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Ground Investigation Report

at
Kingston Wharf, East Cowes, Isle of Wight PO32 6JS

for
Cowes Harbour Commission

Reference: 21091/GIR/Rev103
March 2024

Control Document

Project
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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Commission

This document comprises the Main Investigation Report (MIR) and incorporates the results, discussion, and conclusions to this intrusive works. General site data is recorded below:

Commission Record	
Client	Cowes Harbour Commission
Site Name	Kingston Wharf, East Cowes, Isle of Wight, PO32 6JS
Grid Reference	SZ 503 943
Soils Limited Quotation Ref	Q27988, dated 17th August 2023. Change Request Form CR_3 dated January 11th 2024
Clients Purchase Order	Q27988, dated 5th October 2023 Change Request Form CR_3 dated January 11th 2024

Notes

The record of revision to this document is presented below:

Record Of Revisions		
Revision	**Date**	**Reason**
1.00	November 2023	Copy to Client
1.02	November 2023	Updated Proposed development details.
1.03	March 2024	Updated following additional intrusive investigation

Limitations and Disclaimers

The report was prepared solely for the brief described in Section 1.1 of this report.

The contents, recommendations and advice given in the report are subject to the Terms and Conditions given in Soils Limited's Quotation

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the Client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

If the term "competent person" is used in this report or any Soils Limited document, it means an engineering geologist or civil engineer with a minimum of three years post graduate experience in the understanding and application of the appropriate codes of practice.

Unless the site investigation works have been designed and specified in accordance with EC7, this report is a Geotechnical Investigation Report and is not necessarily a Ground Investigation Report as defined by EC7 (Eurocode 7 Part 1, §3.4, Part 2, §6.1) or a Geotechnical Design Report (Eurocode 7 Part 1, §2.8) as defined by Eurocode 7 and as such may not characterise the ground conditions and additional works may be required to comply with the requirements of EC7.

Within the report reference to ground level relates to the site level at the time of the investigation, unless otherwise stated.

Exploratory hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce an exploratory hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The Client is responsible for establishing the depth to roots and/or of desiccation on a plot by plot basis prior to the construction of foundations. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data or any trees, bushes or shrubs removed prior to or following the site survey.

Where trees are mentioned in the text this means existing trees, substantial bushes or shrubs, recently removed trees (approximately 20 years to full recovery on cohesive soils) and those planned as part of the site landscaping).

The geotechnical laboratory testing was performed by GEO Site & Testing Services Ltd (GSTL) in accordance with the methods given in BS 1377:1990 Parts 1 to 8 and their UKAS accredited test methods.

For the preparation of this report, the relevant BS code of practice were adopted for the geotechnical laboratory testing technical specifications, in the absence of the relevant Eurocode specifications (ref: ISO TS 17892).

The chemical analyses were undertaken by Derwentside Environmental Testing Services (DETS) in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Ordinary watercourses (OWs) are defined as rivers (which are not designated as main rivers), streams, ditches, drains, culverts, cuts and sewers (other than public sewers). This includes all OWs that are not mapped. Ordinary watercourse consent (OWC) is required from the Lead Local Flood Authority (LLFA) when changing/adapting/adding to the cross sections of OWs. Installations of any structure or obstruction into an OW that impedes the flow without consent is prohibited by the Land Drainage Act 1991 Section 23.

Failure to remove obstructions may result in legal action by the LLFA with powers under Section 25 of the Land Drainage Act 1991.

We suggest surveying the site for OW usually seen in rural areas as boundary ditches in order to avoid potential impacts to residents downstream and prosecution. OWC can be applied for from your LLFA.

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. “Contaminated Land” is defined in Section 57 of the Environment Act 1995 (as updated 2021) as:

"Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused".

It must be noted that a detailed survey of the possible presence or absence of invasive species, such as Japanese Knotweed, is outside of the scope of investigation.

Deleterious materials may be present in any Made Ground that pose a potential risk to site workers, end users and adjacent vulnerable receptors. These could include a range of contaminants, including asbestos, especially if the material includes large fractions of demolition derived materials.

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

All environmental works are undertaken in the context of, and in compliance with, BS10175+A2 2017 and LCRM (EA 2021) and all other pertinent planning, standards, documentation and guidance appropriate to the site at the time of production which may include, but are not necessarily limited to, documents provided by BS/CEN/ISO, NHBC, AGS, CIEH, CIRIA, SoBRA and CLAIRE.

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Section 1 Introduction

1.1 Objective of Investigation

The Client commissioned Soils Limited to undertake an intrusive ground investigation and to prepare a Ground Investigation Report to supply the Client and their designers with information regarding ground conditions, to assist in preparing a foundation scheme for development that was appropriate to the settings present on the site.

The investigation was to be undertaken to provide comment on appropriate foundation options for the proposed development. The investigation was to be made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the exploratory holes.

The scope of works did not include the production of a Preliminary Investigation Report, or desktop study, in respect to ground contamination and therefore it was not possible to create, test or revise a conceptual site model in respect to ground contamination.

In the absence of CSM a number of geoenvironmental samples were collected and sent to the laboratory for analysis screening for a wide range of common brownfield contaminants.

1.2 Site Description

At the time of the investigation, October 2023 and February 2024, the site comprised a flat area adjacent to the River Medina. The site was used as a turning area for a boat travel hoist as well as temporary boat storage. The site covering was a mixture of concrete and scalping's. In places the scalping's were underlain by concrete.

The site was bounded to the north by a dismantled gas plant, to the east by boatyard services and boat storage areas, the south of the site was bounded by an industrial unit and to the west of the site was the tidal River Medina, which flowed north into the Solent.

The site was generally flat and level however the site sat within the wider Medina valley which dips down towards the River Medina.

The site location plan is given in Figure 1. An aerial photograph of the site and its close environs has been included in Figure 2.

1.3 Proposed Development

The development was to include a vessel wash down facility and hardstanding for boat storage.

In compiling this report reliance was placed on the contents of the letter addressed to Soils Limited on the 31st July 2022 from Hamil Davies Ltd. The recommendations provided within this report are made exclusively in relation to the scheme outlined above,

and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

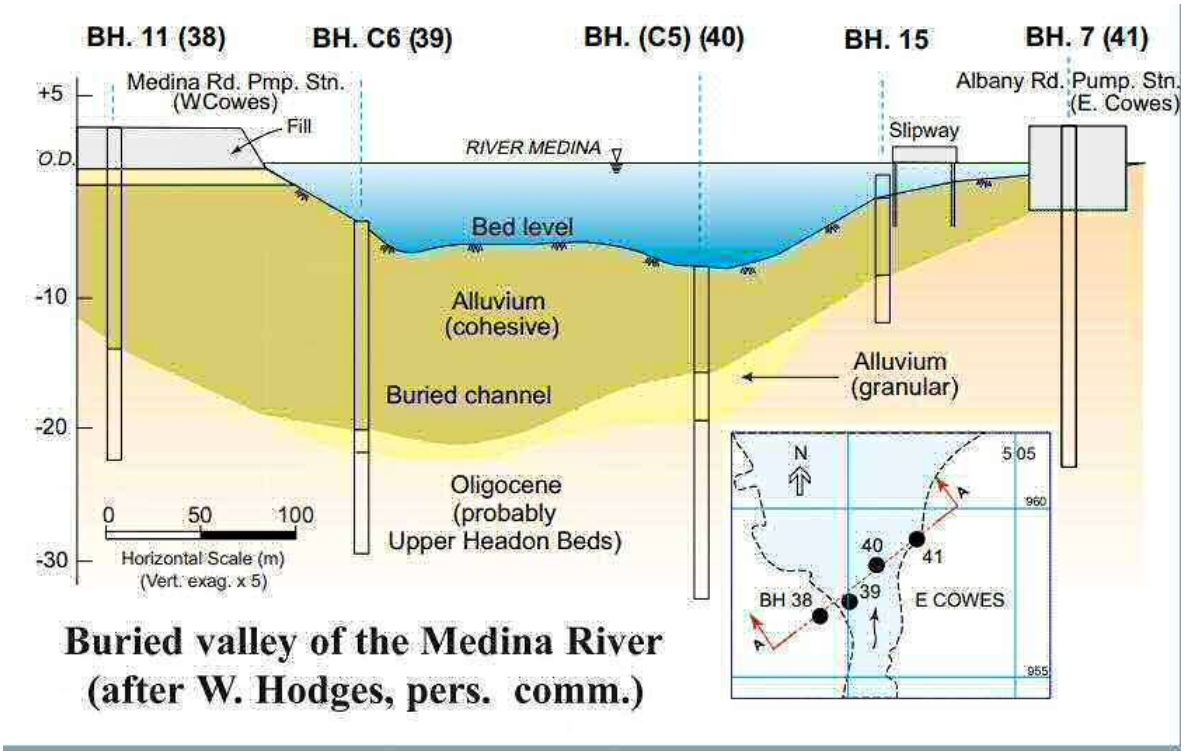
1.4 Anticipated Geology

The 1:50,000 BGS map showed the site to be located directly upon the bedrock Bembridge Limestone Formation with overlying superficial deposits of Tidal River or Creek Deposits.

It must be noted that the local geology passing east west through the River Medina can vary markedly with significant depths of Alluvial deposits near the centre of the valley formed by the River Medina. There can also be areas where the alluvial deposits and the Bembridge Limestone Formation are interbedded with soft bands of alluvial soils due to landslip overriding the alluvium and then subsequent alluvial deposition. In places the only way to differentiate between alluvial deposits and the Bembridge Limestone Formation is by the organic odour emitted from the recent alluvial soils The recent alluvium contains both modern shells and debris sourced from the in-situ soils, so is very difficult to distinguish.

1.4.1 Typical Cross Section

The typical cross section was based on an investigation undertaken by others and



provided to Soils Limited by Prof Edward Bromhead. (Reference: J. N. Hutchinson & E. N. Bromhead (2002) KEYNOTE PAPER: Isle of Wight Landslides. Conference on Instability: Planning & Management, Thomas Telford, May 2002.1-37. ISBN 0 7277 3132 7)

1.4.2 Made Ground

Made Ground comprises material that has been placed by man or spread by man. It can comprise demolition material from former structures on the site or imported material placed to raise levels. Its composition can be very variable both laterally and with depth and may contain putrescible matter and voids.

1.4.3 Tidal River or Creek Deposits

Normally comprises a consolidated soft silty clay, with layers of sand, gravel and peat.

They consist mainly of soft mud, but in places contain admixtures of sand. As a general rule, mud is deposited near highwater mark, silty or sandy mud in areas of intermediate water, and fine sand near the position of the water at low tide. In some places the sediments are laminated and cross-bedded. This lamination is not destroyed by burrowing and bottom organisms that live in great profusion on these tidal flats, probably owing to the fact that the sediments are deposited so rapidly that the organisms do not have time to rework them before they are buried by additional deposits. In some places as much as 3 meters of sediment are deposited in a year. The material laid down by tidal waters.

1.4.4 Bembridge Limestone Formation

The Bembridge Limestone Formation is comprised of peloidal limestones interbedded with lime rich mudstone and clays repeating a total of three times over a thickness of up to 9m.

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions and to aid the design of foundations for the proposed industrial development. The intended investigation, as outlined within the Soils Limited quotation (Q27988, dated 17th August 2023), was to comprise the following items:

- Scan of trial hole plan locations with CAT & Genny
- 1No. day machine excavated trial pits up to 3m deep
- 1No. trial pit soakage test
- 6No. DCP-TRL insitu CBR tests
- 1No. up to 15m deep cable percussive boreholes
- 1No. 10m deep groundwater monitoring well
- Geotechnical laboratory testing
- Geoenvironmental laboratory testing
- Waste acceptance criteria testing

2.1.1 Actual Project Works

The actual project works were undertaken on 9th October 2023, with subsequent sample logging, laboratory testing, and reporting. The actual works comprised:

- Scan of trial hole plan locations with CAT & Genny
- 6No. machine excavated trial pits
- 1No. trial pit soakage test
- 6No. DCP-TRL insitu CBR tests
- 1No. 12.30m deep cable percussive borehole
- 1No. 10m deep groundwater monitoring well
- Geotechnical laboratory testing
- Geoenvironmental laboratory testing
- Waste acceptance criteria testing

One cable percussive borehole was backfilled with gravel and bentonite following the installation of a monitoring well, and the remaining trial pits were backfilled with arising's upon completion and mounded over to allow for future settlement.

All exploratory hole locations have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub sampled so that samples could be sent to the laboratory for both contamination and geotechnical testing.

2.2 Additional Works

The additional intrusive investigation was designed to provide further information on the ground conditions in terms of contaminated soils in the location of the proposed industrial development. The intended additional investigation, as outlined within the Soils Limited quotation Change request form CR_3 (dated January 2024), were undertaken 7th February 2024 and comprised the following items:

- Additional windowless sampler drilling intended to delineate the extent of possible asbestos contamination;
- 10no. 1m deep windowless sampler boreholes at a distance of 1.00m and 3.00m, and at cardinal points around the previous TPSK1 trial hole location;
- Sample logging and Laboratory preparation;
- Laboratory Asbestos screening, 10No samples;
- Additional 2No. Laboratory Asbestos Quantification.

2.3 Ground Conditions

On 9th October 2023 one cable percussive borehole was drilled to a depth of 12.30m below ground level (bgl) at a location selected by the client's engineer.

One standpipe was installed within BH1 to allow for continued monitoring of both groundwater and ground gas, where present.

A total of six trial pits were machine excavated using a JCB 3CX type back hoe excavator to depths of between 1.30 and 3.00m bgl. It was not possible to excavate TP4 due to the presence of a concrete slab underlying the hardstanding at this location.

On 7th February 2024, 10No. up to 1.00m bgl windowless sampler boreholes were excavated with a Premier Drilling rig at a distance of 1.00m and 3.00m, and at cardinal points around the previous TPSK1 trial hole location for the purpose of delineating the area of previous contamination identified during siteworks October 2023.

The maximum depths of exploratory holes have been included in Table 2.1.

All exploratory holes were scanned with a Cable Avoidance Tool (C.A.T.) and GENNY prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Exploratory Holes

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
BH1(w)	12.30	TP3	2.10
TPSK1	2.50	TP5	3.00
TPSK1A	1.95	TP6	2.30
TP2	1.30		
WSN1	1.00	WSS1	1.00
WSN3	1.00	WSS3	1.00
WSE1	0.20	WSW1	1.00

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
WSE3	0.20 [1]	WSW3	1.00
WSNW3	1.00	WSSW3	1.00

Note(s): [W] - well installation. The depths given in this table are taken from the ground level on-site at the time of investigation. [1] Terminated on concrete.

The approximate exploratory hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the exploratory hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference must be made to the detailed records given within Appendix B, but for the purposes of discussion, the succession of conditions encountered in the exploratory holes in descending order can be summarised as:

Made Ground (MG)
Tidal River or Creek Deposits (TRD)
Bembridge Limestone Formation (BLF)

The ground conditions encountered in the exploratory holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
	Top	Bottom		
MG	0.00	0.20 – >3.00[1]	1.80	Multi-coloured clayey SAND and GRAVEL overlying dark grey and black sandy gravelly CLAY with concrete, tarmacadam and brick fragments.
TRD	0.75 – >3.00[1]	7.80	6.00	Soft, bluish grey and orangish brown CLAY.
BLF	7.80	>12.30[1]	Not proven[2]	Yellowish brown silty sand overlying off white medium strong LIMESTONE.

Note(s): [1] Final depth of exploratory hole. [2] Base of strata not encountered. The depths given in this table are taken from the ground level on-site at the time of investigation.

2.4 Ground Conditions Encountered in Exploratory Holes

The ground conditions encountered in exploratory holes have been described below in descending order. The engineering logs are presented in Appendix B.1.

2.4.1 Made Ground

Soils described as Made Ground were encountered in each of the seventeen exploratory holes from ground level to depths ranging between 0.20 and >3.00m bgl.

The Made Ground typically comprised granular soils overlying cohesive soils. The granular layer was typically described as multi-coloured clayey SAND and GRAVEL with concrete, flint, brick, tarmacadam and limestone fragments. The cohesive layers were typically described as dark grey and black sandy gravelly CLAY with inclusions of flint, tarmacadam, concrete and brick fragments. An anoxic type odour was noted within the several trial pits along with peaty fragments and de-composing roots.

The established depth of Made Ground found at each exploratory hole location have been included in Table 2.3.

Table 2.3 Established Depth of Made Ground

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
BH1	1.80	WSE1	0.20
TPSK1	0.75	WSE3	0.20
TPSK1A	0.75	WSS1	0.85
TP2	1.30[I]	WSS3	0.60
TP3	2.10[I]	WSW1	1.00[I]
TP5	3.00[I]	WSW3	1.00[I]
TP6	2.30	WSNW3	1.00[I]
WSN1	1.00[I]	WSSW3	1.00[I]
WSN3	0.75		

Note(s): [I] Final depth of exploratory hole.

2.4.2 Tidal River or Creek Deposits

Soils described as Tidal River Deposits were encountered in six out of the seventeen trial holes from immediately underlying the Made Ground and were present to a depth of 7.80m bgl within BH1 and to the base of TPSK1 and TP6.

The Tidal River Deposits were typically described as soft, bluish grey and orangish brown CLAY with inclusions of weak calcic nodules.

The established depth of Tidal River or Creek Deposits found at each exploratory hole location have been included in Table 2.4.

Table 2.4 Established Depth of Tidal River or Creek Deposits

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
BH1	7.80	WSE1	Not encountered
TPSK1	2.50[I]	WSE3	Not encountered

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
TPSK1A	Not encountered	WSS1	1.00[I]
TP2	Not encountered	WSS3	1.00[I]
TP3	Not encountered	WSW1	Not encountered
TP5	Not encountered	WSW3	Not encountered
TP6	3.00[I]	WSNW3	Not encountered
WSN1	Not encountered	WSSW3	Not encountered
WSN3	1.00[I]		

Note(s): [I] Final depth of exploratory hole.

The thickness of the alluvial deposits are likely to increase markedly in a westerly direction towards the centre of the River Medina.

2.4.3 Bembridge Limestone Formation

Soils described as the Bembridge Limestone Formation were only encountered within BH1 and were present underlying the Tidal River Deposits to the base of the investigation, 12.30m bgl.

The Bembridge Limestone Formation was described as yellowish brown silty sand overlying off white medium strong LIMESTONE recovered as sub-angular fine to coarse GRAVEL.

There can also be areas where the alluvial deposits and the Bembridge Limestone Formation are interbedded with soft bands of alluvial soils due to landslip overriding the alluvium and then subsequent alluvial deposition. In places the only way to differentiate between alluvial deposits and the Bembridge Limestone Formation is by the organic odour emitted from the recent alluvial soils.

2.5 Roots

Roots were encountered in fourteen out of the seventeen exploratory holes at depths ranging between 0.60 and 3.00m bgl. The established depth of root penetration found at the exploratory hole locations has been included in Table 2.5.

Table 2.5 Established Depth of Root Penetration

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
BH1	None observed	WSE1	None observed
TPSK1	2.30	WSE3	None observed
TPSK1A	1.95	WSS1	1.00[I]
TP2	1.30[I]	WSS3	1.00[I]
TP3	0.60	WSW1	1.00[I]
TP5	3.00[I]	WSW4	1.00[I]
TP6	2.30[I]	WSNW3	1.00[I]
WSN1	1.00[I]	WSSW3	1.00[I]
WSN3	0.75		

Note(s): [I] Final depth of exploratory hole.

Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

2.6 Groundwater

Groundwater was encountered within three out of the seventeen trial holes. Groundwater was encountered as seepages within the Made Ground at shallow depth and at greater depth within Bembridge Limestone Member. The groundwater in the Bembridge Limestone Member was confined by the overlying Tidal River Deposits and rose from 7.80m bgl to 3.70m bgl.

The site was noted to be bounded by the tidal River Medina and therefore it is anticipated that groundwater present within the shallow soils may exhibit tidal fluctuations with associated attenuation and a lag from the groundwater bodies.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage and tidal effects. The main intrusive investigation was conducted in October 2023, when groundwater levels should be rising from their annual minimum (lowest) elevation, which typically occurs around September to the annual maximum (highest) which typically occurs around March.

Details of the groundwater strikes during the investigation are presented in Table 2.6.

Table 2.6 Groundwater Strikes

Exploratory Hole	Strike Depth (m bgl)	Notes
BH1	7.80	Rising to 3.70m bgl after 20 minutes
TPSK1	2.30	Slight seepage.
TPSK1A	-	No groundwater encountered
TP2	1.30	Slight seepage.
TP3	-	No groundwater encountered
TP5	-	No groundwater encountered
TP6	-	No groundwater encountered
WSN1	-	No groundwater encountered
WSN3	-	No groundwater encountered
WSE1	-	No groundwater encountered
WSE3	-	No groundwater encountered
WSS1	-	No groundwater encountered
WSS3	-	No groundwater encountered
WSW1	-	No groundwater encountered
WSW4	-	No groundwater encountered
WSNW3	-	No groundwater encountered
WSSW3	-	No groundwater encountered

Groundwater equilibrium conditions may only be conclusively established, if a series of observations are made via groundwater monitoring wells which could be undertaken using the well within BH1 if required.

Section 3 Geotechnical In-Situ and Laboratory Testing

3.1 Standard Penetration Tests

Standard Penetration Tests (SPTs) were undertaken in BH1. The results were interpreted based on the classifications outlined in Appendix C.1, Table C.1.1 to Table C.1.3.

Table 3.1 SPT Hammer Efficiency

SPT Hammer Ref	Energy Ratio Er (%)
AR3552	77

Table 3.2 Standard Penetration Tests (SPT) Interpretation

Strata	N60 Range	Cohesive Soils Classification	Inferred Cohesion (Cu)
TRD	8 – 12	Medium	40 – 60kPa
Strata	**N60 Range**	**Granular Soils Relative Density**	
BLF	10 – 42	Medium dense to dense	

3.2 Dynamic Cone Penetrometer Tests

The Transport Research Laboratory (TRL), Dynamic Cone Penetrometer (DCP) was undertaken at six locations (DCP1 – DCP6). The results were interpreted based on the classification outlined in Appendix C.1.

The results from DCP testing indicated CBR values of between 7% and 273% for the soils encountered in the top 1.00m bgl. The high CBR values encountered were anticipated to be large gravel clasts or Made Ground inclusions struck during the test.

The DCP results are presented in Appendix C.3.

3.3 Infiltration Tests

Infiltration testing was undertaken in TPSK1A within the Tidal River or Creek Deposits following the principles of BRE Digest 365 Soakaway design: 1991.

A single test was attempted in TPSK1A however over the 96minute duration of the test the water level increased by 8% rather than decreased, likely due to water ingress from the Made Ground and Tidal River or Creek Deposits.

3.4 Quick Unconsolidated Undrained Triaxial Compression Tests

Quick Unconsolidated Undrained Triaxial Compression Tests (QUU) were performed on one sample obtained from the Tidal River or Creek Deposits. The strength interpretation was based on the classification outlined in Table C.2.1.

Table 3.3 Undrained Cohesion Results Classification

Strata	Sample Depth (m bgl)	Cohesive Soils	
		Classification	Undrained Cohesion (Cu)
TRD	6.50 – 6.95	Medium	56kPa

A full interpretation of the QUU tests are outlined Table C.2.1, Appendix C.2 and the laboratory report in Appendix C.3.

3.5 Atterberg Limit Tests

Atterberg Limit tests were performed on two samples obtained from the Tidal River or Creek Deposits. The results were classified in accordance with BRE Digest 240.

Table 3.4 Atterberg Limit Results Classification

Strata	Depth (m bgl)	Classification BRE 240
TRD	2.55 and 7.50	High

A full interpretation of the Atterberg Limit tests, are outlined in Table C.2.2, Appendix C.2 and the laboratory report in Appendix C.3.

3.6 Particle Size Distribution Tests

Particle Size Distribution (PSD) tests were performed on one sample from the Bembridge Limestone Member.

Table 3.5 Particle Size Distribution Classification

Strata	Depth (m bgl)	Shrinkabilitiy Classification BRE 240
BLM	9.00	Yes

Note that a cohesive soil is only classified as having a volume change potential if it is also plastic and an Atterberg Limit test can be conducted on the strata.

A full interpretation of the PSD tests, are outlined in Table C.2.3, Appendix C.2 and the laboratory report in Appendix C.3.

3.7 Sulphate and pH Tests

Water soluble sulphate (2:1) and pH testing in accordance with Building Research Establishment Special Digest 1, 2005, ‘Concrete in Aggressive Ground’ was carried out on three samples, one from the Tidal River or Creek Deposits and two from the Bembridge Limestone Formation.

Table 3.6 Sulphate and pH Test Results

Strata	Depth (m bgl)	Sulphate Concentration (mg/l)	pH
TRD	3.00	206	8.2
BLF	8.00	202	7.9
	10.50	154	8.2

The significance of the sulphate and pH Test results are discussed in Section 0 and the laboratory report in Appendix C.3.

Section 4 Engineering Appraisal

4.1 Established Ground Conditions

An engineering appraisal of the soil types encountered during the site investigation and likely to be encountered during the redevelopment of this site is presented. Soil descriptions are based on analysis of disturbed samples taken from the exploratory holes.

4.1.1 Made Ground and Topsoil

Foundations must not be placed on non-engineered fill unless such use can be justified on the basis of a thorough ground investigation and detailed design. Foundations must be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

Peat and organic soils are highly compressible, and even lightly loaded foundations will be subject to considerable settlements over a long period if placed on them. For this reason, these soils are not suitable for carrying the loads for important structures.

Soils described as Made Ground were encountered in each of the seventeen exploratory holes from ground level to depths ranging between 0.20 and >3.00m bgl.

4.1.2 Tidal River or Creek Deposits

Soils described as Tidal River Deposits were encountered in six out of the seventeen trial holes from immediately underlying the Made Ground and were present to a depth of 7.80m bgl within BH1.

Soils of the Tidal River or Creek Deposits are normally consolidated, predominantly cohesive soils and as such are expected to display low bearing capacities with moderate to high settlement characteristics. The soils of the Tidal River or Creek Deposits were not considered suitable for the proposed development due to their generally poor engineering characteristics and the variations both in composition and deposition thickness. Peat and organic soils may also be present that are highly compressible, and even lightly loaded foundations will be subject to considerable settlements over a long period if placed on them. For this reason, these soils are not suitable for carrying the loads for important structures

4.1.3 Bembridge Limestone Formation

Soils described as the Bembridge Limestone Formation were only encountered within BH1 and were present underlying the Tidal River Deposits to the base of the investigation, 12.30m bgl.

Generally, soils of the Bembridge Limestone Formation are a weak rock and would possess moderate bearing and settlement characteristics. The Bembridge Limestone Formation would be suitable as a bearing stratum providing that a piled foundation solution was adopted.

4.1.4 Guidance on Shrinkable Soils

The ground conditions were established as Tidal River or Creek Deposits, with a typical thickness off 7.80m, overlying the bedrock of Bembridge Limestone Formation.

The volume change potential for each strata was established and presented in Table 4.1.

Table 4.1 Established Volume Change Potential by Strata

Strata	Volume Change Potential BRE	Established Lower Boundary (m bgl)
TRD	High	7.80
BLM	Yes	>12.30

4.1.5 Groundwater

Groundwater was encountered within three out of the seventeen trial holes. Groundwater was encountered as seepages within the Made Ground at shallow depth and at greater depth within Bembridge Limestone Member. The groundwater in the Bembridge Limestone Member was confined by the overlying Tidal River Deposits and rose from 7.80m bgl to 3.70m bgl.

The site was noted to be bounded by the tidal River Medina and therefore it is anticipated that groundwater present within the shallow soils may exhibit tidal fluctuations with associated attenuation and lag for groundwater bodies.

Section 5 Pavements

5.1 Pavements

The Transport Research Laboratory (TRL) Dynamic Cone Penetrometer (DCP) was undertaken at six locations on site (DCP1 – DCP6). The results from dynamic cone penetrometer tests indicated **CBR values of between 7% and 273%** for the soils encountered in the top 1.00m bgl. The high CBR values encountered were anticipated to be large gravel clasts struck during the test.

When removing 400mm of Made Ground the worst case CBR value was 7% which was considered suitable for design purposes for the majority of the road layout.

As CBR values were highly variable due to changes in moisture content and ground conditions, **in-situ testing must be undertaken** immediately prior to the installation of pavements/roads. Any soft spots at formation level must be dug out and replaced with a suitably compacted granular fill. Prior to construction the formation level must be proof rolled.

The variable soils of the Made Ground should be considered to be frost susceptible.

The overall thickness of the pavement will be dictated by the frost susceptibly of the sub-grade.

Section 6 Site Drainage

6.1 Soakaways

The results of in-situ soakage tests indicated that the soils of the Tidal River or Creek Deposits underlying the site had shallow groundwater which resulted in the water level in the test pit rising over time.

It is recommended that the results of the in-situ permeability testing are passed to a drainage engineer for commentary and design.

Section 7 Determination of Chemical Analysis

7.1 Soil Sampling

Exploratory hole locations were established to provide an overview of ground conditions across the site in relation to the proposed construction, together with enabling the collection of samples to enable chemical characterisation of the underlying strata.

Representative samples for potential environmental testing were obtained from the exploratory holes at depths of between 0.20m and 2.50m to allow appropriate representation of the materials encountered, with additional samples to be obtained, if necessary, where there was visual or olfactory evidence of contamination.

In the absence of a preliminary investigation report or desk study analytical testing was based initially on a screening suite of commonly identified inorganic and organic contaminants, taking into account the prevailing site conditions.

7.2 Determination of Chemical Analysis

The driver for determination of the analysis suite was the information obtained from the Preliminary Investigation Report and Contamination Investigation Report intrusive investigation.

The initial chemical analyses were carried out on four samples of Made Ground and one sample of the Tidal River or Creek Deposits.

Ten further Asbestos ID analyses followed by two Asbestos Quantification tests were undertaken on samples of Made Ground recovered during additional siteworks February 2024. The nature of the analyses is detailed in Table 7.1.

Table 7.1 Chemical Analyses Suites - Soil

Determinants	Soil Tested	
	MG	TRD
Metal suites: Arsenic, Boron (Water Soluble), Cadmium, Chromium (total & hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc	5	1
Organic Matter	5	1
pH	5	1
Polycyclic aromatic hydrocarbons (PAH) – (EPA 16)	5	1
Phenols – total monohydric	5	1
Extractable petroleum hydrocarbons (EPH) – Texas banding	5	1
Total petroleum hydrocarbons (TPH) – CWG banding	5	1
BTEX and MTBE	5	1
Cyanide total & free	5	1
Polychlorinated biphenyls (PCB) – 7 Congeners	5	1
Waste acceptance criteria (WAC)	5	
Asbestos screening	16	1
Asbestos quantification	3	

The soil testing was carried out in compliance with the MCERTS performance standard,

Table 3.6 Sulphate and pH Test Results

Strata	Depth (m bgl)	Sulphate Concentration (mg/l)	pH
TRD	3.00	206	8.2
BLF	8.00	202	7.9
	10.50	154	8.2

The significance of the sulphate and pH Test results are presented in the laboratory report in Appendix C.3.

Section 8 Qualitative Risk Assessment

8.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix D.2.

8.2 Representative Contamination Criteria - Soil

The development was to include a vessel wash down facility and hardstanding for boat storage.

In compiling this report reliance was placed on the contents of the letter addressed to Soils Limited on the 31st July 2022 from Hamil Davies Ltd. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Based on the proposed development, the results of the chemical analysis have been compared against generic assessment criteria (GAC) for a '***Commercial***' end use, as presented in SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014 (C4SL), derived for the protection of human health. Where this document has not published screening values for determinants, GACs derived for the same end use have been adopted from the following published guidance; DEFRA Soil Guideline Values (SGV) and LQM/CIEH/Suitable 4 Use Level (S4UL).

To assess the potential toxicity of organic determinants (Petroleum Hydrocarbons and Polyaromatic Hydrocarbons) to the human health, soils samples were analysed for Soil Organic Matter (SOM). The selected samples analysed recorded, SOM values of between 2.8% and 16.9%. For each soil sample tested, the resultant SOM allowed for the correct comparison to be made with the appropriate guideline value for each organic determinants analysed.

8.3 Risk Assessment – Made Ground

Table 8.1 outlines the sample that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix D.1.

Table 8.1 Summary of GAC Exceedances – Made Ground

Location	Depth (m bgl)	Contaminant	Concentration	Guidance Level
		No exceedances		

Note(s): Units mg/kg

The risk assessment has established no potential pollutant linkages in relation to human health from the Made Ground across the site.

8.4 Risk Assessment – Tidal River or Creek Deposits

Table 8.2 outlines the samples that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix D.1.

Table 8.2 Summary of GAC Exceedances – Tidal River or Creek Deposits

Location	Depth (m bgl)	Contaminant	Concentration	Guidance Level
		No exceedances		

Note(s): Units mg/kg

The risk assessment has established no potential pollutant linkages in relation to human health from the Tidal River or Creek Deposits.

8.5 Asbestos

The test certificate for each sample submitted for contamination analysis during this investigation includes the results of an Asbestos Screen.

A sample from the Made Ground (TPSK1:0.50m bgl) was reported as 'Detected' with a material type of Chrysotile, present as loose fibres, the asbestos was subsequently quantified at 0.005%.

Additional works as a delineation exercise around TPSK1 resulted in two further positive Asbestos ID's detected with a material type of Chrysotile, present as loose fibres. Composite samples of Made Ground were analysed, and the two samples with positive Asbestos screen were WSS3:0.00 – 0.60, and WSNW3 0.00 – 1.00m bgl. The asbestos was subsequently quantified at 0.001% in both samples.

In summary, the positive Asbestos identification indicated that the presence in soils is no longer an isolated outlier. Further delineation of the area is an option for the site. Quantification results can be passed to a specialist asbestos consultant whereby further advice must be sought for the site.

8.6 Risk to Groundwater

Taking into consideration the ground conditions encountered, the presence of oily sheen noted on groundwater seepages and the presence of PAH and TPH levels within the soil samples it is recommended that groundwater sampling and laboratory testing is undertaken.

8.7 Risk from Ground Gas Ingression

The investigation identified potentially putrescible materials in the form of wood

fragments within the Made Ground, however as the proposed development plans did not include any buildings or confined spaces it is considered that there is no risk to the end user.

8.7.1 Radon

Based on a review of the online Radon Mapping the site **was not situated** within an area where protection or risk assessment against the ingress of radon was required. Radon protection measures **will not be required** within the proposed new development.

8.8 Generic Quantitative Risk Assessment

Quantitative risk assessments were undertaken for the soil. The full laboratory chemical report is presented in Appendix D.1.

8.8.1 Soils

None of the samples tested showed elevated concentrations when assessed against the commercial screening values.

8.8.2 Asbestos

Asbestos Containing Material (ACM) were detected within three samples: TPSK1 at 0.50m bgl; WSS3:0.00 – 0.60; and WSNW3 0.00 – 1.00m bgl. The ACM was determined to comprise loose fibres of chrysotile and was quantified at 0.005% in TPSK1 at 0.50m, and 0.001% in both WSS3:0.00 – 0.60; and WSNW3 0.00 – 1.00m bgl.

The Tier 1 Quantitative risk assessment therefore established that there was **a risk to the human health receptors** of construction workers or future end-users and an asbestos consultant should be appointed to provide specialist advice.

8.9 Recommendations

Soil chemical analysis recorded three samples with Asbestos fibres present.

Therefore, there was a risk to the Human Health receptor and further specialist advice from an asbestos consultant should be sought.

Taking into consideration the ground conditions encountered, the presence of oily sheen noted on groundwater seepages and the presence of PAH and TPH levels within the soil samples it is recommended that groundwater sampling and laboratory testing is undertaken.

8.10 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

8.11 Excavated Material

Excavated material as waste must be defined or classified prior to any disposal, transport, recycling or re-use at or by an appropriately licensed or exempt carrier and/or off-site disposal facility. The requirements inherent in both Duty of Care and Health and Safety must also be complied with. In order to determine what is to happen, what is suitable, appropriate and most effective in the disposal of wastes, especially those subject to CDM waste management plan requirements, several factors must be considered, and competent advice must always be sought.

8.12 HazWasteOnline

WAC analysis was undertaken on a single sample to provide a general indication for future waste removal.

The sample was classified as suitable for disposal at an inert landfill. The WAC certificate is presented in Appendix D.1.

8.13 Re-use of Excavated Material On-site

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is accepted as an alternative regime to the EPR.

8.14 Imported Material

Any soil, which is to be imported onto the site, must undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it is suitable for the purpose for which it is intended.

8.15 Discovery Strategy

There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site.

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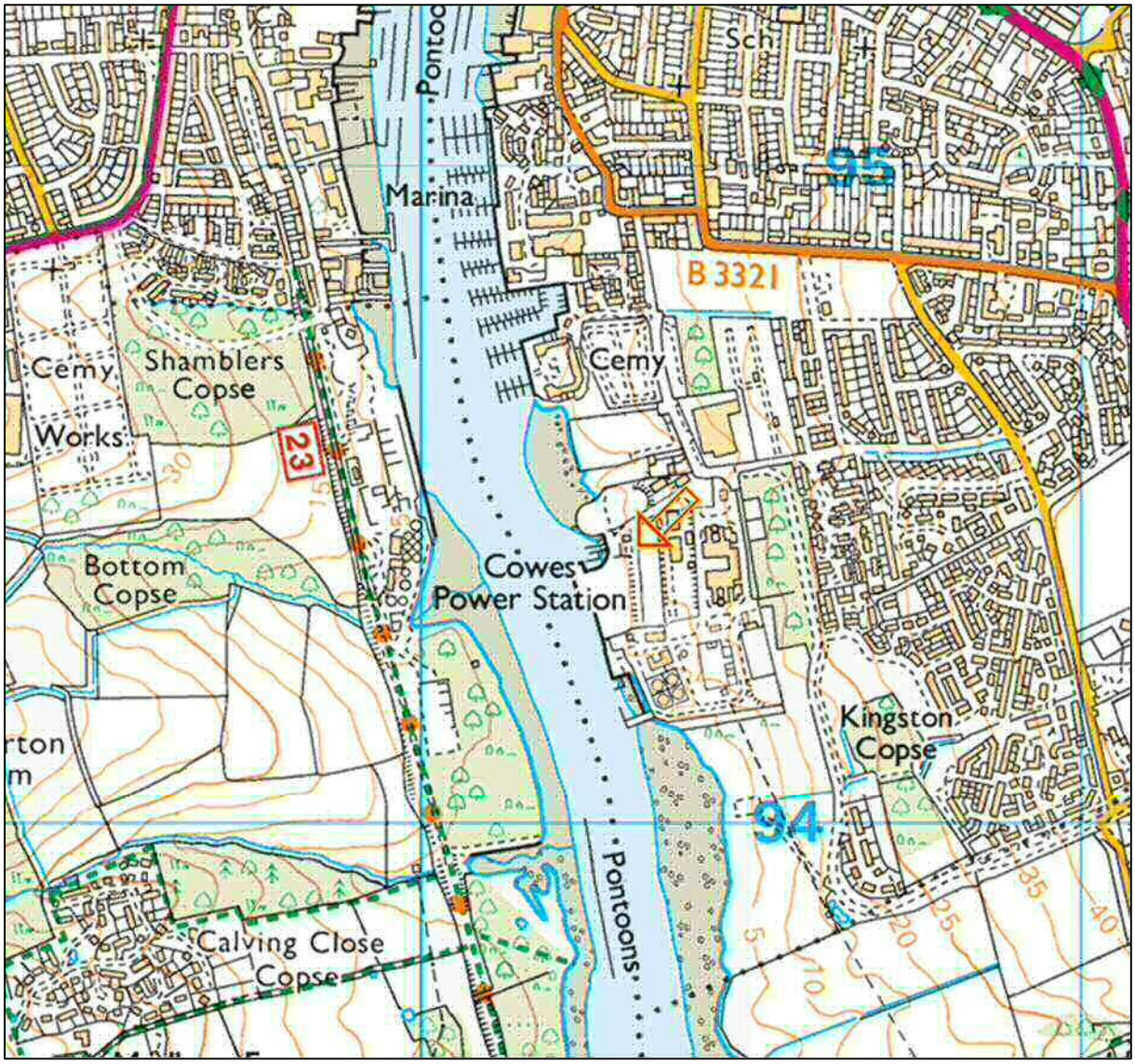

Figure 1 – Site Location Map

N

Job Number 21091	**Project** Kingston Wharf, East Cowes, Isle of Wight, PO32 6JS
Client Cowes Harbour Commission	**Date** March 2024

Figure 2 – Aerial Photograph

Project
Kingston Wharf, East Cowes, Isle of Wight, PO32 6JS

Client
Cowes Harbour Commission

Date
March 2024

Job Number
21091

Figure 3 – Exploratory Hole Plan

Project
Kingston Wharf, East Cowes, Isle of Wight, PO32 6JS

Client
Cowes Harbour Commission

Date
March 2024

Job Number
21091

Figure 4 – Additional Works Exploratory Hole Plan

Project
Kingston Wharf, East Cowes, Isle of Wight, PO32 6JS

Client
Cowes Harbour Commission

Date
March 2024

Job Number
21091

Appendix A Standards and Resources

The site works, soil descriptions and geotechnical testing was undertaken in accordance with the following standards were applicable:

- BS 5930:2015 and BS EN ISO 22476-3:2005+A1:2011
- BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design
- BS EN ISO 14688-1:2018 - Geotechnical investigation and testing - Identification and description
- BS EN ISO 14688-2:2018 - Geotechnical investigation and testing - Principles for a classification
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites
- LCRM 2021 Environment Agency
- BS 8004:2015 – Code of practice for foundations
- BS 1377:1990 Parts 1 to 8
- BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'
- Stroud, M. A. 1974, "The Standard Penetration Test – its application and interpretation", Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.
- N.E. Simons, B.K. Menzies, "A Short Course in Foundation Engineering"
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- CIRIA C733, Asbestos in soil and made ground: a guide to understanding and managing risks and CAR2012 regulations.
- Google Earth
- British Geological Survey Website & iGeology App

Appendix B Field Work

Appendix B.1 Engineers Logs

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Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**BH1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	09/10/23	JA	TRB	PRELIM	**CP**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Dando 2000	07/11/2023	1:50

Weather: | Termination: Very dense Limestone at the base. | SPT Hammer: AR3552 Energy Ratio: 77% | Sheet 1 of 2

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				0.05 (0.30)		Firm greyish brown, slightly sandy, slightly gravelly silty CLAY. Gravel is subangular fine to coarse flint. MADE GROUND		
0.30	ES			0.30		Firm greyish brown, slightly silty, slightly sandy, slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. MADE GROUND		
0.30 - 0.50	B					REINFORCED CONCRETE		
0.50	ES			(0.70)		Soft dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium flint and brick. MADE GROUND		
0.50 - 0.70	B							
0.90 - 1.10	B			1.00		CONCRETE		
1.00	ES			1.10		Soft dark grey and light greenish grey slightly sandy gravelly REWORKED CLAY. Gravel is subangular fine to coarse flint. MADE GROUND		
1.20	SPT B	N=5 (6,2/1,1,2,1)						
1.50	ES			(0.70)				
1.80 - 2.00	B			1.80		Soft bluish grey and orangish brown slightly gravelly CLAY. Gravel is subangular fine to coarse limestone. TIDAL RIVER CREEK DEPOSITS.		
2.00	ES							
2.10 - 2.55	U							
2.55 - 2.75	B							
3.00	SPT D	N=6 (1,0/1,1,2,2)						
3.50	D							
4.00 - 4.40	B							
4.50 - 4.90	U							
4.90 - 5.10	D			(6.00)				
5.50	SPT D	N=9 (1,1/2,2,2,3)						
6.00	D							
6.50 - 6.95	U							
6.95 - 7.15	D							
7.50	D							
8.00	SPT D	N=8 (2,2/2,2,2,2)		7.80		Yellowish brown silty SAND. Occasional subangular fine to coarse limestone gravel. BEMBRIDGE LIMESTONE FORMATION.		
9.00	D			(2.30)				
9.50	SPT D	N=13 (10,3/3,3,3,4)						

Start & End of Shift Observations				
Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter	
Depth (m)	Dia (mm)

Casing Diameter	
Depth (m)	Dia (mm)
3.00	200
12.00	150

Remarks:
No roots observed.

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	10.00	SLOTTED	50

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
7.80			20	3.70	

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:	Client:	Hole ID:
Kingston Wharf	Cowes Harbour Comission	**BH1**

Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	09/10/23	JA	TRB	PRELIM	**CP**

Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Dando 2000	07/11/2023	1:50

Weather: | Termination: Very dense Limestone at the base. | SPT Hammer: AR3552 Energy Ratio: 77% | Sheet 2 of 2

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
10.10	D			10.10		Yellowish brown silty SAND. Occasional subangular fine to coarse limestone gravel. BEMBRIDGE LIMESTONE FORMATION.		
10.20 - 10.40	B			(0.50)		Off-white, medium strong LIMESTONE. Recovered as subangular fine to coarse limestone gravel. BEMBRIDGE LIMESTONE FORMATION.		
10.50	SPT	N=31 (25 for 140mm/10,6,7,8)		10.60		Stiff, greyish cream slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse limestone. Occasional marine shell fragments. BEMBRIDGE LIMESTONE FORMATION.		
	D			(0.90)				
11.50	D			11.50		Off-white, medium strong LIMESTONE. Recovered as subangular fine to coarse limestone gravel. BEMBRIDGE LIMESTONE FORMATION.		
12.00	SPT	33 (42 for 130mm/33 for 265mm)		(0.80)				
	D			12.30		End of Borehole at 12.30m		
12.00 - 12.30	B							

11 12 13 14 15 16 17 18 19 20

Start & End of Shift Observations				
Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter	
Depth (m)	Dia (mm)

Casing Diameter	
Depth (m)	Dia (mm)
3.00	200
12.00	150

Remarks:
No roots observed.

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	10.00	SLOTTED	50

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
7.80			20	3.70	

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

Soils Limited
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Trial Pit Log

Trial Pit No. **TP2** Sheet 1 of 1

Project Name: Kingston Wharf	Project No.: 21091	Method: Machine Excavated	Hole Type TP
Location: Kingston Road, Isle of Wight, PO32 6JS		Plant: CAT	Scale 1:25
Client: Cowes Harbour Comission	Trial Pit Length: m	Trial Pit Width: m	Support:
Dates: 09/10/2023	Level:	Co-ords:	Logged By DEE

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
	0.10	ES		0.20			Yellowish brown gravelly SAND. Gravel is angular to rounded, fine to coarse flint, chalk, and limestone. Frequent rootlets. MADE GROUND.
	0.30	B ES		0.45			White mottled grey, clayey sandy GRAVEL AND COBBLES. Gravel is angular to rounded, fine to coarse chalk, flint, and tarmac. Cobbles are angular to sub-angular chalk. MADE GROUND.
	0.60	D ES		1.00			Firm blueish grey mottled yellowish brown and grey, slightly silty reworked CLAY. MADE GROUND.
▼	1.10	D ES		1.30			Firm to stiff multicoloured slightly sandy slightly gravelly reworked CLAY. Gravel is sub-angular fine to coarse chalk/calcic material. Frequent rootlets and decomposing roots. Water seepage at 1.30m bgl with mild sheen on surface. MADE GROUND.
							End of Pit at 1.300m

1 2 3 4 5

General Remarks:
Rootlets observed to 1.30m bgl.

Groundwater Remarks: Water seepage at 1.30m bgl.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

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Trial Pit Log

Trial Pit No.
TPSK1A
Sheet 1 of 1

Project Name: Kingston Wharf	Project No.: 21091	Method: Machine Excavated	Hole Type TP
Location: Kingston Road, Isle of Wight, PO32 6JS		Plant: CAT	
		Support:	Scale 1:25
Client: Cowes Harbour Comission	Trial Pit Length: m	Trial Pit Width: m	
Dates: 09/10/2023	Level:	Co-ords:	Logged By DEE

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
							Multicoloured, slightly sandy, slightly silty GRAVEL and COBBLES. Gravel is angular to sub-angular, fine to coarse, Limestone, brick, clinker, tarmac and flint. Cobbles are angular bricks. Occasional rootlets. MADE GROUND.
				0.50			Stiff greenish grey slightly sandy, slightly gravelly CLAY. Frequent black staining, possibly organic. Gravel is angular to rounded, fine to coarse flint, brick, tarmac, limestone. Occasional angular to sub-angular brick cobbles. Occasional rootlets. MADE GROUND.
				0.75			Firm blueish grey mottled grey and dark grey, slightly sandy, slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to coarse flint, increasing with depth. Sand is fine and features in frequent inclusions and lenses. Occasional rootlets and decomposing rootlets. TIDAL RIVER CREEK DEPOSITS
				1.60			Firm to stiff, yellowish brown mottled grey and blue CLAY. Occasional rootlets and decomposing rootlets. TIDAL RIVER CREEK DEPOSITS
				1.95			End of Pit at 1.950m

General Remarks:
Rootlets observed to 2.30m bgl.

Groundwater Remarks: No water strike.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

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Trial Pit Log

Trial Pit No.
TPSK1
Sheet 1 of 1

Project Name: Kingston Wharf	Project No.: 21091	Method: Machine Excavated	Hole Type TP
Location: Kingston Road, Isle of Wight, PO32 6JS		Plant: CAT	
		Support:	Scale 1:25
Client: Cowes Harbour Comission	Trial Pit Length: m	Trial Pit Width: m	
Dates: 09/10/2023	Level:	Co-ords:	Logged By DEE

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
	0.10	D ES					Multicoloured, slightly sandy, slightly silty GRAVEL and COBBLES. Gravel is angular to sub-angular, fine to coarse, Limestone, brick, clinker, tarmac and flint. Cobbles are angular bricks. Occasional rootlets. MADE GROUND.
	0.50	D ES		0.50			Stiff greenish grey slightly sandy, slightly gravelly CLAY. Frequent black staining, possibly organic. Gravel is angular to rounded, fine to coarse flint, brick, tarmac, limestone. Occasional angular to sub-angular brick cobbles. Occasional rootlets. MADE GROUND.
	0.80	D ES		0.75			Firm blueish grey mottled grey and dark grey, slightly sandy, slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to coarse flint, increasing with depth. Sand is fine and features in frequent inclusions and lenses. Occasional rootlets and decomposing rootlets. TIDAL RIVER CREEK DEPOSITS
	1.40	D ES					*Becomes blue at 1.40m bgl. Becomes soft at 1.40m bgl.*
	1.70	D		1.60			Firm to stiff, yellowish brown mottled grey and blue CLAY. Occasional rootlets and decomposing rootlets. TIDAL RIVER CREEK DEPOSITS
							Occasional gravel sized inclusions of calcic material/chalk from 2.00m bgl.
▽	2.30	D					
				2.50			End of Pit at 2.500m

1 2 3 4 5

General Remarks:
Rootlets observed to 2.30m bgl.

Groundwater Remarks: No water strike. Seepage into hole at 2.30m bgl.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk	**Trial Pit Log**	Trial Pit No. **TP6** Sheet 1 of 1

Project Name: Kingston Wharf	Project No.: 21091	Method: Machine Excavated	Hole Type TP
Location: Kingston Road, Isle of Wight, PO32 6JS		Plant: CAT Support:	Scale 1:25
Client: Cowes Harbour Comission	Trial Pit Length: m	Trial Pit Width: m	
Dates: 09/10/2023	Level:	Co-ords:	Logged By DEE

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
	0.10	D ES		0.20			Pink mottled grey, slightly silty sandy GRAVEL. Gravel is angular to sub-angular, fine to coarse limestone, igneous, concrete and flint. MADE GROUND.
	0.30	B D ES		0.50			Multicoloured SAND AND GRAVEL. Gravel is angular to rounded, fine to coarse limestone, clinker, igneous, brick, flint and tarmac. Frequent ash. MADE GROUND.
	0.60	B D ES					Black mottled multicoloured SAND AND GRAVEL with frequent cobbles. Gravel is angular to rounded, fine to coarse clinker, slag, brick, concrete, metal, and glass. Cobbles angular brick and concrete. Occasional clay lenses and inclusions, increasing with depth. MADE GROUND.
	1.00	B ES					
	1.50	D ES		1.40			Firm blackish brown mottled multicoloured, slightly sandy, gravelly CLAY. Gravel is angular to sub-angular, fine to coarse clinker, brick, concrete, and metal. Frequent ash. Occasional rope fragments. MADE GROUND.
	2.00	D ES		1.90			Stiff multicoloured slightly sandy, slightly gravelly CLAY. Gravel is angular to sub-angular, fine to coarse brick, flint, clinker, and concrete. Occasional rootlets. MADE GROUND.
	2.50	D ES		2.30			Stiff multicoloured CLAY. Occasional inclusions of weak calcic material. TIDAL RIVER CREEK DEPOSITS.
	3.00	D ES		2.90 3.00			Very stiff light blueish grey gravelly CLAY. Gravel is sub-angular fine to medium weak calcic material and extremely weak calcic mudstone. TIDAL RIVER CREEK DEPOSITS. End of Pit at 3.000m

1 2 3 4 5

General Remarks:
Rootlets observed to 2.30m bgl.

Groundwater Remarks: No groundwater encountered.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk	**Trial Pit Log**	Trial Pit No. **TP5** Sheet 1 of 1

Project Name: Kingston Wharf	Project No.: 21091	Method: Machine Excavated	Hole Type TP
Location: Kingston Road, Isle of Wight, PO32 6JS		Plant: CAT Support:	Scale 1:25
Client: Cowes Harbour Comission	Trial Pit Length: m	Trial Pit Width: m	
Dates: 09/10/2023	Level:	Co-ords:	Logged By DEE

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
	0.20	B D ES		0.10			Pink mottled grey, slightly silty sandy GRAVEL. Gravel is angular to sub-angular, fine to coarse limestone, flint, tarmac and concrete. MADE GROUND.
	0.50	D ES		0.40			Multicoloured slightly sandy, clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse limestone, flint, brick, tarmac and concrete. Frequent sub-angular limestone cobbles and boulders. Frequent clay lenses. MADE GROUND.
	0.90	D ES		0.80			Firm to stiff, greenish brown mottled multicoloured, slightly gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse flint, concrete, tarmac, brick, and limestone. Occasional rootlets and decomposing wood fragments. Organic odour. MADE GROUND.
	1.50	D ES					Firm to stiff, yellowish brown mottled blue and grey, CLAY. Occasional angular to sub-angular fine to coarse flint gravel and sand lenses. Occasional fine calcareous shells. Occasional rootlets, decomposing wood fragments and roots. MADE GROUND.
	2.00	D ES		1.95			Firm to stiff with occasional soft inclusions, dark grey mottled yellowish brown, slightly sandy, slightly gravelly CLAY. Gravel is sub-angular fine to coarse flint and rare brick. Frequent sand and flint gravel lenses and inclusions. Frequent black mottling. Occasional rootlets, decomposing wood fragments and roots. MADE GROUND.
	2.50	D ES		2.30			Firm to stiff, multicoloured slightly sandy, slightly gravelly CLAY. Gravel is sub-angular fine to coarse flint and rare brick. Occasional rootlets, decomposing wood fragments and roots. Distinct organic odour. MADE GROUND.
	3.00	D ES		3.00			End of Pit at 3.000m

General Remarks:
Rootlets observed to 3.00m bgl.

Groundwater Remarks: No groundwater encountered.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

Soils Limited
Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Trial Pit Log

Trial Pit No. **TP3** Sheet 1 of 1

Project Name: Kingston Wharf	Project No.: 21091	Method: Machine Excavated	Hole Type TP
Location: Kingston Road, Isle of Wight, PO32 6JS		Plant: CAT	
		Support:	Scale 1:25
Client: Cowes Harbour Comission	Trial Pit Length: m	Trial Pit Width: m	
Dates: 09/10/2023	Level:	Co-ords:	Logged By DEE

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (mAOD)	Legend	Stratum Description
	0.20	D ES		0.30			Yellowish brown gravelly SAND. Gravel is angular to rounded, fine to coarse flint, chalk, and limestone. Frequent rootlets. MADE GROUND.
	0.50	D ES		0.60			Multicoloured clayey SAND AND GRAVEL. Gravel is angular to rounded, fine to coarse concrete, flint, brick and tarmac. Occasional clay lenses. Occasional rootlets. MADE GROUND.
	0.70	D ES					Black mottled multicoloured, slightly sandy, clayey GRAVEL. Gravel is angular to rounded, fine to coarse flint, tarmac, concrete and brick. Frequent clay lenses increasing with depth. Anoxic odour. Occasional concrete boulders. Rare metal fragments. MADE GROUND.
	1.00	B					
	1.60	B ES		1.50			Firm and stiff intermittently slightly sandy gravelly CLAY. Gravel is angular to rounded, fine to coarse flint, tarmac, concrete and brick. Frequent large sand and gravel lenses. Anoxic odour. MADE GROUND. *60cm diameter concrete pile persists to base of hole.*
	2.10	D ES		2.10			End of Pit at 2.100m

General Remarks:
Rootlets observed to 0.60m bgl.

Groundwater Remarks: No groundwater encountered.

Sample Type
D: Disturbed
B: Bulk
J: Jar
W: Water

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Contract Name:	Client:	Hole ID:
Kingston Wharf	Cowes Harbour Comission	**WSN1**

Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**

Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	D			0.20 (0.30) 0.50 (0.50) 1.00		Multicoloured clayey very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint, road base, and rare concrete and brick. Occasional clay lenses. MADE GROUND. Pinkish grey mottled multicoloured, slightly silty, very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, flint and rare tarmac. MADE GROUND. Firm multicoloured, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional decomposing organic material. Re-worked soils. MADE GROUND. End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSN3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 0.75	D			0.20		Greyish brown clayey very sandy GRAVEL. Gravel is angular to well-rounded, fine to coarse limestone, flint, and rare concrete and brick. Occasional clay lenses. MADE GROUND.		
				0.40		Multicoloured, sandy very clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse brick, tarmac, cement, and flint. Rare brick cobble. MADE GROUND.		
				(0.35)		Firm multicoloured, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint and rare clinker. Occasional decomposing organic material. Re-worked soils. MADE GROUND.		
				0.75		Soft to firm yellowish brown mottled brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to well rounded, fine to coarse flint.		
				1.00		End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSE1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 0.20	D			0.10 0.20		Greyish brown clayey very sandy GRAVEL. Gravel is angular to well-rounded, fine to coarse flint, and limestone. Occasional clay lenses. MADE GROUND.		
						Pinkish grey mottled multicoloured, slightly silty, very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, flint, tarmac and brick. MADE GROUND.		
						End of Borehole at 0.20m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth (m)	Dia (mm)

Remarks:

Chiselling

From (m)	To (m)	Duration	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSE3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 0.20	D			0.20		Pinkish grey mottled multicoloured, slightly silty, very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, flint, tarmac and brick. MADE GROUND.		
						End of Borehole at 0.20m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSS1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 0.85	D			(0.50)		Multicoloured, sandy very clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse limestone, brick, flint, tarmac, and clinker. Rare broken brick cobble. MADE GROUND.		
				0.50 0.60		Firm multicoloured, slightly sandy, very gravelly CLAY. Gravel is angular to rounded, fine to coarse tarmac, brick, clinker, desiccated concrete and flint. MADE GROUND.		
				0.85 1.00		Firm dark grey mottled black and greyish brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint and rare brick, clinker and desiccated concrete. Occasional decomposing organic material. Re-worked soils. MADE GROUND.		
						Soft to firm, blueish grey mottled dark grey, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional decomposing organic material. Possibly re-worked soils.		
						End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSS3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 0.60	D			0.20 (0.40) 0.60 (0.40) 1.00		Pinkish grey mottled multicoloured, slightly silty, very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, flint and tarmac. MADE GROUND. Multicoloured, sandy very clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse brick, tarmac, breezeblock, desiccated concrete, cement, and flint. Rare brick cobble. Frequent clay lenses and inclusions. MADE GROUND. *Becomes gravelly CLAY.* Firm dark grey mottled black and greyish brown, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint and rare brick, clinker and desiccated concrete. Occasional decomposing organic material. Re-worked soils. MADE GROUND. Soft to firm, dark grey mottled black becoming blueish grey mottled dark grey, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Frequent decomposing organic material. End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSW1**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	D			(0.50) 0.50		Pinkish grey mottled yellowish brown, slightly silty, very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, flint and rare tarmac. MADE GROUND.		
				0.60		Firm multicoloured, slightly sandy, very gravelly CLAY. Gravel is angular to rounded, fine to coarse brick, clinker, desiccated concrete, tarmac and flint. MADE GROUND.		
				(0.40) 1.00		Firm blackish brown mottled greyish brown and black, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint and rare clinker. Frequent decomposing organic material and wood fragments. Very rare coarse sand sized brick. Re-worked soils. MADE GROUND.		
						End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSW3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	D			0.15 (0.40) 0.55 0.75 1.00		Yellowish brown silty very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint and rare limestone. MADE GROUND. Pinkish grey mottled grey, slightly silty, sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, and rare flint. MADE GROUND. Multicoloured, sandy very clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse brick, clinker, concrete, cement, and flint. Frequent clay inclusions. MADE GROUND. Firm multicoloured, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional decomposing organic material. Very rare sand sized brick. Re-worked soils. MADE GROUND. End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSSW3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	D			0.20		Yellowish brown silty very sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse flint and rare limestone. MADE GROUND.		
				0.40		Pinkish grey mottled grey, slightly silty, sandy GRAVEL. Gravel is angular to sub-rounded, fine to coarse limestone, and rare flint. MADE GROUND.		
				0.60		Greyish brown clayey very sandy GRAVEL. Gravel is angular to well-rounded, fine to medium flint and rare concrete. MADE GROUND.		
				0.80		Multicoloured, sandy very clayey GRAVEL. Gravel is angular to sub-angular, fine to coarse flint, brick, limestone and concrete. Frequent clay inclusions. MADE GROUND.		
				1.00		Firm multicoloured, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint. Occasional decomposing organic material. Re-worked soils. MADE GROUND.		
						End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

soils LIMITED

Contract Name:		Client:			Hole ID:
Kingston Wharf		Cowes Harbour Comission			**WSNW3**
Contract Number:	Start and End Date:	Logged By:	Checked By:	Status:	Hole Type:
21091	07/02/24	DEE	DEE	FINAL	**WS**
Easting:	Northing:	Ground Level:	Plant Used:	Print Date:	Scale:
			Premier 4	20/03/2024	1:50

Weather: | Termination: | Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	D			(0.60) 0.60		Multicoloured, silty very sandy GRAVEL. Gravel is angular to sub-angular, fine to coarse flint, limestone, concrete brick and tarmac. MADE GROUND.		
				(0.40) 1.00		Soft to firm multicoloured, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse flint with rare brick. Occasional decomposing organic material. Re-worked soils. MADE GROUND.		
						End of Borehole at 1.00m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	No groundwater encountered.

Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.

Appendix C Geotechnical In-Situ and Laboratory Testing

Appendix C.1 Classification

Classification based on SPT "N" values:

The inferred undrained strength of the cohesive soils was based on the SPT "N" blow counts, derived from the relationship suggested by Stroud (1974) and classified using Table C.1.1. (Ref: Stroud, M. A. 1974, "The Standard Penetration Test – its application and interpretation", Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.).

Table C.1.1 SPT "N" Blow Count Cohesive Classification

Classification	Undrained Cohesive Strength C_u (kPa)
Extremely low	<10
Very low	10 – 20
Low	20 – 40
Medium	40 – 75
High	75 – 150
Very high	150 – 300
Extremely high	> 300

Note(s): (Ref: BS EN ISO 14688-2:2004+A1:2013 Clause 5.3.)

The relative density of granular soils was classified based of the relationship given in Table C.1.2.

The *UK National Annex to Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing, NA 3.7 SPT test, BS EN 1997-2:2007, Annex F* states "Relative density descriptions on borehole records should also be based on uncorrected SPT N values, unless significantly disturbed, using the density classification in BS 5930:2015, Table 7.

Table C.1.2 SPT "N" Blow Count Granular Classification

Classification	SPT "N" blow count (blows/300mm)
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	Greater than 50

Note(s): (Ref: The Standard Penetration Test (SPT): Methods and Use, CIRIA Report 143, 1995)

Chalk samples recovered are disturbed by the sampling process. Therefore, it is difficult to assess an accurate chalk grade for in accordance with CIRIA C574 'Engineering in

Chalk'. In the absence of a standardised correlation between SPT "N" values and chalk grade for the most recent chalk classification (CIRIA C574) a broad indication of the in-situ chalk grade can be assessed using a paper by T.R.M. Wakeling from a site in Mundford, Norfolk, which compares SPT "N" values to the old Spink & Norbury chalk classification. From the Spink & Norbury classification it is possible to infer a basic CIRIA Grade (structureless or structured), as outlined in Table C.1.3.

Table C.1.3 Interpretation of SPT "N" Blow Counts in Chalk

SPT "N" Value Range	Spink & Norbury Grade	Inferred CIRIA Grade
<8	VI	Structureless (Dm)
8 – 15	V	Structureless (Dc)
15 – 20	IV	Structured chalk (C5 – A1)
20 - 25	III	Structured chalk (C5 – A1)
25 - 35	II	Structured chalk (C5 – A1)
>35	I	Structured chalk (C5 – A1)

Note(s):

Classification of DCP results to CBR:

The DCP consists of a cone fixed to the bottom of a 575mm vertical rod. An 8kg weight is repeatedly lifted and dropped onto an anvil at the mid-height of the rod to deliver a 'blow'. A vertical scale alongside the rod is used to measure the depth of penetration of the cone. These measurements are then converted to CBR values using the following equation derived from the DTP Interim Advice Note 73/06 – Design Guidance for Road Pavement Foundations:

Appendix C.2 Interpretation

Table C.2.1 Interpretation of QUU Tests

Location	Stratum	Sample Depth (m bgl)	Moisture Content (%)	Soil Strength	Shear Strength (kPa)
BH1	BLM	6.50-6.95	28	Medium	56

Note(s):

Table C.2.2 Interpretation of Atterberg Limit Tests

Stratum	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Soil Classification	Volume Change Potential BRE
TRD	34-41	46-53	91-96	44-48	CV	High

Note(s): BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results)
Soils Classification based on British Soil Classification System
The most common use of the term clay is to describe a soil that contains enough clay-sized material or clay minerals to exhibit cohesive properties. The fraction of clay-sized material required varies, but can be as low as 15%. Unless stated otherwise, this is the sense used in Digest 240. The term can be used to denote the clay minerals. These are specific, naturally occurring chemical compounds, predominately silicates. The term is often used as a particle size descriptor. Soil particles that have a nominal diameter of less than 2 µm are normally considered to be of clay size, but they are not necessarily clay minerals. Some clay minerals are larger than 2 µm and some particles, 'rock flour' for example, can be finer than 2 µm but are not clay minerals.
(The Atterberg Limit Tests were undertaken in accordance with BS 1377:Part 2:1990 Clauses 3.2, 4.3 and 5)

Table C.2.3 Interpretation of PSD Tests

Location	Depth (m bgl)	Soil Description	Volume Change Potential BRE	Passing 63µm Sieve (%)
BH1	9.00	Brown fine to coarse gravelly silty/ clayey fine to coarse SAND	Yes	28

Note(s): BRE 240 states that a soil has a volume change potential when the clay fraction **exceeds 15%**. Only the silt and clay combined fraction are determined by sieving therefore the volume change potential is estimated from the percentage passing the 63µm sieve. NHBC Standards Chapter 4.2 states that a soil is shrinkable if the percentage of silt and clay passing the 63µm sieve is greater than 35% and the Plasticity Index is greater than 10%.
(The Particle Size Distribution Tests were undertaken in accordance with BS 1377: Part 2: 1990 Clause 9)

Appendix C.3 Geotechnical In-Situ and Laboratory Results

Soakaway Calculations

Soakaway Test No.	TPSK1A Test 1
Contract:	Kingston Wharf
Contract No.	21091

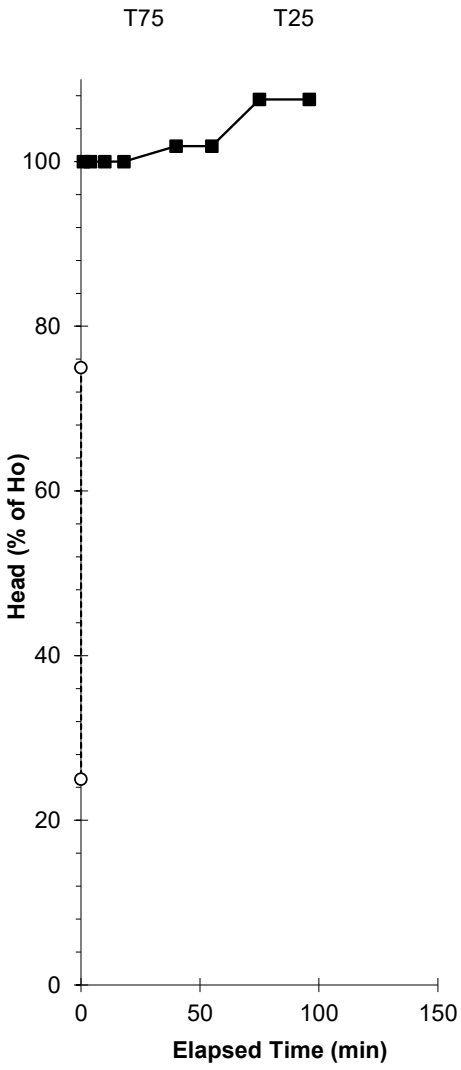
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.95	m
Width of Pit	0.60	m
Length of Pit	1.70	m
Depth of Pit Soaked	0.53	m
ap50	2.239	m2
Vp75-25	-	m3
t75-25	-	min
water used	0.5406	m3
f	not calculated	m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
1.42	0	100	0.53
1.42	1	100	0.53
1.42	4	100	0.53
1.42	10	100	0.53
1.42	18	100	0.53
1.41	40	102	0.54
1.41	55	102	0.54
1.38	75	108	0.57
1.38	96	108	0.57



T75	0.000	75
T25	0.000	25
T75-25	0.000	Derived from Best Fit

Comments

Water level increased over the test duration.

SOILS LIMITED
Newton House, Cross Road, Tadworth
Surrey, KT20 5SR
Telephone: 01737 814 221
Facsimile: 01737 812 557

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

Contract Number: 69137

Client Ref: **21091**
Client PO: **21091**

Date Received: **07-11-2023**
Date Completed: **16-11-2023**
Report Date: **16-11-2023**

Client: **Soils Limited**
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

This report has been checked and approved by:

B. Evans

Brendan Evans
Office Administrator

Contract Title: **Kingston Wharf**
For the attention of: **Tom Rees-Blanchard**

Test Description	Qty
Samples Received - @ Non Accredited Test	6
Moisture Content of Soil BS1377 : Part 2 : Clause 3.2 : 1990 - * UKAS	2
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	2
PSD Wet & Dry Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	1
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	1
Determination of Point Load Value Axial or Diametrical including WC ***Please note GSTL is not accredited for the water content of rock*** ISRM Suggested Method for Point Load Strength - * UKAS	2
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.4 & 5.3)	
Contract Number	69137	
Project Name	Kingston Wharf	
Date Tested	13/11/2023	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH1		B	2.55	-	2.75	Brown fine to medium gravelly silty CLAY
BH1		D	7.50	-		Brown fine to medium gravelly silty CLAY
				-		
				-		
				-		
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				-		
				-		
				-		

Operator
Owain Davies

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.4 & 5.3)	
Contract Number	69137	
Project Name	Kingston Wharf	
Date Tested	13/11/2023	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
BH1		B	2.55	-	2.75	41	84	31	53	91	CV Very High Plasticity
BH1		D	7.50	-		34	73	27	46	96	CV Very High Plasticity
				-							
				-							
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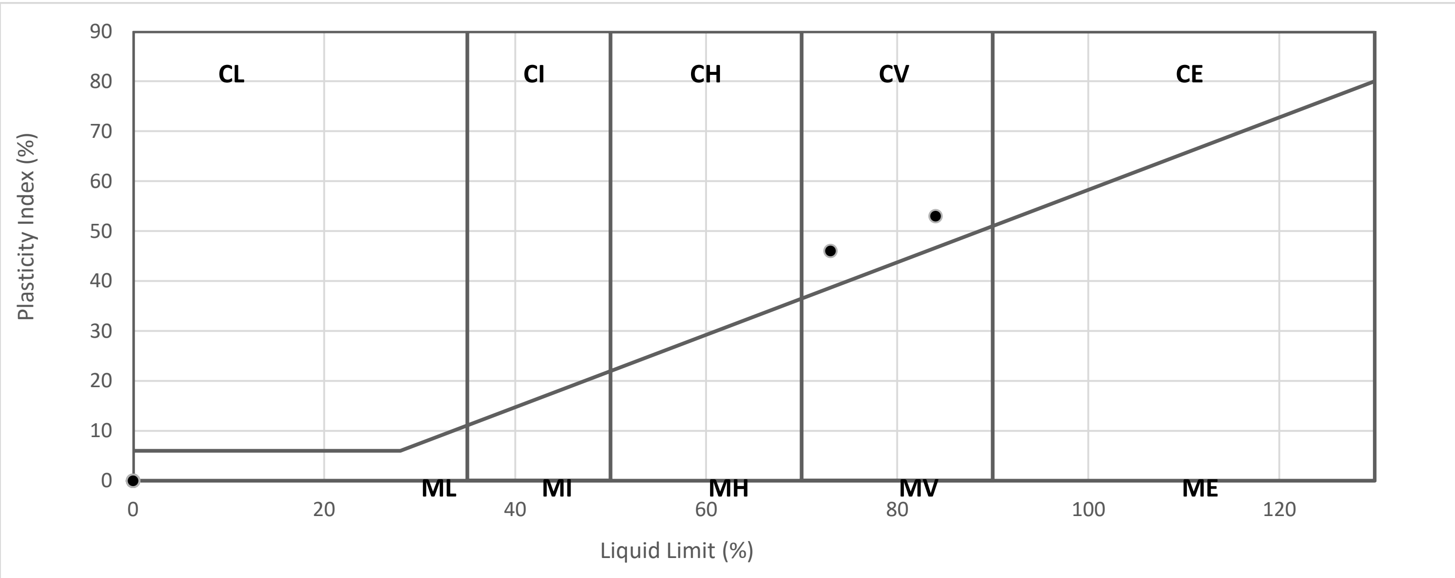
Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

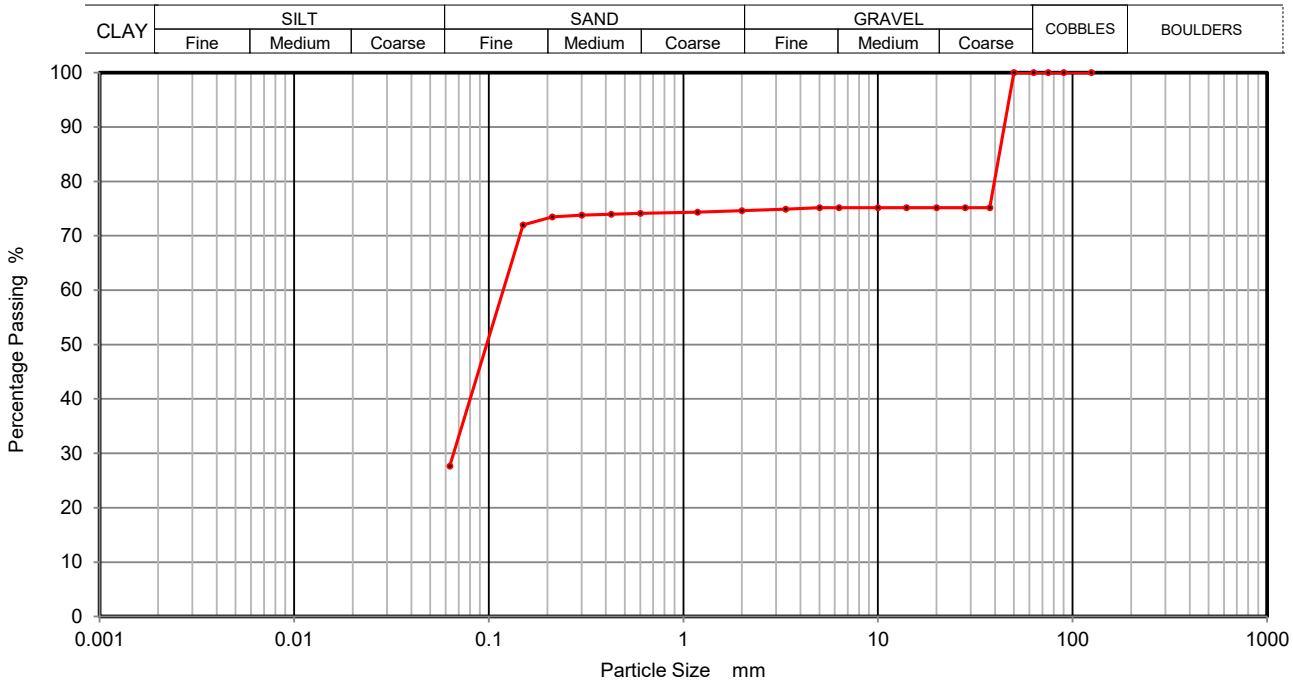
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



Operator
Owain Davies

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	69137
		Borehole/Pit No.	BH1
Project Name	Kingston Wharf	Sample No.	
Soil Description	Brown fine to coarse gravelly silty/ clayey fine to coarse SAND	Depth Top	9.00
		Depth Base	
Date Tested	16/11/2023	Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	75		
28	75		
20	75		
14	75		
10	75		
6.3	75		
5	75		
3.35	75		
2	75		
1.18	74		
0.6	74		
0.425	74		
0.3	74		
0.212	73		
0.15	72		
0.063	28		

Sample Proportions	% dry mass
Cobbles	0
Gravel	25
Sand	47
Silt and Clay	28

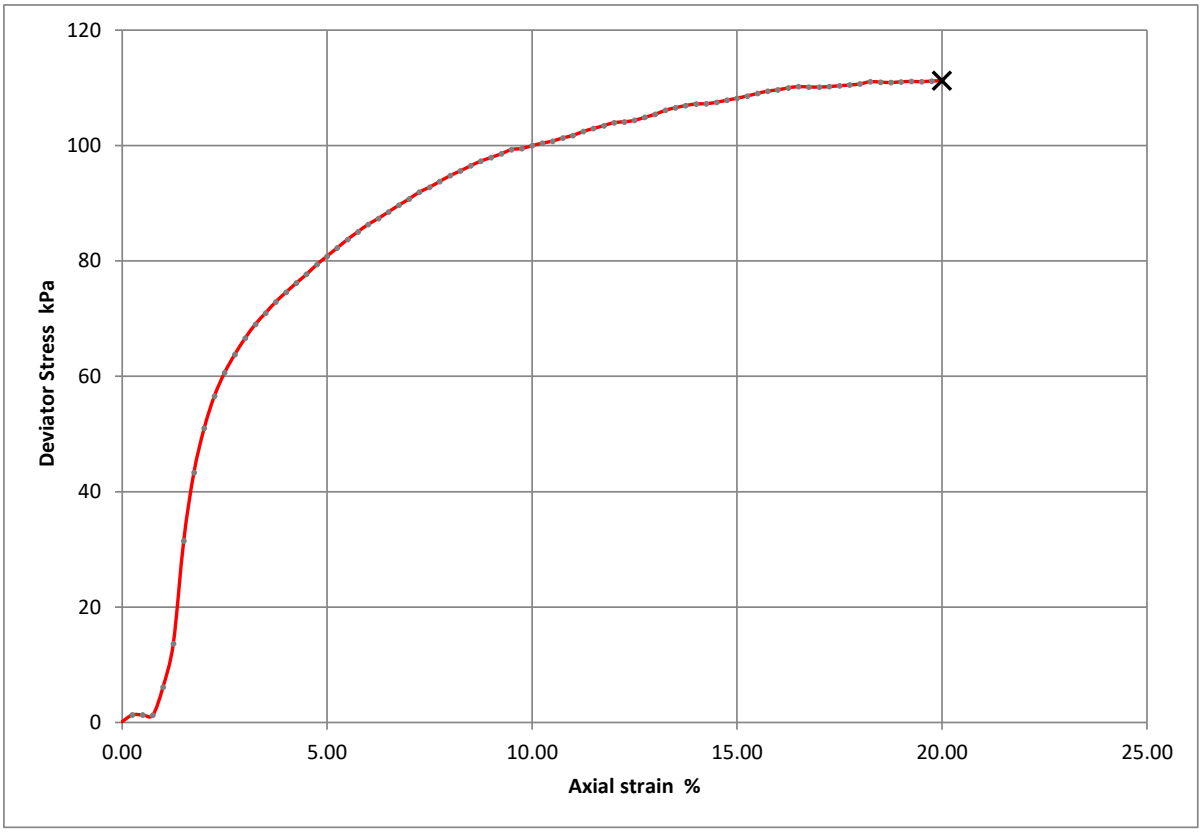
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

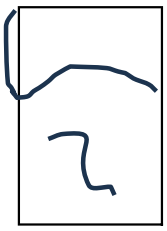
UKAS TESTING 2788

	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	69137
		Borehole/Pit No.	BH1
Project Name	Kingston Wharf	Sample No.	
Soil Description	Brown Silty CLAY	Depth Top (m)	6.50
		Depth Base (m)	6.95
Date Tested	13/11/2023	Sample Type	UT100
		Operator	Jordan



Moisture Content (%)	28
Bulk Density (Mg/m^3)	1.96
Dry Density (Mg/m^3)	1.53
Specimen Length (mm)	208.9
Specimen Diameter (mm)	101.1
Cell Pressure (kPa)	125
Deviator Stress (kPa)	111
Undrained Shear Strength (kPa)	56
Failure Strain (%)	20
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.4mm
Rate of Strain (%/min)	1.32

Notes.



Failure Sketch.

UKAS TESTING
2788

Point Load Test

The complete ISRM suggested methods for rock characterization, testing and monitoring 1974-2006 Determining Point Load Strength

Contract Number	69137
Project Name	Kingston Wharf
Sample Type	Core
Date Tested	09/11/2023

*Please note that GSTL is not accredited for the water content of rock

Hole Reference	Depth (m)			Sample No	Test Type		Width	Platen Seperation	Failure Load	Equivalent Diameter	Point Load	Size Factor	Point Load Index	Moisture Content	Description	Angle Between Plane of Anisotropy & Core Axis	Type of Anisotropy (Bedding or Cleavage)
					d / a / b / i	⊥ //											
BH1	10.20	-	10.40		i		60	30	0.02	47.87	0.01	0.98	0.01	26.2	CLAY		
BH1	12.00	-	12.30		i		108	49	8.40	82.09	1.25	1.25	1.56	3.0	SILTSTONE		
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Key	Reported As
Width	(W) mm
Platen Separation	(D) mm
Failure Load	(P) kN
Equivalent Diameter	(De) mm
Point Load	(Is) MPa
Size Factor	(F)
Point Load Index	(Is(50)) MPa
Moisture Content	%
Description	SC

Operator
Julian Jones

Tom Rees-Blanchard
Soils Ltd
Thomas Telford House - Unit 11
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-12744

Site Reference:	Kingston Wharf
Project / Job Ref:	21091
Order No:	None Supplied
Sample Receipt Date:	13/10/2023
Sample Scheduled Date:	13/10/2023
Report Issue Number:	1
Reporting Date:	19/10/2023

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate						
DETS Report No: 23-12744	**Date Sampled**	09/10/23	09/10/23	09/10/23		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Kingston Wharf	**TP / BH No**	BH1	BH1	BH1		
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	3.00	8.00	10.50		
Reporting Date: 19/10/2023	**DETS Sample No**	679992	679993	679994		

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.2	7.9	8.2		
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	1566	742	823		
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.16	0.07	0.08		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	206	202	154		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.21	0.20	0.15		
Total Sulphur	%	< 0.02	NONE	0.06	0.05	0.05		
Ammonium as NH_4	mg/kg	< 0.5	MCERTS	8.9	7.5	9.2		
Ammonium as NH_4	mg/l	< 0.05	MCERTS	0.89	0.75	0.92		
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	724	234	333		
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	362	117	166		
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS	4	< 3	< 3		
Water Soluble Nitrate (2:1) as NO_3	mg/l	< 1.5	MCERTS	1.9	< 1.5	< 1.5		
W/S Magnesium	mg/l	< 0.1	NONE	7.7	6.5	5.2		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-12744	
Soils Ltd	
Site Reference: Kingston Wharf	
Project / Job Ref: 21091	
Order No: None Supplied	
Reporting Date: 19/10/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
679992	BH1	None Supplied	3.00	23.6	Grey clay
679993	BH1	None Supplied	8.00	21.7	Brown sand
679994	BH1	None Supplied	10.50	18.2	Grey sandy clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-12744

Soils Ltd

Site Reference: Kingston Wharf

Project / Job Ref: 21091

Order No: None Supplied

Reporting Date: 19/10/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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List of HWOL Acronyms and Operators
DETS Report No: 23-12744
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: None Supplied
Reporting Date: 19/10/2023

Acronym	**Description**
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

Appendix D Chemical Laboratory Analyses

Appendix D.1 Chemical Laboratory Results

Tom Rees-Blanchard
Soils Ltd
Thomas Telford House - Unit 11
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-12742

Site Reference:	Kingston Wharf
Project / Job Ref:	21091
Order No:	21091
Sample Receipt Date:	13/10/2023
Sample Scheduled Date:	13/10/2023
Report Issue Number:	1
Reporting Date:	19/10/2023

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.

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Soil Analysis Certificate						
DETS Report No: 23-12742	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Kingston Wharf	**TP / BH No**	TP2	TPSK1	TP3	TP5	TP6
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 21091	**Depth (m)**	0.30	0.50	0.70	0.20	2.50
Reporting Date: 19/10/2023	**DETS Sample No**	679985	679986	679987	679988	679989

Determinand	**Unit**	**RL**	**Accreditation**	(n)		(n)		
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Detected	Not Detected	Not Detected	Not Detected
Sample Matrix (S)	Material Type	N/a	NONE		Loose Fibres			
Asbestos Type (S)	PLM Result	N/a	**ISO17025**		Chrysotile			
pH	pH Units	N/a	**MCERTS**	7.4	7.8	7.7	9.6	8.0
Total Cyanide	mg/kg	< 1	NONE		< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	< 1	NONE		< 1	< 1	< 1	< 1
Organic Matter (SOM)	%	< 0.1	**MCERTS**	4.1	2.8	16.9	6.5	3.3
Arsenic (As)	mg/kg	< 2	**MCERTS**	4	8	18	13	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	1.5	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.5	< 0.2	0.4	0.6	< 0.2
Chromium (Cr)	mg/kg	< 2	**MCERTS**	3	11	15	10	14
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	7	15	33	22	56
Lead (Pb)	mg/kg	< 3	**MCERTS**	3	81	140	127	18
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	4	7	12	10	21
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	**MCERTS**	10	23	32	20	23
Zinc (Zn)	mg/kg	< 3	**MCERTS**	18	30	194	111	58
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-12742	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Kingston Wharf	**TP / BH No**	TP2	TPSK1	TP3	TP5	TP6
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 21091	**Depth (m)**	0.30	0.50	0.70	0.20	2.50
Reporting Date: 19/10/2023	**DETS Sample No**	679985	679986	679987	679988	679989

Determinand	Unit	RL	Accreditation	(n)		(n)		
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	4.16	22.20	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	1.76	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	88.70	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.20	54.50	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.19	0.18	1.78	120	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.21	17.40	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.17	0.32	0.39	88.90	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	0.15	0.27	0.47	60.30	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.15	0.29	19.90	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	0.13	0.15	0.31	13.90	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.19	0.22	8.44	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	3.10	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	0.13	5.79	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	1.43	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.37	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.91	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	8.2	508	< 1.6

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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 23-12742	**Date Sampled**	None Supplied				
Soils Ltd	**Time Sampled**	None Supplied				
Site Reference: Kingston Wharf	**TP / BH No**	TP2				
Project / Job Ref: 21091	**Additional Refs**	None Supplied				
Order No: 21091	**Depth (m)**	0.30				
Reporting Date: 19/10/2023	**DETS Sample No**	679985				

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
EPH Texas (C6 - C8) : HS_1D_MS _Total	mg/kg	< 0.05	NONE	< 0.05				
EPH Texas (>C8 - C10) : EH_1D_Total	mg/kg	< 1	**MCERTS**	< 1				
EPH Texas (>C10 - C12) : EH_1D_Total	mg/kg	< 1	**MCERTS**	< 1				
EPH Texas (>C12 - C16) : EH_1D_Total	mg/kg	< 1	**MCERTS**	2				
EPH Texas (>C16 - C21) : EH_1D_Total	mg/kg	< 1	**MCERTS**	5				
EPH Texas (>C21 - C40) : EH_1D_Total	mg/kg	< 6	**MCERTS**	14				
EPH Texas (C6 - C40) : HS_1D_MS+EH_1D_Total	mg/kg	< 6	NONE	22				

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-12742	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Kingston Wharf	**TP / BH No**	TP2	TPSK1	TP3	TP5	TP6
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 21091	**Depth (m)**	0.30	0.50	0.70	0.20	2.50
Reporting Date: 19/10/2023	**DETS Sample No**	679985	679986	679987	679988	679989

Determinand	Unit	RL	Accreditation	(n)		(n)		
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE		< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	**MCERTS**		< 2	17	3	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	**MCERTS**		< 2	8	16	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	**MCERTS**		< 3	12	112	< 3
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	**MCERTS**		< 3	6	149	< 3
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	**MCERTS**		< 10	< 10	188	< 10
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE		< 21	44	469	< 21
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE		< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	**MCERTS**		< 2	12	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	**MCERTS**		< 2	11	44	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	**MCERTS**		< 2	44	383	< 2
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	**MCERTS**		< 3	49	530	< 3
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	**MCERTS**		< 10	65	529	< 10
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE		< 21	181	1486	< 21
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE		< 42	225	1955	< 42

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-12742	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Kingston Wharf	**TP / BH No**	TPSK1	TP3	TP5	TP6	
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 21091	**Depth (m)**	0.50	0.70	0.20	2.50	
Reporting Date: 19/10/2023	**DETS Sample No**	679986	679987	679988	679989	

Determinand	Unit	RL	Accreditation		(n)			
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	8	< 5	< 5	
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	3	< 2	
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	4	< 2	
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	

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Soil Analysis Certificate - PCB (7 Congeners)						
DETS Report No: 23-12742	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Kingston Wharf	**TP / BH No**	TPSK1	TP3	TP5	TP6	
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 21091	**Depth (m)**	0.50	0.70	0.20	2.50	
Reporting Date: 19/10/2023	**DETS Sample No**	679986	679987	679988	679989	

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
PCB Congener 28	mg/kg	< 0.008	NONE	< 0.008	< 0.008	< 0.008	< 0.008	
PCB Congener 52	mg/kg	< 0.008	NONE	< 0.008	< 0.008	< 0.008	< 0.008	
PCB Congener 101	mg/kg	< 0.008	NONE	< 0.008	< 0.008	0.564	< 0.008	
PCB Congener 118	mg/kg	< 0.008	NONE	< 0.008	< 0.008	0.385	< 0.008	
PCB Congener 138	mg/kg	< 0.008	NONE	< 0.008	< 0.008	0.575	< 0.008	
PCB Congener 153	mg/kg	< 0.008	NONE	< 0.008	< 0.008	0.592	< 0.008	
PCB Congener 180	mg/kg	< 0.008	NONE	< 0.008	< 0.008	< 0.008	< 0.008	
Total PCB (7 Congeners)	mg/kg	< 0.1	NONE	< 0.1	< 0.1	2.1	< 0.1	

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

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-12742		**Date Sampled**	None Supplied				**Landfill Waste Acceptance Criteria Limits**	
Soils Ltd		**Time Sampled**	None Supplied				**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Site Reference: Kingston Wharf		**TP / BH No**	TP2						
Project / Job Ref: 21091		**Additional Refs**	None Supplied						
Order No: 21091		**Depth (m)**	0.30						
Reporting Date: 19/10/2023		**DETS Sample No**	679985						
Determinand	**Unit**	**MDL**							
TOC[MU]	%	< 0.1	2.4				3%	5%	6%
Loss on Ignition[MU]	%	< 0.01	1.50				--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05				6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1				1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10				500	--	--
Total PAH[MU]	mg/kg	< 1.7	< 1.7				100	--	--
pH[MU]	pH Units	N/a	7.4				--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	3.3				--	To be evaluated	To be evaluated

Eluate Analysis	**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01			< 0.1	0.5	2	25
Barium[U]	< 0.02			< 0.2	20	100	300
Cadmium[U]	< 0.0005			< 0.005	0.04	1	5
Chromium[U]	< 0.005			< 0.05	0.5	10	70
Copper[U]	< 0.01			< 0.1	2	50	100
Mercury[U]	< 0.0005			< 0.005	0.01	0.2	2
Molybdenum[U]	< 0.001			< 0.01	0.5	10	30
Nickel[U]	< 0.007			< 0.07	0.4	10	40
Lead[U]	< 0.005			< 0.05	0.5	10	50
Antimony[U]	< 0.005			< 0.05	0.06	0.7	5
Selenium[U]	< 0.005			< 0.05	0.1	0.5	7
Zinc[U]	< 0.005			< 0.05	4	50	200
Chloride[U]	10.8			108	800	15000	25000
Fluoride[U]	< 0.5			< 5	10	150	500
Sulphate[U]	12.8			128	1000	20000	50000
TDS	96			960	4000	60000	100000
Phenol Index[U]	< 0.01			< 0.1	1	-	-
DOC[U]	9.3			92.9	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.10						
Dry Matter (%)	85.8						
Moisture (%)	16.6						
Stage 1							
Volume Eluate L10 (litres)	0.88						

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepencies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test

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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 23-12742
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: 21091
Reporting Date: 19/10/2023

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 679985	TP2	None Supplied	0.30	14.2	White chalk
^ 679986	TPSK1	None Supplied	0.50	12.1	Brown sandy clay with stones
^ 679987	TP3	None Supplied	0.70	10	Black sandy gravel with stones and concrete
^ 679988	TP5	None Supplied	0.20	6.5	Brown gravelly sand with stones and concrete
^ 679989	TP6	None Supplied	2.50	21.8	Grey clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S
^ no sampling date provided; unable to confirm if samples are within acceptable holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-12742
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: 21091
Reporting Date: 19/10/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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UKAS TESTING 4480

Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-12742
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: 21091
Reporting Date: 19/10/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichlorometha	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

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List of HWOL Acronyms and Operators
DETS Report No: 23-12742
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: 21091
Reporting Date: 19/10/2023

Acronym	**Description**
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
EPH Texas (C10 - C12) - EH_1D_Total
EPH Texas (C12 - C16) - EH_1D_Total
EPH Texas (C16 - C21) - EH_1D_Total
EPH Texas (C21 - C40) - EH_1D_Total
EPH Texas (C6 - C40) - HS_1D_MS+EH_1D_Total
EPH Texas (C6 - C8) - HS_1D_MS _Total
EPH Texas (C8 - C10) - EH_1D_Total
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
Mineral Oil (C10 - C40) (BS EN 12457-2) - EH_CU_1D_AL
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
Total BTEX (BS EN 12457-2) - HS_1D_MS_Total
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Parameter	Matrix Type	Suite Reference	Expanded Uncertainity Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%

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DETS Report No: 23-13780

Site Reference:	Kingston Wharf
Project / Job Ref:	21091
Order No:	21091
Sample Receipt Date:	07/11/2023
Sample Scheduled Date:	07/11/2023
Report Issue Number:	1
Reporting Date:	13/11/2023

Authorised by:

Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

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UKAS TESTING
4480

Soil Analysis Certificate						
DETS Report No: 23-13780	**Date Sampled**	None Supplied				
Soils Ltd	**Time Sampled**	None Supplied				
Site Reference: Kingston Wharf	**TP / BH No**	TPSK1				
Project / Job Ref: 21091	**Additional Refs**	None Supplied				
Order No: 21091	**Depth (m)**	0.50				
Reporting Date: 13/11/2023	**DETS Sample No**	684249				

Determinand	Unit	RL	Accreditation					
Asbestos Quantification (S)	%	< 0.001	ISO17025	0.005				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-13780
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: 21091
Reporting Date: 13/11/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

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AR As Received

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List of HWOL Acronyms and Operators
DETS Report No: 23-13780
Soils Ltd
Site Reference: Kingston Wharf
Project / Job Ref: 21091
Order No: 21091
Reporting Date: 13/11/2023

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

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DETS Report No: 24-01544

Site Reference:	Kingston Wharf, East Cowes, Isle Of Wight
Project / Job Ref:	21091
Order No:	None Supplied
Sample Receipt Date:	15/02/2024
Sample Scheduled Date:	15/02/2024
Report Issue Number:	1
Reporting Date:	21/02/2024

Authorised by:

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Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

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4480

Soil Analysis Certificate						
DETS Report No: 24-01544	**Date Sampled**	14/02/24	14/02/24	14/02/24	14/02/24	14/02/24
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Kingston Wharf, East Cowes, Isle Of Wight	**TP / BH No**	WSN1	WSN3	WSE1	WSE3	WSS1
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.00 - 1.00	0.00 - 0.75	0.00 - 0.20	0.00 - 0.20	0.00 - 0.85
Reporting Date: 21/02/2024	**DETS Sample No**	699254	699255	699256	699257	699258

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Sample Matrix (S)	Material Type	N/a	NONE					
Asbestos Type (S)	PLM Result	N/a	ISO17025					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
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Tel : 01622 850410

4480

Soil Analysis Certificate						
DETS Report No: 24-01544	**Date Sampled**	14/02/24	14/02/24	14/02/24	14/02/24	14/02/24
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Kingston Wharf, East Cowes, Isle Of Wight	**TP / BH No**	WSS3	WSW1	WSW3	WSSW3	WSNW3
Project / Job Ref: 21091	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.00 - 0.60	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00	0.00 - 1.00
Reporting Date: 21/02/2024	**DETS Sample No**	699259	699260	699261	699262	699263

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Detected	Not Detected	Not Detected	Not Detected	Detected
Sample Matrix (S)	Material Type	N/a	NONE	Loose fibres				Loose fibres
Asbestos Type (S)	PLM Result	N/a	ISO17025	Chrysotile				Chrysotile

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 24-01544
Soils Ltd
Site Reference: Kingston Wharf, East Cowes, Isle Of Wight
Project / Job Ref: 21091
Order No: None Supplied
Reporting Date: 21/02/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

UKAS TESTING
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List of HWOL Acronyms and Operators
DETS Report No: 24-01544
Soils Ltd
Site Reference: Kingston Wharf, East Cowes, Isle Of Wight
Project / Job Ref: 21091
Order No: None Supplied
Reporting Date: 21/02/2024

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

Dee Windsor
Soils Ltd
Thomas Telford House - Unit 11
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

Normec DETS Limited
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 24-02170

Site Reference:	Kingston Wharf, East Cowes, Isle Of Wight
Project / Job Ref:	21091
Order No:	None Supplied
Sample Receipt Date:	15/02/2024
Sample Scheduled Date:	29/02/2024
Report Issue Number:	1
Reporting Date:	12/03/2024

Authorised by:

Kevin Old
Operations Director

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

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Soil Analysis Certificate						
DETS Report No: 24-02170	**~Date Sampled**	14/02/24	14/02/24			
Soils Ltd	**~Time Sampled**	None Supplied	None Supplied			
~Site Reference: Kingston Wharf, East Cowes, Isle Of Wight	**~TP / BH No**	WSS3	WSNW3			
~Project / Job Ref: 21091	**~Additional Refs**	None Supplied	None Supplied			
~Order No: None Supplied	**~Depth (m)**	0.00 - 0.60	0.00 - 0.10			
Reporting Date: 12/03/2024	**DETS Sample No**	701704	701705			

Determinand	Unit	RL	Accreditation					
Asbestos Quantification (S)	%	< 0.001	ISO17025	0.001	0.001			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
~ Sample details provided by the customer

Normec DETS Limited
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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 24-02170
Soils Ltd
~Site Reference: Kingston Wharf, East Cowes, Isle Of Wight
~Project / Job Ref: 21091
~Order No: None Supplied
Reporting Date: 12/03/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
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Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
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Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
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Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received
~ Sample details provided by the customer

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Kent ME17 2JN
Tel : 01622 850410

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4480

List of HWOL Acronyms and Operators
DETS Report No: 24-02170
Soils Ltd
~Site Reference: Kingston Wharf, East Cowes, Isle Of Wight
~Project / Job Ref: 21091
~Order No: None Supplied
Reporting Date: 12/03/2024

Acronym	**Description**
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total
~	Sample details provided by the customer

Det - Acronym

Appendix D.2 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

Introduction

The statutory definition of contaminated land is defined in the Environmental Protection Act 1990, ref. 1.1, which was introduced by the Environment Act 1995, ref. 1.2;

'Land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) pollution of controlled waters is being, or is likely to be, caused.'

The UK guidance on the assessment of contaminated has developed as a direct result of the introduction of these two Acts. The technical guidance supporting the new legislation has been summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs), a proposed series of twelve documents. Seven were originally published in March 1994, four more were published in April 2002, while the last remaining guidance document, CLR 11, ref 1.3 was published in 2004. In 2008 CLR reports 7 to 10 were withdrawn by DEFRA and the Environment Agency and updated version of CLR 9 and 10 were produced in the form of Science Reports SR2, ref. 1.4 and SR3, ref. 1.5.

In establishing whether a site fulfils the statutory definition of 'contaminated land' it is necessary to identify, whether a pollutant linkage exists in respect of the land in question and whether the pollutant linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage,
- presents a significant possibility of significant harm being caused to that receptor,
- is resulting in the pollution of the controlled waters which constitute the receptor, or
- is likely to result in such pollution.

A 'pollutant linkage' may be defined as the link between a contaminant 'source' and a 'receptor' by means of a 'pathway'.

Assessment Methodology

The guidance proposes a four-stage assessment process for identifying potential pollutant linkages on a site. These stages are set out in the table below:

No.	Process	Description
1	Hazard Identification	Establishing contaminant sources, pathways and receptors (the conceptual model).
2	Hazard Assessment	Analysing the potential for unacceptable risks (what linkages could be present, what could be the effects).
3	Risk Estimation	Trying to establish the magnitude and probability of the possible consequences (what degree of harm might result and to what receptors, and how likely is it).
4	Risk Evaluation	Deciding whether the risk is unacceptable.

Stages 1 and 2 develop a *'conceptual model'* based upon information collated from desk based studies, and frequently a walkover of the site. The walkover survey should be conducted in general accordance with CLR 2, ref. 1.6. The formation of a conceptual model is an iterative process and as such, it should be updated and refined throughout each stage of the project to reflect any additional information obtained.

The extent of the desk studies and enquiries to be conducted should be in general accordance with CLR 3, ref. 1.7. The information from these enquiries is presented in a desk study report with recommendations, if necessary, for further work based upon the conceptual model. Specific DoE 'Industry Profiles' provide guidance on the nature of contaminants relating to specific industrial processes.

If potential pollutant linkages are identified within the conceptual model, a Phase 2 site investigation and report will be recommended. The investigation should be planned in general accordance with CLR 4, ref 1.8. The number of exploratory holes and samples collected for analysis should be consistent with the size of the site and the level of risk envisaged. This will enable a contamination risk assessment to be conducted, at which point the conceptual model can be updated and relevant pollutant linkages can be identified.

A two-stage investigation may be more appropriate where time constraints are less of an issue. The first stage investigation being conducted as an initial assessment for the presence of potential sources, a second being a more refined investigation to delineate wherever possible the extent of the identified contamination.

All site works should be in general accordance with the British Standards BS 10175:2011, ref. 1.9. and BS 5930:2015, ref. 1.10.

The generic contamination risk assessment screens the results of the chemical analysis against generic guidance values which are dependent on the proposed end-use of the development.

The end-use may be defined as one of the following ref. 1.15;

- Residential with homegrown produce – domestic low rise and low density housing with gardens where vegetables may be grown for home consumption
- Residential without homegrown produce – domestic low density and low density housing where no gardens are present.
- Allotments – specific areas where vegetables are grown for home consumption.
- Public open space in close proximity to residential housing – includes the predominantly grassed area adjacent to high density housing and the central green area around which houses are developed. This land-use includes the smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting.
- Public open space in use as general parkland – provided for recreational use and may be used for family visits and picnics, children's play area, sports grounds and dig walking.
- Commercial – industrial premises where there is limited exposure to soil.

Standard Land-use Scenarios

The standard land-use scenarios used to develop conceptual exposure models are presented in the following sections:

Residential with homegrown produce

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

• Critical receptor is a young female child (zero to six years old)
• Exposure duration is six years.
• Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
• Building type is a two-storey small terraced house.

A sub-set of the Residential land-use is **Residential without Homegrown produce**. The generic scenario assumes low density housing with communal landscaped gardens where the consumption of home grown vegetables will not occur.

Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
- There is no building.

Commercial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

- Critical receptor is a working female adult (aged 16 to 65 years old).
- Exposure duration is a working lifetime of 49 years.
- Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
- Building type is a three-storey office (pre 1970).

Public Open Space within Residential Area

The generic scenario refers to any grassed area 0.05 ha and that is close to Housing.

- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil
- Predominantly used by children for playing and may be used for activities such as a football kick about
- Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
- older children as the critical receptor on basis that they will use site most frequently (Age class 4-9)
- ingestion rate 75 $mg.day^{-1}$

Public Open Space Park

This generic scenario refers to any public park that is more than 0.5ha in area:

- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% cover)
- Female child age classes 1-6
- Soil ingestion rate of 50 $mg.day^{-1}$
- Occupancy period outdoors = 2 $hours.day^{-1}$
- Exposure frequency of 170 days.year-1 for age classes 2-18 and 85
- $days.year^{-1}$ for age class 1
- Outdoor exposure pathways only (no tracking back).

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC).

GAC are conservative values adopted to ensure that they are applicable to the majority of possible contaminated site. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC derived by a third party or the Environment Agency/ DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC to ensure that they are used appropriately. Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific values for relevant soil contaminants based on the site specific conditions.

In 2014, the publication of Category 4 Screening Levels (C4SL) ref 1.15, 1.16, as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3) ref 1.5 used in the generation of SGVs. C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010 ref 1.16. Where a C4SL has been published, Soils Limited has adopted them as GAC for these six substances.

For all other substances the soils will be compared to Suitable 4 Use Levels (S4ULs) published by LQM ref. 1.12, which were developed for around 85 substances and are intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants.

Where no S4UL or C4SL is available, the assessment criteria (AC) may be generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.07, ref. 1.13. Toxicological and physico-chemical/fate and transport data used to generate the AC has been derived from a hierarchy of data sources as follows:

1. Environment Agency or Department of Environment Food and Rural Affairs (DEFRA) documents;
2. Other documents produced by UK Government or state organisations;
3. European institution documents;
4. International organisation documents;
5. Foreign government institutions.

In the case of the majority of contaminants considered, the toxicological data has been drawn from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), ref. 1.6, where available. Where no TOX report is available reference has been made to the health criteria values, derived for use in Land Quality Press (2006), ref. 1.17, as this is considered to represent a peer reviewed data source. Similarly, fate and transport data has been derived in the first instance from Environment Agency (2003), ref. 1.18 and for contaminants not considered in this
document the fate and transport data used in previous versions of the CLEA model has been used.

Chemical laboratory test results are processed as follows. A statistical analysis of the results is conducted, as detailed in CIEH and CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', ref. 1.14. Individual concentrations are compared to the selected guideline values to identify concentrations of contaminants that are above the selected screening criteria.

Where the risk estimation identifies significant concentrations of one or more contaminants, a further risk evaluation needs to be undertaken.

References

1.1 The Environmental Protection Act, Part IIA, Section 78, DoE 1990.

1.2 Environment Act 1995, Section 57, DoE 1995.

1.3 CLR 11, '*Model Procedures for the Management of Contaminated Land*', DEFRA and Environment Agency, 2004.

1.4 Environment Agency Science Report SC050021/SR2 'Human health toxicological assessment of contaminants in soil'.

1.5 Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', Environment Agency, 2008

1.6 CLR 2, '*Guidance on preliminary site inspection of contaminated land*', Report by Applied Environmental, DoE 1994.

1.7 CLR 3 '*Documentary Research on Industrial Sites*', Report by RPS Consultants Ltd., DOE, 1994

1.8 CLR 4, '*Sampling strategies for contaminated land*', Report by The Centre for Research into the Built Environment, the Nottingham Trent University, DoE, 1994

1.9 BS 10175: 2011 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2011

1.10 BS 5930: 2015 '*Code of practice for ground investigations*', British Standards Institute, 2015

1.11 Science Report SC050021 '*Contaminants in Soil: Updated Collation of Toxicological Data and Intake Values for Humans*', Environment Agency, 2009

1.12 The LQM/S4ULs for Human Health Risk Assessment, Nathanail P, McCaffery C, Gillett A, Ogden R, and Nathanail J, Land Quality Press, Nottingham, published 2015.

1.13 CLEA '*Software Version 1.071*' (downloaded from the Environment Agency website, http://www.environment-agency.gov.uk)

1.14 CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE), May 2008.

1.15 DEFRA SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination, published March 2014.

1.16 Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination', Revision 2, DEFRA research project SP1010.

1.17 Generic Assessment Criteria for Human Health Risk Assessment, Nathanial CP, McCaffery C, Ashmore M, Cheng Y, Gillett A, Hooker P and Ogden RC

1.18 CLR 2, '*Guidance on preliminary site inspection of contaminated land*', Report by Applied Environmental, DoE 1994.

				Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park					
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Type	Contaminants	Species	Year																					
Metals	Antimony		2010					550						7500								EIC/AGS/	CL:AIRE	2010
	Arsenic		2014		37			40			49			640			79			168		C4SL	DEFRA	2014
			2015		~~37~~			40			40			640			79			170		S4UL	LQM/CIEH	2015
	Beryllium		2015		1.7			1.7			35			12			2.2			63		S4UL	LQM/CIEH	2015
	Boron		2015		290			11000			45			240000			21000			46000		S4UL	LQM/CIEH	2015
	Cadmium		2015		~~11~~			85			1.9			190			120			532		S4UL	LQM/CIEH	2015
			2014		26			149			4.9			410			220			880		C4SL	DEFRA	2014
	Chromium	III	2015		910			910			18000			8600			1500			33000		S4UL	LQM/CIEH	2015
		VI	2014		21			21			170			49			23			250		C4SL	DEFRA	2014
		VI	2015		6			6			1.8			33			7.7			220		S4UL	LQM/CIEH	2015
	Copper		2015		2400			7100			520			68000			12000			44000		S4UL	LQM/CIEH	2015
	Lead		2014		200			310			80			2330			630			1300		C4SL	DEFRA	2014
	Mercury	Elemental	2015		1.2			1.2			21			*58*			16			*30*		S4UL	LQM/CIEH	2015
		Inorganic	2015		40			56			19			1100			120			240		S4UL	LQM/CIEH	2015
		Methyl	2015		11			15			6			320			40			68		S4UL	LQM/CIEH	2015
	Nickel		2015		130			180			53			980			230			800		S4UL	LQM/CIEH	2015
	Selenium		2015		250			430			88			12000			1100			1800		S4UL	LQM/CIEH	2015
	Vanadium		2015		410			1200			91			9000			2000			5000		S4UL	LQM/CIEH	2015
	Zinc		2015		3700			40000			620			730000			81000			170000		S4UL	LQM/CIEH	2015
	Benzene		2014		0.87			3.3			0.18			98			140			230		C4SL	DEFRA	2014
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015
	Toluene		2015	130	290	660	*880*	1900	3900	22	51	120	*65000*	*110000*	*180000*	56000	56000	56000	*87000*	*95000*	*100000*	S4UL	LQM/CIEH	2015
	Ethylbenzene		2015	47	110	260	83	190	440	16	39	91	*4700*	*13000*	*27000*	24000	24000	25000	*17000*	*22000*	*27000*	S4UL	LQM/CIEH	2015
	Xylenes	o-xylene	2015	60	140	330	88	210	480	28	67	160	*6600*	*15000*	*33000*	41000	42000	43000	*17000*	*24000*	*33000*	S4UL	LQM/CIEH	2015
		m-xylene	2015	59	140	320	82	190	450	31	74	170	*6200*	*14000*	*31000*	41000	42000	43000	*17000*	*24000*	*32000*	S4UL	LQM/CIEH	2015
		p-xylene	2015	56	130	310	79	180	310	29	69	160	*5900*	*14000*	*30000*	41000	42000	43000	*17000*	*23000*	*31000*	S4UL	LQM/CIEH	2015
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	*3200*	*5900*	*12000*	*570000*	590000	600000	*95000*	*130000*	*180000*	S4UL	LQM/CIEH	2015
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	*7800*	*17000*	*40000*	600000	610000	620000	*150000*	*220000*	*320000*	S4UL	LQM/CIEH	2015
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	*2000*	*4800*	*11000*	13000	13000	13000	*14000*	*18000*	*21000*	S4UL	LQM/CIEH	2015
	Aliphatic >C10 - C12		2015	*130*	*330*	*760*	*130*	*330*	*770*	2200	4400	7300	*9700*	*23000*	*47000*	13000	13000	13000	*21000*	*23000*	*24000*	S4UL	LQM/CIEH	2015
	Aliphatic >C12 - C16		2015	*1100*	*2400*	*4300*	*1100*	*2400*	*4400*	11000	13000	13000	*59000*	*82000*	*90000*	13000	13000	13000	*25000*	*25000*	*26000*	S4UL	LQM/CIEH	2015
	Aliphatic >C16 - C35		2015	*65000*	*92000*	*110000*	*65000*	*92000*	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C35 - C44		2015	*65000*	*92000*	*140000*	*65000*	*92000*	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	*26000*	*46000*	*86000*	56000	56000	56000	*76000*	*84000*	*92000*	S4UL	LQM/CIEH	2015
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	*56000*	*110000*	*180000*	56000	56000	56000	*87000*	*95000*	*100000*	S4UL	LQM/CIEH	2015
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	*3500*	*8100*	*17000*	5000	5000	5000	*7200*	*8500*	*9300*	S4UL	LQM/CIEH	2015
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	*16000*	*28000*	*34000*	5000	5000	5000	*9200*	*9700*	*10000*	S4UL	LQM/CIEH	2015
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	*36000*	*37000*	*38000*	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aliphatic + Aromatic >C44 - C70		2015	1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH' s) (mg/kg)	Acenaphthene		2015	210	510	1100	*3000*	*4700*	*6000*	34	85	200	*84000*	*97000*	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Acenaphthylene		2015	170	420	920	*2900*	*4600*	*6000*	28	69	160	*83000*	*97000*	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Anthracene		2015	2400	5400	11000	*31000*	*35000*	*37000*	380	950	2200	520000	54000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10			21	C4SL	DEFRA	2014
			2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene		2015	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015

			Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park					
		SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Type	Contaminants Species	Year																					
	Fluoranthene	2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene	2015	170	400	860	*2800*	*3800*	*4500*	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene	2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene	2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	*190*	*460*	*1100*	4900	4900	4900	*1200*	*1900*	*3000*	S4UL	LQM/CIEH	2015
	Phenanthrene	2015	95	220	440	*1300*	*1500*	*1500*	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene	2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar(Bap as surrogate matter)	2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane	2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane	2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	*140000*	*57000*	*76000*	*100000*	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane	2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane	2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene	2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	*810*	*1100*	1500	S4UL	LQM/CIEH	2015
	Tetrachloromethane (Carbon Tetrachloride)	2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene	2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
	Trichloromethane	2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (cloroethene)	2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
Explosives	2,4,6 Trinitrotoluene	2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)	2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)	2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	*23000*	*23000*	*24000*	S4UL	LQM/CIEH	2015
Pesticides	Aldrin	2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin	2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	S4UL	LQM/CIEH	2015
	Atrazine	2015	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	S4UL	LQM/CIEH	2015
	Dichlorvos	2015	0.032	0.066	0.14	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	S4UL	LQM/CIEH	2015
	Alpha - Endosulfan	2015	7.4	18	41	*160*	*280*	*410*	1.2	2.9	6.8	*5600*	*7400*	*8400*	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Beta - Endosulfan	2015	7	17	39	*190*	*320*	*440*	1.1	2.7	6.4	*6300*	*7800*	*8700*	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Alpha -Hexachlorocyclohexanes	2015	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	S4UL	LQM/CIEH	2015
	Beta -Hexachlorocyclohexanes	2015	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	S4UL	LQM/CIEH	2015
	Gamma -Hexachlorocyclohexanes	2015	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	S4UL	LQM/CIEH	2015
Chlorobenzenes	Chlorobenzene	2015	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	*1300*	*2000*	*2900*	S4UL	LQM/CIEH	2015
	1,2-Dichlorobenzene	2015	23	55	130	24	57	130	94	230	540	*2000*	*4800*	*11000*	90000	95000	98000	*24000*	*36000*	*51000*	S4UL	LQM/CIEH	2015
	1,3-Dichlorobenzene	2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015
	1,4-Dichlorobenzene	2015	61	150	350	61	150	350	15	37	88	*4400*	*10000*	*25000*	17000	17000	1700	*36000*	*36000*	*36000*	S4UL	LQM/CIEH	2015
	1,2,3,-Trichlorobenzene	2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	*770*	*1100*	*1600*	S4UL	LQM/CIEH	2015
	1,2,4,-Trichlorobenzene	2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	*1700*	*2600*	*4000*	S4UL	LQM/CIEH	2015
	1,3,5,-Trichlorobenzene	2015	**0.33**	**0.81**	**1.9**	**0.33**	**0.81**	**1.9**	**4.7**	**12**	**28**	**23**	**55**	**130**	**1700**	**1700**	**1800**	***380***	***580***	***860***	S4UL	LQM/CIEH	2015
	1,2,3,4,-Tetrachlorobenzene	2015	**15**	**36**	**78**	**24**	**56**	**120**	**4.4**	**11**	**26**	**1700**	**3080**	**4400**	**830**	**830**	**830**	***1500***	***1600***	***1600***	S4UL	LQM/CIEH	2015
	1,2,3,5,- Tetrachlobenzene	2015	**0.66**	**1.6**	**3.7**	**0.75**	**1.9**	**4.3**	**0.38**	**0.9**	**2.2**	***49***	***120***	***240***	**78**	**79**	**79**	***110***	***120***	***130***	S4UL	LQM/CIEH	2015
	1,2,4, 5,- Tetrachlobenzene	2015	**0.33**	**0.77**	**1.6**	**0.73**	**1.7**	**3.5**	**0.06**	**0.16**	**0.37**	***42***	***72***	***96***	**13**	**13**	**13**	**25**	**26**	**26**	S4UL	LQM/CIEH	2015
	Pentachlrobenzene	2015	**5.8**	**12**	**22**	**19**	**30**	**38**	**1.2**	**3.1**	**7**	***640***	***770***	***830***	**100**	**100**	**100**	**190**	**190**	**190**	S4UL	LQM/CIEH	2015
	Hexachlorobenzene	2015	***1.8***	***3.3***	**4.9**	***4.1***	***5.7***	***6.7***	**0.47**	**1.1**	**2.5**	***110***	**120**	**120**	**16**	**16**	**16**	**30**	**30**	**30**	S4UL	LQM/CIEH	2015
Phenols & Chlorophenols																							
	Phenols	2015	120	200	380	440	690	1200	23	42	83	*440*	*690*	*1300*	*440*	*690*	*1300*	*440*	*690*	*1300*	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)	2015	**0.87**	**2**	**4.5**	**94**	**150**	**210**	**0.13**	**0.3**	**0.7**	**3500**	**4000**	**4300**	**620**	**620**	**620**	**1100**	**1100**	**1100**	S4UL	LQM/CIEH	2015
	Pentachlorophenols	2015	**0.22**	**0.52**	**1.2**	***27***	**29**	**31**	**0.03**	**0.08**	**0.19**	**400**	**400**	**400**	**60**	**60**	**60**	**110**	**120**	**120**	S4UL	LQM/CIEH	2015
Others																							
	Carbon Disulphide	2015	**0.14**	**0.29**	**0.62**	**0.14**	**0.29**	**0.62**	**4.8**	**10**	**23**	**11**	**22**	**47**	**11000**	**11000**	**12000**	**1300**	**1900**	**2700**	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene	2015	**0.29**	**0.7**	**1.6**	**0.32**	**0.78**	**1.8**	**0.25**	**0.61**	**1.4**	**31**	**66**	**120**	**25**	**25**	**25**	**48**	**50**	**51**	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.	2012			**8**			**8**			**8**			**240**							SGV	DEFRA	2012

NOTE

Priority	Guideline (mg kg^{-1})

				Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park		
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6
Type	Contaminants	Species	Year																		
	1	Site Specific Assessment Criteria (SSAC) (Soils Limited)																			
	2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014)																			
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																			
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail *et al*, 2015)																			
		For Generic Risk Assessment, the values in Bold have priority																			
		Table reviewed February 2020																			

Appendix E Information Provided by the Client

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