/ACSE/302	*	Air dried at 30°C	2.3
BTEX (mg/kg)	MT/ACSE/101	*g	As received	< 0.50
PCBs (7 congeners) (mg/kg)	MT/ACSE/104	*	Air dried at 30°C	< 1.00
Mineral oil (C10 - C40) (mg/kg)	MT/ACSE/105	*g	As received	1110
PAHs (mg/kg)	MT/ACSE/106	*g	Air dried at 30°C	6.16
pH (units)	MT/ACSE/301	*g	Air dried at 30°C	8.5

ELUATE ANALYSIS

Analyte	Method	Concentration in Eluate (mg/l)	Amount Leached (mg/kg)
Liquid : Solid Ratio (L/S)	LP/ACSE/101	* L/S 2 L/S 8	L/S 2 L/S 10
pH (units)	MT/ACSE/301	* 7.9 7.6	
Temperature (°C)	MT/ACSE/301	* 20 20	
Conductivity (mS/m)	MT/ACSE/303	* 24.5 8.86	
Arsenic	MT/ACSE/205	* < 0.003 < 0.003	< 0.006 < 0.030
Barium	MT/ACSE/205	* 0.261 0.0454	0.523 0.790
Cadmium	MT/ACSE/205	* < 0.0003 < 0.0003	< 0.0006 < 0.003
Chromium (total)	MT/ACSE/205	* < 0.001 < 0.001	< 0.002 < 0.010
Copper	MT/ACSE/205	* < 0.001 < 0.001	< 0.002 < 0.010
Mercury	MT/ACSE/202	* < 0.0001 < 0.0001	< 0.0002 < 0.0010
Molybdenum	MT/ACSE/205	* < 0.0004 < 0.0004	< 0.001 < 0.004
Nickel	MT/ACSE/205	* < 0.0003 < 0.0003	< 0.001 < 0.003
Lead	MT/ACSE/205	* < 0.004 < 0.004	< 0.008 < 0.040
Antimony	MT/ACSE/205	* < 0.003 < 0.003	< 0.006 < 0.030
Selenium	MT/ACSE/205	* < 0.006 < 0.006	< 0.012 < 0.060
Zinc	MT/ACSE/205	* 0.010 0.005	0.020 0.058
Chloride	MT/ACSE/204	* < 3.00 < 3.00	< 6.00 < 30.0
Fluoride	MT/ACSE/204	* 0.44 0.52	0.884 5.11
Sulphate	MT/ACSE/204	* 35.7 3.18	71.5 82.38
Total dissolved solids	MT/ACSE/304	* 110 60	220 677.7
Phenol index	MT/ACSE/107	* < 0.05 < 0.05	< 0.100 < 0.50
Dissolved organic carbon	MT/ACSE/103	* 9.10 3.58	18.2 44.4

LANDFILL WASTE ACCEPTANCE CRITERIA SPECIFICATION

Inert Waste	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste
3 %	5 %	6 %
---	---	10 %
6	---	---
1	---	---
500	---	---
100	---	---
---	>6	---

LANDFILL WASTE ACCEPTANCE CRITERIA SPECIFICATION

BS EN 12457-3:2002 LIMIT VALUES (mg/kg) at L/S 10

Inert Waste	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15000	25000
10	150	500
1000	20000	50000
4000	60000	100000
1	---	---
500	800	1000

Comments: (comments are beyond the scope of UKAS accreditation)

Denotes individual sample results which exceed the landfill waste acceptance criteria for Inert Waste

The landfill waste acceptance criteria limits are provided for guidance only.
 Eluates prepared in accordance with BS EN 12457-3:2002

Certificate No. 16-05026-Issue 1-Page: 3
Site Address Hayling Island - Hayling Billy Pub



ACSE Sample Number 22742
Sample ID 271099 - 16-73724
Clients Sample Ref. WS03
Location / Sample Depth (m) 1.10-1.20m
Time Sampled
Date Sampled 06/06/2016
Sample Deviating Codes g
Client's Sample Description
ACS Testing Material Description Brown silty sandy CLAY
Principal Matrix (as received) CLAY

LANDFILL WASTE ACCEPTANCE CRITERIA (WAC)

TEST VALUES

Mass of Undried Test Portion (Mw)	178	g	Volume of Leachant Used (L2)	0.347	litres
Mass of Dried Test Portion (Mp)	175	g	Volume of Leachant Used (L8)	1.400	litres
Moisture Content Ratio (MC)	1.5	%	Volume of Eluate (VE1)	0.295	litres
Dry Matter Content (DR)	98.5	%	Volume of Eluate (VE2)	1.301	litres

SOLIDS ANALYSIS

Analyte	Method		Sample Condition for Analysis	Results
Total Organic Carbon (%)	MT/ACSE/102	*	As received	0.27
Loss on ignition (%)	MT/ACSE/302	*	Air dried at 30°C	1.6
BTEX (mg/kg)	MT/ACSE/101	*g	As received	< 0.50
PCBs (7 congeners) (mg/kg)	MT/ACSE/104	*	Air dried at 30°C	< 1.00
Mineral oil (C10 - C40) (mg/kg)	MT/ACSE/105	*g	As received	< 50.0
PAHs (mg/kg)	MT/ACSE/106	*g	Air dried at 30°C	< 2.00
pH (units)	MT/ACSE/301	*g	Air dried at 30°C	8.3

ELUATE ANALYSIS

Analyte	Method	Concentration in Eluate (mg/l)	Amount Leached (mg/kg)
Liquid : Solid Ratio (L/S)	LP/ACSE/101	* L/S 2 L/S 8	L/S 2 L/S 10
pH (units)	MT/ACSE/301	* 7.8 7.7	
Temperature (°C)	MT/ACSE/301	* 20 20	
Conductivity (mS/m)	MT/ACSE/303	* 20.3 8.50	
Arsenic	MT/ACSE/205	* < 0.003 < 0.003	< 0.006 < 0.030
Barium	MT/ACSE/205	* 0.217 0.0376	0.434 0.678
Cadmium	MT/ACSE/205	* < 0.0003 < 0.0003	< 0.0006 < 0.003
Chromium (total)	MT/ACSE/205	* 0.001 < 0.001	0.002 < 0.010
Copper	MT/ACSE/205	* 0.002 < 0.001	0.004 < 0.010
Mercury	MT/ACSE/202	* < 0.0001 < 0.0001	< 0.0002 < 0.0010
Molybdenum	MT/ACSE/205	* < 0.0004 < 0.0004	< 0.001 < 0.004
Nickel	MT/ACSE/205	* < 0.0003 < 0.0003	< 0.001 < 0.003
Lead	MT/ACSE/205	* < 0.004 < 0.004	< 0.008 < 0.040
Antimony	MT/ACSE/205	* < 0.003 < 0.003	< 0.006 < 0.030
Selenium	MT/ACSE/205	* < 0.006 < 0.006	< 0.012 < 0.060
Zinc	MT/ACSE/205	* 0.007 0.004	0.013 0.046
Chloride	MT/ACSE/204	* < 3.00 < 3.00	< 6.00 < 30.0
Fluoride	MT/ACSE/204	* 0.79 0.75	1.59 7.55
Sulphate	MT/ACSE/204	* 29.7 < 3.00	59.4 50.09
Total dissolved solids	MT/ACSE/304	* 145 100	290 1076
Phenol index	MT/ACSE/107	* < 0.05 < 0.05	< 0.100 < 0.50
Dissolved organic carbon	MT/ACSE/103	* 10.4 < 2.00	20.8 < 20.0

LANDFILL WASTE ACCEPTANCE CRITERIA SPECIFICATION

Inert Waste	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste
3 %	5 %	6 %
---	---	10 %
6	---	---
1	---	---
500	---	---
100	---	---
---	>6	---

LANDFILL WASTE ACCEPTANCE CRITERIA SPECIFICATION

BS EN 12457-3:2002 LIMIT VALUES (mg/kg) at L/S 10		
Inert Waste	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15000	25000
10	150	500
1000	20000	50000
4000	60000	100000
1	---	---
500	800	1000

Comments: (comments are beyond the scope of UKAS accreditation)

Denotes individual sample results which exceed the landfill waste acceptance criteria for Inert Waste

The landfill waste acceptance criteria limits are provided for guidance only.
 Eluates prepared in accordance with BS EN 12457-3:2002

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

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). It is possible that some deterioration may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.
- b – No sampling time given (waters only) unable to confirm if samples are within acceptable holding times.
- c – This Test Item was received in an inappropriate container; it is possible that sample and/or analyte integrity has not been maintained and that the results are non-representative of the original sample taken.
- d – On receipt, the temperature of the sample received was found to fall outside the recommendations of EN ISO 18512:2007 Soils & Granular Wastes.
- e – The sample was received in a container that had been filled incorrectly which may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.
- f – The delay between Sampling and Sample Receipt is greater than the recommended holding time for the analyte of interest in this matrix. It is possible that some deterioration may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.
- g – The delay between Sampling and Analysis is greater than the recommended holding time for the analyte of interest in this matrix. It is possible that some deterioration may have compromised sample and/or analyte integrity, rendering the results non-representative of the original sample taken.

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).

Head Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE

Tel 01202 628680
Fax 01202 628680

Registered Office

Unit 14B
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset BH16 6LE
ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

**Quality Testing & Materials Consultancy
to the
Construction Industry**

[illegible]

Site Name	Hayling Island - Hayling Billy Pub
Location	Hayling Island - Hayling Billy Pub
Site ID	
Job Number	16-05026
Date	24/06/2016
User Name	anthony.elkins@acstesting.co.uk
Company Name	ACS Testing Ltd

[illegible]

Site Name	Hayling Island - Hayling Billy Pub
Location	Hayling Island - Hayling Billy Pub
Site ID	
Job Number	16-05026
Date	24/06/2016
User Name	anthony.elkins@acstesting.co.uk
Company Name	ACS Testing Ltd

[illegible]

APPENDIX G

CLEA MODEL OUTPUT SHEETS

Topsoil
Made Ground
Superficial Deposits



[illegible]

[illegible]



		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	1.09E+03	1.09E+03	0.00	1.00	1.00	1.13E+03 (sol)	Yes	Yes
2	Aliphatic 6-8 (S4UL)	2.26E+06	3.64E+03	3.64E+03	0.00	1.00	1.00	7.31E+02 (sol)	Yes	Yes
3	Aliphatic 8-10 (S4UL)	4.51E+04	1.08E+03	1.07E+03	0.01	0.99	1.00	4.50E+02 (vap)	Yes	Yes
4	Aliphatic 10-12 (S4UL)	4.51E+04	5.49E+03	5.32E+03	0.06	0.94	1.00	2.83E+02 (vap)	Yes	Yes
5	Aliphatic 12-16 (S4UL)	4.51E+04	4.62E+04	3.04E+04	0.51	0.49	1.00	1.42E+02 (sol)	Yes	Yes
6	Aliphatic 16-35 (S4UL)	7.73E+05	NR	NR	1.00	NR	NR	5.09E+01 (sol)	Yes	No
7										
8										
9										
10	Aromatic 5-7 (S4UL)	2.01E+05	1.07E+04	1.02E+04	0.05	0.95	1.00	4.93E+03 (sol)	No	No
11	Aromatic 7-8 (S4UL)	2.01E+05	3.26E+04	2.81E+04	0.14	0.86	1.00	4.43E+03 (vap)	No	No
12	Aromatic 8-10 (S4UL)	1.81E+04	1.89E+03	1.84E+03	0.05	0.95	1.00	3.59E+03 (vap)	Yes	Yes
13	Aromatic 10-12 (S4UL)	1.81E+04	1.01E+04	8.30E+03	0.30	0.70	1.00	2.15E+03 (sol)	Yes	Yes
14	Aromatic 12-16 (S4UL)	1.81E+04	9.11E+04	1.71E+04	0.90	0.10	1.00	1.01E+03 (sol)	Yes	Yes
15	Aromatic 16-21 (S4UL)	1.32E+04	NR	NR	1.00	NR	NR	3.21E+02 (vap)	Yes	No
16	Aromatic 21-35 (S4UL)	1.35E+04	NR	NR	1.00	NR	NR	2.90E+01 (sol)	Yes	No
17										
18										
19	Benzene (S4UL)	2.62E+02	1.07E+01	1.03E+01	0.04	0.96	1.00	4.93E+03 (sol)	No	No
20	Toluene (S4UL)	2.01E+05	3.28E+04	2.82E+04	0.14	0.86	1.00	4.43E+03 (vap)	No	No

[illegible]

[illegible]

[illegible]



		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	1.07E+02	1.07E+02	0.00	1.00	1.00	7.41E+02 (sol)	Yes	Yes
2	Aliphatic 6-8 (S4UL)	2.26E+06	3.11E+02	3.11E+02	0.00	1.00	1.00	4.17E+02 (sol)	Yes	Yes
3	Aliphatic 8-10 (S4UL)	4.51E+04	8.72E+01	8.72E+01	0.00	1.00	1.00	2.43E+02 (vap)	Yes	Yes
4	Aliphatic 10-12 (S4UL)	4.51E+04	4.40E+02	4.39E+02	0.00	1.00	1.00	1.51E+02 (vap)	Yes	Yes
5	Aliphatic 12-16 (S4UL)	4.51E+04	3.70E+03	3.62E+03	0.04	0.96	1.00	7.57E+01 (sol)	Yes	Yes
6	Aliphatic 16-35 (S4UL)	2.94E+05	NR	NR	1.00	NR	NR	2.71E+01 (sol)	Yes	No
7										
8										
9										
10	Aromatic 5-7 (S4UL)	2.01E+05	8.29E+02	8.26E+02	0.00	1.00	1.00	2.65E+03 (sol)	No	No
11	Aromatic 7-8 (S4UL)	2.01E+05	2.38E+03	2.35E+03	0.01	0.99	1.00	2.37E+03 (vap)	No	No
12	Aromatic 8-10 (S4UL)	1.81E+04	1.54E+02	1.54E+02	0.00	1.00	1.00	1.91E+03 (vap)	Yes	Yes
13	Aromatic 10-12 (S4UL)	1.81E+04	8.51E+02	8.40E+02	0.02	0.98	1.00	1.15E+03 (sol)	Yes	Yes
14	Aromatic 12-16 (S4UL)	1.81E+04	9.68E+03	8.05E+03	0.29	0.71	1.00	5.36E+02 (sol)	Yes	Yes
15	Aromatic 16-21 (S4UL)	1.28E+04	NR	NR	1.00	NR	NR	1.71E+02 (vap)	Yes	No
16	Aromatic 21-35 (S4UL)	1.35E+04	NR	NR	1.00	NR	NR	1.54E+01 (sol)	Yes	No
17										
18										
19	Benzene (S4UL)	2.62E+02	8.31E-01	8.28E-01	0.00	1.00	1.00	2.65E+03 (sol)	No	No
20	Toluene (S4UL)	2.01E+05	2.39E+03	2.36E+03	0.01	0.99	1.00	2.37E+03 (vap)	No	No

[illegible]

[illegible]

[illegible]



		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	5.20E+02	5.20E+02	0.00	1.00	1.00	2.85E+02 (sol)	Yes	Yes
2	Aliphatic 6-8 (S4UL)	2.26E+06	1.31E+03	1.31E+03	0.00	1.00	1.00	1.40E+02 (sol)	Yes	Yes
3	Aliphatic 8-10 (S4UL)	4.51E+04	3.48E+02	3.48E+02	0.00	1.00	1.00	7.71E+01 (vap)	Yes	Yes
4	Aliphatic 10-12 (S4UL)	4.51E+04	1.74E+03	1.72E+03	0.02	0.98	1.00	4.75E+01 (vap)	Yes	Yes
5	Aliphatic 12-16 (S4UL)	4.51E+04	1.46E+04	1.32E+04	0.17	0.83	1.00	2.37E+01 (sol)	Yes	Yes
6	Aliphatic 16-35 (S4UL)	5.91E+05	NR	NR	1.00	NR	NR	8.48E+00 (sol)	Yes	No
7										
8										
9										
10	Aromatic 5-7 (S4UL)	2.01E+05	6.63E+03	6.42E+03	0.03	0.97	1.00	1.69E+03 (sol)	No	No
11	Aromatic 7-8 (S4UL)	2.01E+05	1.37E+04	1.28E+04	0.06	0.94	1.00	1.03E+03 (vap)	No	No
12	Aromatic 8-10 (S4UL)	1.81E+04	6.10E+02	6.04E+02	0.02	0.98	1.00	6.30E+02 (vap)	Yes	Yes
13	Aromatic 10-12 (S4UL)	1.81E+04	2.98E+03	2.84E+03	0.09	0.91	1.00	3.70E+02 (sol)	Yes	Yes
14	Aromatic 12-16 (S4UL)	1.81E+04	2.04E+04	1.28E+04	0.55	0.45	1.00	1.70E+02 (sol)	Yes	Yes
15	Aromatic 16-21 (S4UL)	1.18E+04	NR	NR	1.00	NR	NR	5.38E+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	6.64E+00	6.48E+00	0.02	0.98	1.00	1.69E+03 (sol)	No	No
20	Toluene (S4UL)	2.01E+05	1.38E+04	1.29E+04	0.06	0.94	1.00	1.03E+03 (vap)	No	No

[illegible]

APPENDIX H

STATISTICAL ANALYSIS

Lead



Contaminant: Lead

Critical Concentration: 310 mg/kg

CLR7 Statistical Tests (Planning)

Conducted at 95% confidence level

Enter measured contaminant concentrations:

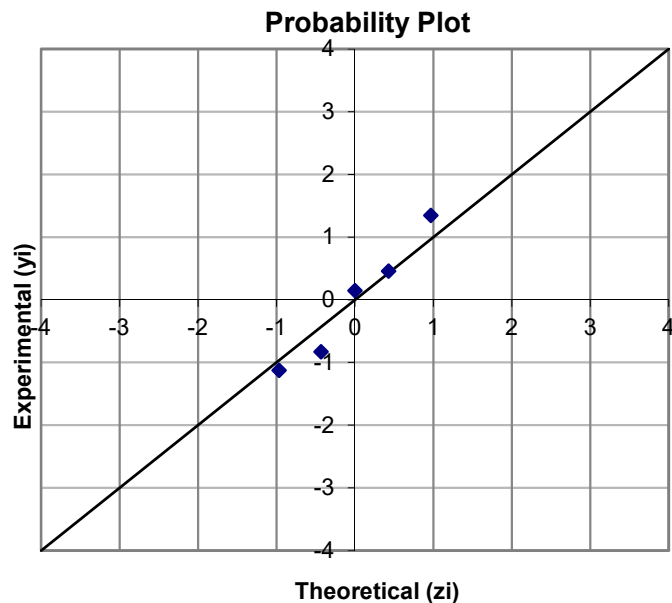
[illegible]

Mean value statistical test results:

n	5
Mean ($\bar{x}$)	241.2
St Dev (s)	189.705

Is the sample mean higher than the Critical Concentration?

NO



Outlier Test: Maximum value statistical test results. Where an outlier is identified delete the value from the population of results.

Normal Distribuiton		Not-Normal Distribution	
Highest Value	497	Ln Highest Value	6.21
Mean	241.20	Ln Mean	5.07
St Dev	189.70	Ln St Dev	1.18
Tn	1.35	Tn	0.97
Crit Value	1.67	Crit Value	1.67
Outlier?	NO	Outlier?	NO

Normal Distribution	
$-t_{(n-1, 0.95)}$	-2.132
t_0	-0.81
Outcome	ACCEPT H_0
$UCL_{0.95}$	422.08

One Sample t-test

Non-Normal Distribution	
$-k_{(0.05)}$	-4.36
k_0	-0.81
Outcome	ACCEPT H_0
$UCL_{0.95}$	611.10
One sided Chebychev	

Null Hypothesis, H_0 :

That the level of contamination [in the land of interest] is the same as, or higher than, the critical concentration.

Therefore:

Reject H_0 means the concentration of contaminants is low relative to an appropriate critical concentration.

Accept H_0 means that the true mean concentration of the contaminant may be equal to or greater than critical concentration.