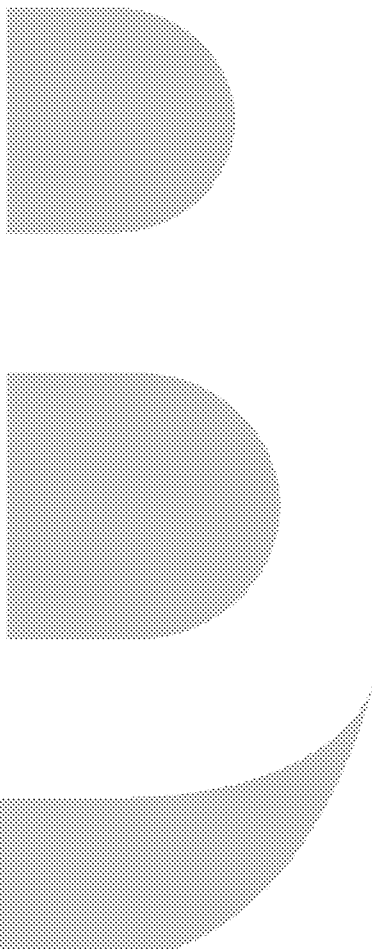


Appendix 13.2

Main Investigation Report





Main Investigation Report

at

Land east of Westergate, Chichester, West Sussex PO20 3RD

for

CALA Homes

Reference: I9522/MIR__R27
September 2021

Control Document

Project

Land east of Westergate, Chichester, West Sussex PO20 3RD

Document Type

Main Investigation Report

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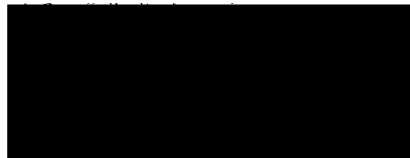
Final

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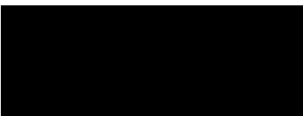
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Second check by

Eur Ing R B Higginson BSc, PGDip, CEng, MICE, FGS.



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

Soils Limited was commissioned by CALA Homes to undertake an intrusive ground investigation and prepare a Main Investigation Report on land at Land east of Westergate, Chichester, West Sussex PO20 3RD. The scope of the investigation was outlined in the Soils Limited quotation reference Q24788, dated 9th June 2021.

This document comprises the Main Investigation Report and incorporates the results, discussion and conclusions to this intrusive works.

This Main Investigation Report must be read in conjunction with the Preliminary Investigation Report undertaken on the above site by Soils Limited, Report ref: 19522/PIR, dated September 2021.

Standards

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

- BS 5930:2015 and BS EN ISO 22476-2:2005+A1:2011
- BS EN 1997-1:2004+A1:2013 Eurocode 7.
- BS EN ISO 14688-1:2018
- BS EN ISO 14688-2:2018
- BS 8004:2015
- BS 1377:1990 Parts 1 to 8
- NHBC Standards 2021
- BRE Digest 241 "Low-rise buildings on shrinkable clay soils: Part 2
- 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
- BS 10175:2011+A1:2013
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- BRE "*Cover Systems For Land Regeneration, Thickness Design of Cover Systems for Contaminated Land, BRE, March 2004*"
- CIRIA C733, Asbestos in soil and made ground: a guide to understanding and managing risks and CAR2012 regulations.
- CIRIA 665 Assessing risks posed by hazardous ground gases to buildings
- BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

- British Geological Survey Website & iGeology App (accessed August 2021)
- Google Earth (accessed August 2021)

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 was 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.

Trial 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 a trial hole.

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Section I Introduction

I.1 Objective of Investigation

Soils Limited was commissioned by CALA Homes to undertake an intrusive ground investigation and to prepare a Main 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 residential development. The investigation was to be made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the trial holes.

Soil samples were taken for chemical laboratory testing to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any contamination identified as dictated by the Conceptual Site Model (CSM) in the Preliminary Investigation Report undertaken for the site by Soils Limited (Report ref: 19522/PIR, September 2021) and/or the Revised Conceptual Site Model presented in Appendix C.1.

I.2 Location

The site was located at Land east of Westergate, Chichester, West Sussex PO20 3RD and was centred around an approximate O.S Land Ranger Grid Reference of SU 94104 04798.

The site location plan is given in Figure 2.

I.3 Site Description

The site comprised agricultural fields and grassland with no structures noted within the site boundary. The site was covered with a variety of vegetation including mature trees along line field boundaries, the open areas being completely overgrown in some areas with ruderal growth. The field to the southwest of the site was cropped and occasional dirt tracks were noted running across the site.

The site was generally undulating with dips of <5° towards the water courses running approximately west to east through the centre of the site, and north to south along the eastern boundary. The slope of the wider aspect was down to the southeast and east.

The surrounding area comprised residential with gardens to the north and west, and agricultural fields to the south and east.

An aerial photograph of the site and its environs has been included in Figure 3.

1.4 Proposed Development

The proposal comprised redevelopment of the site from farmland to housing with gardens and areas of open recreational space. At time of writing only a speculative plan has been provided for the development and this report must be reviewed and revised in relation to actual site-specific proposals if it is to be presented as evidence in pursuit of a planning application. All conclusions and findings in this report will therefore be essentially generic in nature and should be viewed in this light.

In compiling this report reliance was placed on drawing number 00163_CALA_CN_01, dated October 2020 and was prepared by the client. The recommendations provided within this report must be reviewed and revised when a finalised scheme is prepared and must not be applied without further consultation with Soils Limited.

The speculative development plans provided by the client are presented in Appendix D.

1.5 Anticipated Geology

The 1:50,000 BGS map showed the site to be located upon bedrock of the London Clay Formation with various overlying superficial deposits recorded across the site area, as described below.

The site has a water course running through its centre from west to east, feeding into another water course which runs north to south along the eastern site boundary. Alluvium is recorded adjacent to both water courses, beyond which no superficial deposits are noted, then Raised Beach Deposits are evident. To the north of these deposits, Head is noted and to the south, River Terrace Deposits are present. Made Ground is noted on the south eastern boundary as a Railway embankment.

1.5.1 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.

1.5.2 Alluvium

Alluvium is the most recent river or estuarine deposit and generally comprises silty clays usually with an appreciable organic content. Lenses of sand and gravel are also commonly found, as are pockets of peat.

The BSI Code of Practice for Foundations, BS8004: 1986, Clause 2.2.2.3.4 Peat and organic soils, includes the caveat that 'all these 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'.

1.5.3 Head

Head deposit are drifts produced by solifluxion, the downslope movement of debris outwash during the periglacial period, and characteristically comprise poorly sorted sands gravels and chalk of local derivation.

1.5.4 Raised Beach Deposits

Raised Beach Deposits consist of shingle, sand, silt and clay. Beach deposits may be in the form of dunes, sheets or banks, now above the level of the present shoreline as a result of earth movement or a general fall in sea level.

1.5.5 River Terrace Deposits

The rivers Test and Itchen have deposited extensive spreads of River Terrace Deposits in the Southampton area, representative of ancient floodplains. In total, eleven terraces have been recorded. The River Terrace Deposits consist predominantly of gravels made up of subangular to subrounded flints with a significant sand component locally with lenses of silt, clay or peat.

The five highest terraces have appreciable clay content. Poorly sorted, clayey and sandy silts and silty clays overlie the 1st, 3rd, 5th and 6th terraces and locally at above terrace gravels.

1.5.6 London Clay Formation

The London Clay Formation in the Hampshire region comprises silty and sandy clay, clayey and sandy silt, silty sand; sporadic claystones and thin beds of flint pebbles. The formation includes the Bognor Sand, Whitecliff Sand, Durley Sand, Portsmouth Sand and Nursling Sand Members. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required.

The lowest part of the London Clay Formation rests on the Lambeth Group.

1.6 Limitations and Disclaimers

This Main Investigation Report relates to the site located at Land east of Westergate, Chichester, West Sussex PO20 3RD and was prepared for the sole benefit of CALA Homes (The "Client"). 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 Quotation Q24788, dated 9th June 2021 accepted by the client in their Purchase Order Q24788, dated 8th July 2021.

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.

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 on 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).

It should 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.

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:

"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”.

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.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets remains with Soils Limited. License is for the sole use of the client and may not be assigned, transferred or given to a third party.

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 residential development. The intended investigation, as outlined within the Soils Limited quotation (Q24788, dated 9th June 2021), was to comprise the following items:

- 5 days of windowless sampler boreholes and dynamic probes
- 1 day of additional dynamic probes
- Installation of 9No. combined soil gas and groundwater monitoring wells (4No. in proposed balancing ponds and 5No. general spread).
- 2 days of machine excavated trial pitting
- 2 days in-situ CBR testing (DCP/TRL probe)
- Geotechnical laboratory testing
- Contamination laboratory testing
- 6No. winter groundwater monitoring visits (assumed October to March inclusive)

2.1.1 Actual Project Works

The actual project site works were undertaken between 14th and 20th July 2021 with subsequent laboratory testing and reporting, and comprised:

- 28No. windowless sampler boreholes (WS01 to WS28)
- 28No. dynamic probe (DPSH) (DP01 to DP28)
- Installation of 9No. combined soil gas and groundwater monitoring wells
- 30No. in-situ CBR tests using TRL DCP probe (DCP01 to DCP30)
- Geotechnical laboratory testing
- Contamination laboratory testing
- 6No. winter groundwater monitoring visits (to follow)

It was agreed with the client to replace the proposed machine excavated trial pits with further windowless sampler boreholes to minimise any damage to the cropped fields, which formed some of site area.

Nine windowless sampler boreholes (WS01, WS06, WS09, WS12, WS16, WS17, WS19, WS23, WS28) were backfilled with gravel and bentonite following the installation of monitoring wells. The installations comprised plain 35mm internal diameter pipework with bentonite backfill from ground level to 1.0m below ground level (bgl) with perforated pipework and granular response zone below, to the base of each borehole.

The remainder of the windowless sampler boreholes were backfilled with gravel. All trial hole locations have been presented in Figure 4 and Figure 5.

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

2.2 Ground Conditions

On dates between 14th and 20th July 2021 28no. windowless sampler boreholes (WS01 to WS28) were drilled, using a Premier Compact 110 rig and Dando Terrier rig, to depths ranging between 1.00m and 5.00m below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the client.

28No. dynamic probes, super heavy, (DP01 to DP28) were driven prior and adjacent to their corresponding windowless sampler borehole to depths ranging between 4.00m and 6.00m bgl. A single standpipe was installed in 9No. window sample borehole locations (WS01, WS06, WS09, WS12, WS16, WS17, WS19, WS23, WS28) to allow for continued monitoring of both groundwater and soils gas, where present.

The maximum depths of trial holes have been included in Table 2-1.

All trial 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 Trial Holes

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS01 (w)	5.00	WS11	4.00	WS21	2.60
WS02	4.00	WS12 (w)	3.60	WS22	2.00
WS03	1.00	WS13	2.70	WS23 (w)	2.50
WS04	3.00	WS14	4.00	WS24	4.00
WS05	2.40	WS15	4.00	WS25	2.50
WS06 (w)	4.00	WS16 (w)	3.65	WS26	2.20
WS07	3.00	WS17 (w)	4.00	WS27	2.40
WS08	3.00	WS18	4.00	WS28 (w)	1.00
WS09 (w)	2.50	WS19 (w)	3.00	-	
WS10	4.00	WS20	2.00	-	
DP01	6.00	DP11	6.00	DP21	6.00
DP02	6.00	DP12	6.00	DP22	6.00
DP03	6.00	DP13	6.00	DP23	6.00
DP04	6.00	DP14	6.00	DP24	6.00
DP05	6.00	DP15	6.00	DP25	4.00
DP06	6.00	DP16	6.00	DP26	4.50
DP07	6.00	DP17	6.00	DP27	4.60
DP08	6.00	DP18	6.00	DP28	4.90
DP09	6.00	DP19	6.00	-	
DP10	6.00	DP20	6.00	-	

Note: w - well installation

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the trial 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 should be made to the detailed records given within Appendix A, but for the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised as:

Made Ground/Topsoil (MG/TS)
Alluvium (ALV)
Head (HEAD)
River Terrace Deposits (RTD)
London Clay Formation (LC)

A breakdown of the test hole locations related to the anticipated geology is given in Figure 1, below.

The ground conditions encountered in the trial holes are summarised in Table 2-2.

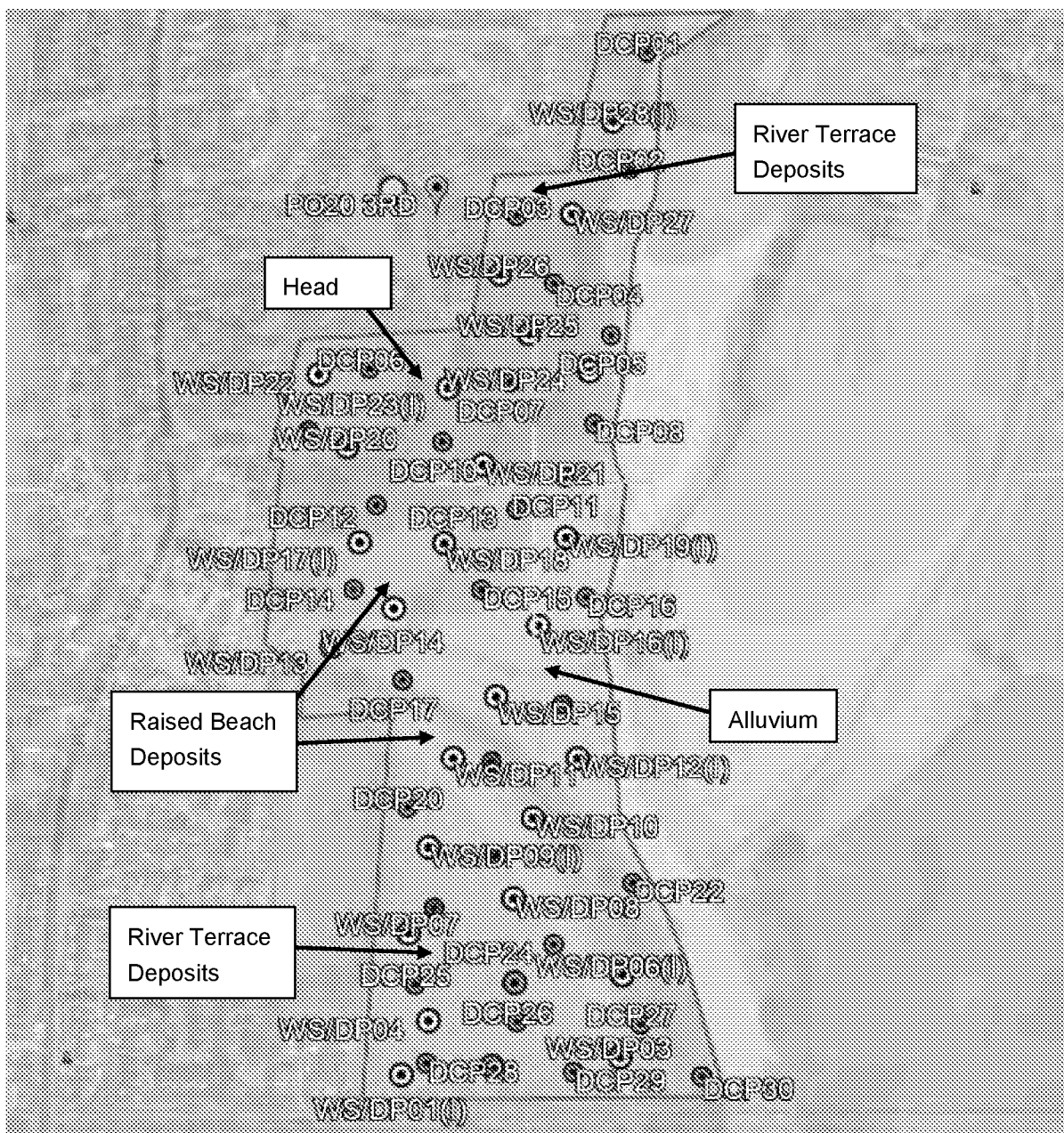
Table 2-2 Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG/TS	Anthropocene	G.L.	0.12-0.60	0.30	MG: Soft grey and orangish brown slightly clayey slightly sandy SILT with occasional rootlets. Locally with rare angular to sub-angular fine gravel. TS: Soft dark grey and brown silty CLAY with occasional rootlets. Locally with rare angular to sub-angular fine gravel.
ALV	Holocene	0.30-0.60	1.00 ¹ -2.60 (2.00) ³	1.50 (where proven) ²	Soft grey and orangish brown slightly sandy CLAY. Locally with pockets of fine to coarse sand, occasional gravel and black discolouration.
HEAD	Holocene	0.12-0.50	1.00 ¹ -4.00 ¹ (4.10) ³	2.20 (where proven) ²	Firm brown gravelly CLAY / clayey sandy GRAVEL with fine roots and rootlets. Locally silty and with pockets of sand. Gravel is angular to sub-angular fine to coarse flint.

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
RTD	Holocene	0.25-2.50	1.00-4.70 (4.90) ³	2.50 (where proven) ²	Orangish brown fine to coarse slightly gravelly SAND, locally sandy gravelly CLAY. Gravel is angular to sub-angular fine to coarse flint.
LC	Eocene	1.00-4.70	1.90 ¹ -5.00 ¹ (6.00 ¹) ³	Not proven	Firm dark grey silty CLAY with rare shell fragments and rare fine selenite crystals.

Note: ¹ Final depth of trial hole. ² Base of strata not encountered. ³ Inferred from the dynamic probes

Figure I - Superficial Geology of Site Area with Trial Hole Locations



The superficial geology underlying the site is provided in Figure 1 with trial hole locations overlain for reference.

As shown, the superficial geology is complex and varies across the site area. The Alluvium (yellow) is anticipated to be present adjacent to the water courses, which run through the centre of the site from west to east, and north to south along the eastern site boundary. Raised Beach Deposits (pale green) are evident beyond the Alluvium with some areas in between recorded with no superficial deposits present. To the north of the Alluvium and Raised Beach Deposits, Head (purple) is noted and to the southwest, River Terrace Deposits (orange) are present.

2.3 Ground Conditions Encountered in Trial Holes

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

2.3.1 Made Ground and Topsoil

Soils described as Made Ground were encountered in thirteen of the twenty-eight trial holes from ground level to depths ranging between 0.30m and 0.60m bgl.

The Made Ground typically comprised soft grey and orangish brown slightly clayey slightly sandy SILT with occasional rootlets. Locally with rare angular to sub-angular fine gravel.

Soils described as Topsoil were encountered in fifteen of the twenty-eight trial holes from ground level to depths ranging between 0.12m and 0.60m bgl.

The Topsoil comprised soft dark grey and brown silty CLAY with occasional rootlets. Locally with rare angular to sub-angular fine gravel.

The depth of Made Ground and Topsoil has been included in Table 2-3.

Table 2-3 Final Depth of Made Ground/Topsoil

Trial Hole	Strata	Depth (m bgl)	Trial Hole	Strata	Depth (m bgl)
WS/DP01	MG	0.30	WS/DPI5	MG	0.50
WS/DP02	MG	0.30	WS/DPI6	TS	0.30
WS/DP03	MG	0.40	WS/DPI7	TS	0.25
WS/DP04	MG	0.30	WS/DPI8	TS	0.50
WS/DP05	MG	0.30	WS/DPI9	TS	0.30
WS/DP06	MG	0.40	WS/DP20	TS	0.40
WS/DP07	MG	0.30	WS/DP21	TS	0.20
WS/DP08	MG	0.40	WS/DP22	TS	0.20
WS/DP09	MG	0.30	WS/DP23	TS	0.30
WS/DPI0	MG	0.60	WS/DP24	TS	0.15
WS/DPI1	MG	0.30	WS/DP25	TS	0.40
WS/DPI2	TS	0.60	WS/DP26	TS	0.40
WS/DPI3	MG	0.50	WS/DP27	TS	0.20

Trial Hole	Strata	Depth (m bgl)	Trial Hole	Strata	Depth (m bgl)
WS/DPI4	TS	0.40	WS/DP28	TS	0.12

2.3.2 Alluvium

Soils of the Alluvium were recorded directly underlying the Made Ground or Topsoil in seven of the twenty-eight trial holes and were recorded to depths ranging between 1.00m and 2.60m bgl, generally within the areas anticipated in the east and centre of the site, as shown in Figure 1. They were also inferred to 2.00m bgl in DP03.

The Alluvium typically comprised soft grey and orangish brown slightly sandy CLAY. Locally with pockets of fine to coarse sand, occasional gravel and black discolouration.

The depth of Alluvium has been included in Table 2-4.

Table 2-4 Final Depth of Alluvium

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS/DP01	N/e	WS/DPI5	N/e
WS/DP02	N/e	WS/DPI6	N/e
WS/DP03	1.00 ¹ / 2.00	WS/DPI7	N/e
WS/DP04	N/e	WS/DPI8	N/e
WS/DP05	N/e	WS/DPI9	N/e
WS/DP06	2.60	WS/DP20	N/e
WS/DP07	1.80	WS/DP21	N/e
WS/DP08	2.00	WS/DP22	N/e
WS/DP09	N/e	WS/DP23	N/e
WS/DPI0	2.00	WS/DP24	N/e
WS/DPI1	2.30	WS/DP25	N/e
WS/DPI2	1.90	WS/DP26	N/e
WS/DPI3	N/e	WS/DP27	N/e
WS/DPI4	N/e	WS/DP28	N/e

Note: ¹ Final depth of trial hole. N/e – not encountered

2.3.3 Head

Soils of the Head were encountered directly underlying the Made Ground or Topsoil in twelve of the twenty-eight trial holes and were recorded to depths ranging between 1.00m and 4.00m bgl, in both cases the base of the borehole. They were also inferred to depths of up to 4.10m bgl within dynamic probe holes. The Head was generally located in the northern half of the site, to the north of the central water course, as shown on Figure 1.

The Head typically comprised firm brown gravelly CLAY / clayey sandy GRAVEL with fine roots and rootlets. Locally silty and with pockets of sand. Gravel is angular to sub-angular fine to coarse flint.

The depth of Head has been included in Table 2-5.

Table 2-5 Final Depth of Head

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS/DP01	N/e	WS/DPI 5	N/e
WS/DP02	N/e	WS/DPI 6	N/e
WS/DP03	N/e	WS/DPI 7	3.80
WS/DP04	N/e	WS/DPI 8	3.10
WS/DP05	N/e	WS/DPI 9	N/e
WS/DP06	N/e	WS/DP20	2.00
WS/DP07	N/e	WS/DP21	2.60 ¹ / 2.70
WS/DP08	N/e	WS/DP22	2.00 ¹ / 2.20
WS/DP09	N/e	WS/DP23	2.50 ¹ / 3.20
WS/DPI 10	N/e	WS/DP24	4.00 ¹ / 4.10
WS/DPI 11	N/e	WS/DP25	2.50 ¹ / 2.60
WS/DPI 12	N/e	WS/DP26	2.20 ¹ / 2.50
WS/DPI 13	N/e	WS/DP27	2.40 ¹ / 3.60
WS/DPI 14	4.00 ¹ / 4.10	WS/DP28	1.00 ¹ / 3.70

Note: ¹ Final depth of trial hole. N/e – not encountered

2.3.4 River Terrace Deposits

The River Terrace Deposits were encountered directly beneath the Made Ground, Topsoil, Head or Alluvium in eleven trial holes and were recorded to depths ranging between 0.90m and 4.70m bgl. They were also inferred from a further four dynamic probes holes to a maximum depth of 4.90m bgl. The River Terrace Deposits were located in the southwest of the site, to the south and west of the water courses, and also to the far north of the site, as shown on Figure 1.

The River Terrace Deposits typically comprised orangish brown fine to coarse slightly gravelly SAND, locally sandy gravelly CLAY. Gravel is angular to sub-angular fine to coarse flint.

This unit may include Raised Beach Deposits, which are also recorded by the BGS as comprising Sand and Gravel and therefore very difficult to distinguish from the River Terrace Deposits, particularly given their limited and inconsistent presence.

The depth of River Terrace Deposits has been included in Table 2-6.

Table 2-6 Final Depth of River Terrace Deposits

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS/DP01	4.70	WS/DPI 5	2.50
WS/DP02	3.40	WS/DPI 6	1.00
WS/DP03	N/e	WS/DPI 7	N/e
WS/DP04	3.00 ¹ / 4.20	WS/DPI 8	N/e
WS/DP05	3.70	WS/DPI 9	1.90

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS/DP06	N/e	WS/DP20	N/e
WS/DP07	3.00 ¹ / 3.80	WS/DP21	N/e
WS/DP08	3.00 ¹ / 3.60	WS/DP22	N/e
WS/DP09	1.90	WS/DP23	N/e
WS/DP10	N/e	WS/DP24	N/e
WS/DP11	N/e	WS/DP25	N/e / 4.00 ¹
WS/DP12	N/e	WS/DP26	N/e / 4.50 ¹
WS/DP13	2.70 ¹ / 3.80	WS/DP27	N/e / 4.60 ¹
WS/DP14	N/e	WS/DP28	N/e / 4.90 ¹

Note: ¹ Final depth of trial hole. N/e – not encountered

2.3.5 London Clay Formation

The London Clay Formation was encountered directly underlying the Alluvium, Head or River Terrace Deposits in twenty-four of the twenty-eight trial holes and recorded to the full depth of the investigation at 5.00m bgl. It was also inferred to 6.00m bgl in the dynamic probe holes.

The London Clay Formation typically comprised firm dark grey silty CLAY with rare shell fragments and rare fine selenite crystals.

The depth of London Clay Formation has been included in Table 2-7.

Table 2-7 Final Depth of London Clay Formation

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS/DP01	5.00 ¹ / 6.00 ¹	WS/DP15	4.00 ¹ / 6.00 ¹
WS/DP02	4.00 ¹ / 6.00 ¹	WS/DP16	4.00 ¹ / 6.00 ¹
WS/DP03	N/e / 6.00 ¹	WS/DP17	4.00 ¹ / 6.00 ¹
WS/DP04	N/e / 6.00 ¹	WS/DP18	4.00 ¹ / 6.00 ¹
WS/DP05	N/e / 6.00 ¹	WS/DP19	1.90 ¹ / 6.00 ¹
WS/DP06	4.00 ¹ / 6.00 ¹	WS/DP20	N/e / 6.00 ¹
WS/DP07	N/e / 6.00 ¹	WS/DP21	N/e / 6.00 ¹
WS/DP08	N/e / 6.00 ¹	WS/DP22	N/e / 6.00 ¹
WS/DP09	2.50 ¹ / 6.00 ¹	WS/DP23	N/e / 6.00 ¹
WS/DP10	4.00 ¹ / 6.00 ¹	WS/DP24	N/e / 6.00 ¹
WS/DP11	4.00 ¹ / 6.00 ¹	WS/DP25	N/e
WS/DP12	3.60 / 6.00 ¹	WS/DP26	N/e
WS/DP13	N/e / 6.00 ¹	WS/DP27	N/e
WS/DP14	N/e / 6.00 ¹	WS/DP28	N/e

Note: ¹ Final depth of trial hole. N/e – not encountered

2.4 Roots

Roots were encountered in each of the twenty-eight trial holes at depths ranging between 0.75m and 3.10m bgl. Desiccated roots were also recorded to depths of between 2.70m and 3.40m bgl in two trial holes.

It must be noted that the roots to crops can extend to a significant depth of the order or between one and two metres below ground level.

The depths of root penetration have been included in Table 2.8.

Table 2-8 Depth of Root Penetration

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS01	1.40	WS15	1.00
WS02	1.60	WS16	2.00
WS03	1.00 ¹	WS17	1.00
WS04	1.30	WS18	3.10
WS05	0.80	WS19	0.90
WS06	1.50	WS20	1.00
WS07	1.50	WS21	0.75
WS08	1.50	WS22	0.80
WS09	1.30	WS23	1.40
WS10	2.00 / 3.40 ²	WS24	1.10
WS11	2.10	WS25	2.50
WS12	1.20	WS26	1.10
WS13	1.00 / 2.70 ²	WS27	1.60
WS14	1.50	WS28	1.00 ¹
Note: ¹ Final depth of trial hole. ² Desiccated roots			

Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that may have been removed both within the site and its close environs. The site comprised a number of open fields, some appearing to be used for agriculture. Mature trees were noted along the boundaries of these fields, both along the site boundaries and within the site area. They were particularly abundant within the central western part of the site.

A review of Google Earth historical satellite imagery showed that no significant vegetation has been removed or added to the site in past 20 years.

It must be emphasised that the probability of determining the maximum depth of roots from a narrow diameter borehole is low. A direct observation such as from within a trial pit is necessary to gain a better indication of the maximum root depth.

2.5 Groundwater

Groundwater was encountered within ten of the twenty-eight trial holes. The details are included in Table 2-9.

Table 2-9 Groundwater Monitoring During Site Works

Trial Hole	Depth to Water (m bgl)		Notes
	Strike	After Standing 20mins	
WS01	2.00	1.70	-

Trial Hole	Depth to Water (m bgl)		Notes
	Strike	After Standing 20mins	
WS02	1.10	0.76	-
WS04	2.00	0.76	-
WS05	2.00	1.76	-
WS06	2.00	1.70	-
WS12	2.00	1.70	-
WS13	1.10	0.76	-
WS17	1.20	1.42	Seepage only.
WS19	2.00	1.55	-
WS21	1.10	1.10	No rise observed.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage.

The investigation was conducted in July (2021), when groundwater levels should be falling towards their annual minimum (lowest) elevation, which typically occurs around September. The annual maximum (highest) elevation typically occurs around March.

Groundwater has been recorded in ten boreholes at depths varying between 0.76m and 1.70m bgl for short-term settled levels. Given the site has two water courses running through and alongside it and is situated between ~5m and ~10m AOD, shallow groundwater would be anticipated, particularly in the east of the site where the site lies adjacent to a water course and is lower. It is noted that the areas immediately adjacent to the water courses, through the centre of the site and along the eastern edge, comprise a flood zone with no residential development proposed.

Further groundwater monitoring is proposed for the winter period, commencing in October for six months, ending in March 2022. This will allow the worst-case groundwater levels to be determined. Given the levels observed during the investigation, groundwater levels are likely to have a significantly impact on the proposed development and the recommendations made in this report must be reviewed following the above monitoring period.

Section 3 Discussion of Geotechnical In-Situ and Laboratory Testing

3.1 Dynamic Probe Tests

Dynamic probing (DPSH) was undertaken at twenty-eight locations (DP01 to DP28) adjacent and prior to the drilling of their respective windowless sampler borehole, to depths ranging between 4.00 and 6.00m bgl. The results were converted to equivalent SPT “N60” values based on dynamic energy using commercial computer software (Geostru). The results were then interpreted based on the classifications outlined in Appendix B.1, Table B.1.1 to Table B.1.2.

The SPT “N60” values presented have been corrected in accordance with BS EN 22476 Part 3, to account for the rig dynamic probe trip hammer efficiency, borehole depth, overburden factors etc. Further correction of the ‘N’ values should therefore not be necessary. The energy ratio of the drilling rigs was 85.86% and 77%. The energy ratio for each location is presented on the individual logs within Appendix A.1.

3.1.1 Alluvium

The Alluvium recorded equivalent SPT “N60” values between 0 and 12 within cohesive beds and 0 to 8 in granular beds. The cohesive beds were classified as extremely low to medium strength with an inferred undrained cohesive strength ranging between <10kPa and 60kPa. The granular beds were classified as very loose to loose relative density. The zero values were recorded at various depths within the top 2.00m bgl, some near surface some at 2.00m bgl, with no obvious correlation between strength/density and depth within this unit.

3.1.2 Head

The Head recorded equivalent SPT “N60” values between 0 and 33 within cohesive beds and 0 to 33 in granular beds. The cohesive beds were classified as extremely low to very high strength with an inferred undrained cohesive strength ranging between <10kPa and 165kPa. The granular beds were classified as very loose to dense relative density. The strength/density profile with depth was highly variable, often with medium dense soils overlying loose and very loose soils. The zero values were recorded at depths of over 3.00m bgl in some cases, with no obvious correlation between strength/density and depth within this unit.

3.1.3 River Terrace Deposits

The River Terrace Deposits recorded equivalent SPT “N60” values between 0 and 25 within cohesive beds and 0 to >50 in granular beds. The cohesive beds were classified as extremely low to high strength with an inferred undrained cohesive strength ranging between <10kPa and 125kPa. The granular beds were classified as very loose to very dense relative density. The zero values were recorded at depths of up to 3.00m in some cases, with no obvious correlation between strength/density and depth within this unit.

3.1.4 London Clay Formation

The London Clay Formation recorded equivalent SPT “N60” values between 4 and 29, classifying the cohesive soils as low to high strength and inferred undrained cohesive strength of 20kPa to 145kPa, generally increasing with depth.

A full interpretation of the DPSH tests is outlined in Appendix B.2, Table B.2.1.

3.2 Dynamic Cone Penetrometer Tests

The Transport Research Laboratory (TRL), Dynamic Cone Penetrometer (DCP) were undertaken at thirty locations (DCP01 to DCP30). The results were interpreted based on the classification outlined in Appendix B.1.

The results from DCP testing indicated CBR values of between 2% and 212% for the soils encountered in the top 0.95m bgl, as detailed in Table 3-1.

The high CBR values encountered were anticipated to be large gravel clasts or Made Ground inclusions struck during the test.

Table 3-1 Summary of DCP CBR Results

DCP No.	Anticipated Strata	CBR Range (%)	DCP No.	Anticipated Strata	CBR Range (%)
01	MG/TS over HEAD	3 – 18	16	MG/TS over ALV	5 – 53
02	MG/TS over ALV	3 – 212	17	MG/TS over ALV	17
03	MG/TS over RTD	3 – 14	18	MG/TS over ALV	4 – 28
04	MG/TS over HEAD	7 – 77	19	MG/TS over ALV	10
05	MG/TS over HEAD	3 – 63	20	MG/TS over RTD	7 – 28
06	MG/TS over HEAD	3 – 39	21	MG/TS over RTD	10 – 50
07	MG/TS over HEAD	3 – 33	22	MG/TS over ALV	5 – 38
08	MG/TS over HEAD	5 – 67	23	MG/TS over RTD	14
09	MG/TS over HEAD	19	24	MG/TS over ALV	7 – 39
10	MG/TS over HEAD	12	25	MG/TS over RTD	3 – 35
11	MG/TS over HEAD	2 – 20	26	MG/TS over RTD	11
12	MG/TS over HEAD	9 – 29	27	MG/TS over ALV	12 – 50
13	MG/TS over HEAD	4 – 24	28	MG/TS over RTD	11
14	MG/TS over RTD	4 – 14	29	MG/TS over ALV	6 – 24
15	MG/TS over RTD	5 – 31	30	MG/TS over ALV	4 – 27

All locations are expected to be underlain by Made Ground / Topsoil with superficial deposits underlying. Given the nature of the test, the actual soil types are not known, but based on anticipated geology, the following observations can be made.

3.2.1 Head

In locations anticipated to be underlain by Head DCP testing indicated CBR values of between 2% and 77%.

3.2.2 Alluvium

In locations anticipated to be underlain by Alluvium DCP testing indicated CBR values of between 3% and 212%.

3.2.3 River Terrace Deposits

In locations anticipated to be underlain by River Terrace Deposits DCP testing indicated CBR values of between 3% and 50%.

The DCP results are presented in Appendix B.3.

3.3 Atterberg Limit Tests

Atterberg Limit tests were performed on twenty-four samples, six obtained from the Alluvium, eight from the Head, seven from the cohesive parts of the River Terrace Deposits and the remaining three from the London Clay Formation. The results were classified in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

3.3.1 Alluvium

The cohesive beds of the Alluvium were classified as low to medium volume change potential in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

3.3.2 Head

The cohesive beds of the Head were classified as low/none to high volume change potential in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2 respectively.

3.3.3 River Terrace Deposits

The cohesive beds of the River Terrace Deposits were classified as low to high volume change potential in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

3.3.4 London Clay Formation

The London Clay Formation was classified as medium to high volume change potential in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

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

3.4 Particle Size Distribution Tests

Particle Size Distribution (PSD) tests were performed on thirteen samples, six obtained from the River Terrace Deposits, one from the Alluvium and six from the Head.

One of the samples tested from the River Terrace Deposits was predominately cohesive, recording 53% silt and clay, albeit with 45% sand.

3.4.1 Alluvium

The PSD tests classified the granular beds of the Alluvium as having no volume change potential in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

3.4.2 Head

The PSD tests classified the granular beds of the Head as having a volume change potential in accordance BRE Digest 240 in three of six samples. The results from grading analysis showed that each of the six samples tested had no volume change potential in accordance with NHBC Standards Chapter 4.2. 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.

3.4.3 River Terrace Deposits

The PSD tests classified the granular beds of the River Terrace Deposits as having no volume change potential in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

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

3.5 Sulphate and pH Tests

One sample was taken from the Alluvium, two from the River Terrace Deposits, two from the Head and one from the London Clay Formation for water soluble sulphate (2:1) and pH testing in accordance with Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground'.

The tests recorded water soluble sulphate between <10mg/l and 22mg/l with pH values of 7.5 to 8.1.

The significance of the sulphate and pH Test results are discussed in Section 4.5 and the laboratory report in Appendix B.3.

Section 4 Foundation Design

4.1 General

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 trial holes.

4.1.1 Made Ground and Topsoil

The terms *Fill* and *Made Ground (non-engineered fill)* are used to describe material, which has been placed by man either for a particular purpose e.g. to form an embankment, or to dispose of unwanted material. For the former use, the Fill and/or Made Ground may well have been selected for the purpose and placed and compacted in a controlled manner. With the latter, great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material.

The BSI Code of Practice for Foundations, BS 8004:2015, Clause 4.1.2.2 states, *'Spread foundations should not be placed on non-engineered fill unless such use can be justified on the basis of a thorough ground investigation and detailed design.'*

Peat and organic soils 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 thirteen of the twenty-eight trial holes from ground level to depths ranging between 0.30m and 0.60m bgl. The Made Ground typically comprised soft grey and orangish brown slightly clayey slightly sandy SILT with occasional rootlets. Locally with rare angular to sub-angular fine gravel.

Soils described as Topsoil were encountered in fifteen of the twenty-eight trial holes from ground level to depths ranging between 0.12m and 0.60m bgl. The Topsoil comprised soft dark grey and brown silty CLAY with occasional rootlets. Locally with rare angular to sub-angular fine gravel.

A result of the inherent variability, particularly of uncontrolled Topsoil, Fill and/or Made Ground is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should, therefore, be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

4.1.2 Alluvium

Soils of the Alluvium were recorded directly underlying the Made Ground or Topsoil in seven of the twenty-eight trial holes and were recorded to depths ranging between 1.00m and 2.60m bgl, generally within the areas anticipated in the east and centre of the site, as shown in Figure 1. They were also inferred to 2.00m bgl in DP03.

The Alluvium typically comprised soft grey and orangish brown slightly sandy CLAY. Locally with pockets of fine to coarse sand, occasional gravel and black discolouration.

The results from DPSH testing inferred that the cohesive soils of the Alluvium were of an **extremely low to medium strength** with inferred undrained cohesive strength of **<10kPa to 60kPa**. The granular beds were classified as very loose to loose relative density. The zero values were recorded at various depths within the top 2.00m bgl, some near surface some at 2.00m bgl, with no obvious correlation between strength/density and depth within this unit.

The results from Atterberg Limits tests showed that the cohesive soils of the Alluvium had **low to medium volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

Soils of the Alluvium are normally consolidated, both cohesive and granular soils and as such are expected to display low to moderate bearing capacities with moderate to high settlement characteristics. The soils of the Alluvium were not considered suitable for the proposed development due to likely variations both in composition and depositional thickness.

4.1.3 Head

Soils of the Head were encountered directly underlying the Made Ground or Topsoil in twelve of the twenty-eight trial holes and were recorded to depths ranging between 1.00m and 4.00m bgl, in both cases the base of the borehole. They were also inferred to depths of up to 4.10m bgl within dynamic probe holes. The Head was generally located in the northern half of the site, to the north of the central water course, as shown on Figure 1.

The Head typically comprised firm brown gravelly CLAY / clayey sandy GRAVEL with fine roots and rootlets. Locally silty and with pockets of sand. Gravel is angular to sub-angular fine to coarse flint.

The results from DPSH testing inferred that the cohesive soils of the Head were of an **extremely low to very high strength** with an inferred undrained cohesive strength ranging between **0kPa and 165kPa**. The granular beds were classified as **very loose to dense** relative density. The strength/density profile with depth was highly variable, often with medium dense soils overlying loose and very loose soils. The zero values were recorded at depths of over 3.00m bgl in some cases, with no

obvious correlation between strength/density and depth within this unit.

The results from Atterberg Limits tests showed that the cohesive soils of the Head had **low/none to high volume change potential** in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2 respectively.

Soils of the Head are normally consolidated, both cohesive and granular soils and as such are expected to display low to moderate bearing capacities with moderate to high settlement characteristics. The soils of the Head were not considered suitable for the proposed development due to likely variations both in composition and depositional thickness.

4.1.4 River Terrace Deposits

The River Terrace Deposits were encountered directly beneath the Made Ground, Topsoil, Head or Alluvium in eleven trial holes and were recorded to depths ranging between 0.90m and 4.70m bgl. They were also inferred from a further four dynamic probes holes to a maximum depth of 4.90m bgl. The River Terrace Deposits were located in the southwest of the site, to the south and west of the water courses, and also to the far north of the site, as shown on Figure 1.

The River Terrace Deposits typically comprised orangish brown fine to coarse slightly gravelly SAND, locally sandy gravelly CLAY. Gravel is angular to sub-angular fine to coarse flint.

The results from DPSH testing inferred that the cohesive soils of the River Terrace Deposits were of an **extremely low to high strength** with an inferred undrained cohesive strength ranging between **0kPa and 125kPa**. The granular beds were classified as **very loose to very dense** relative density, generally increasing with depth. The zero values were recorded as depths of up to 3.00m in some cases, with no obvious correlation between strength/density and depth within this unit.

The results from Atterberg Limits tests showed that the cohesive soils of the River Terrace Deposits had **low to high volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

Soils of the River Terrace Deposits are normally consolidated, predominately granular soils and as such are expected to display moderate bearing capacities with moderate settlement characteristics. The soils of the River Terrace Deposits were considered a suitable bearing stratum for the proposed development subject to sufficient bearing capacity being achieved.

4.1.5 London Clay Formation

The London Clay Formation was encountered directly underlying the Alluvium, Head or River Terrace Deposits in twenty-four of the twenty-eight trial holes and recorded to the full depth of the investigation at 5.00m bgl. It was also inferred to 6.00m bgl in the dynamic probe holes.

The London Clay Formation typically comprised firm dark grey silty CLAY with rare shell fragments and rare fine selenite crystals.

The results from DPSH testing inferred that the cohesive soils of the London Clay Formation were of a **low to high strength** and inferred undrained cohesive strength of **20kPa to 145kPa**, generally increasing with depth.

The results from Atterberg Limits tests showed that the soils of the London Clay Formation had **medium to high volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

The soils of the London Clay Formation are heavily overconsolidated cohesive soils and as such are expected to display moderate bearing and settlement characteristics. The soils of the London Clay Formation were considered a suitable bearing stratum for the proposed development, but given the depth encountered in most locations, a piled foundation solution would be required.

4.1.6 Roots

Roots were encountered in each of the twenty-eight trial holes at depths ranging between 0.75m and 3.10m bgl. Desiccated roots were also recorded to depths of between 2.70m and 3.40m bgl in two trial holes.

Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that may have been removed both within the site and its close environs. The site comprised a number of open fields, some appearing to be used for agriculture. Mature trees were noted along the boundaries of these fields, both along the site boundaries and within the site area. They were particularly abundant within the central western part of the site.

A review of Google Earth historical satellite imagery showed that no significant vegetation has been removed or added to the site in past 20 years.

4.1.7 Groundwater

Groundwater was encountered within ten of the twenty-eight trial holes. The details are included in Table 2.9.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in July (2021), when groundwater levels should be falling towards their annual minimum (lowest) elevation, which typically occurs around September. The annual maximum (highest) elevation typically occurs around March.

Groundwater has been recorded in ten boreholes at depths varying between 0.76m and 1.70m bgl for settled levels. Given the site has two water courses running through and alongside it and is situated between ~5m and ~10m AOD, shallow

groundwater would be anticipated, particularly in the east of the site. It is noted that the areas immediately adjacent to the water courses, through the centre of the site and along the eastern edge, comprise a flood zone with no residential development proposed.

Further groundwater monitoring is proposed for the winter period, commencing in October for six months, ending in March 2022. This will allow the worst-case groundwater levels to be determined. Given the levels observed during the investigation, groundwater levels are likely to have a significantly impact on the proposed development and the recommendations made in this report must be reviewed following the above monitoring period.

4.2 Foundation Scheme General

The proposal comprised redevelopment of the site from farmland to housing with gardens and areas of open recreational space. At time of writing only a speculative plan has been provided for the development and this report must be reviewed and revised in relation to actual site-specific proposals if it is to be presented as evidence in pursuit of a planning application. All conclusions and findings in this report will therefore be essentially generic in nature and should be viewed in this light.

In compiling this report reliance was placed on drawing number 00163_CALA_CN_01, dated October 2020 and was prepared by the client. The recommendations provided within this report must be reviewed and revised when a finalised scheme is prepared and must not be applied without further consultation with Soils Limited.

The speculative development plans provided by the client are presented in Appendix D.

4.3 Guidance on Shrinkable Soils

The Building Research Establishment (BRE) Digests 240, 241 and 242 provide guidance on 'best practice' for the design and construction of foundations on shrinkable soils.

4.3.1 Alluvium

The results from Atterberg Limits Tests showed that the Alluvium had **low to medium volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

4.3.2 Head

The cohesive beds of the Head were classified as **low/none to high volume change potential** in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2 respectively.

4.3.3 River Terrace Deposits

The cohesive beds of the River Terrace Deposits were classified as **low to high volume change potential** in accordance with both BRE Digest 240 and NHBC

Standards Chapter 4.2.

4.3.4 London Clay Formation

The London Clay Formation was classified as **medium to high volume change potential** in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

Given that placing foundations into the soils of the Alluvium is not recommended, **high volume change potential** must therefore be adopted where foundations pass through or into the cohesive soils of the Head, River Terrace Deposits or London Clay Formation.

The granular soils of the Head and River Terrace Deposits had no volume change potential.

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 to establish an appropriate founding depth prior to the construction of foundations. This must take account of trees, substantial bushes and hedgerows that are to remain, those that have already been removed or are to be removed or those that are to be planted as part of the site landscaping. When trees are felled it can take up to twenty years for desiccation caused by roots to recover. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data on any trees, bushes or shrubs removed prior to or following the site survey.

The BRE Digest 241 states: *“An increasingly common, potentially damaging situation is where trees or hedges have been cut down prior to building. The subsequent long-term swelling of the zone of clay desiccated by the roots, as moisture slowly returns to the ground, can be substantial. The rate at which the ground recovers is very difficult to predict and if there is any doubt that recovery is complete then bored pile foundations with suspended beams and floors should be used”.*

The stated intention of the NHBC is to ensure that shrinkage and swelling of plastic soils does not adversely affect the structural integrity of foundations to such a degree that remedial works would be required to restore the serviceability of the building. It must be borne in mind that adherence to the NHBC tables and design recommendations may not, in all cases, totally prevent foundation movement and cracking of brickwork might occur.

The BRE Digest 240 suggests: *“Two courses of action are open:*

Estimate the potential for swelling or shrinkage and try to avoid large changes in the water content, for example by not planting trees near the foundations.

Accept that swelling or shrinkage will occur and take account of it. The foundations can be designed to resist resulting ground movements or the superstructure can be designed to accommodate movement without damage.”

The design of foundations suitable to withstand movements is presented in BRE Digest 241 "Low-rise buildings on shrinkable clay soils: Part 2"

4.4 Geotechnical Appraisal

The is underlain by a complex series of superficial deposits including Alluvium, Head, River Terrace Deposits and Raised Beach Deposits. These are underlain by the London Clay Formation, encountered or inferred across all the site except the far north.

4.4.1 Alluvium

The Alluvium is predominantly cohesive and typically of very low cohesive strength, so is not considered suitable for supporting any form of significant structures. Generally, these soils are found in the east and centre of the site adjacent to the water courses on and adjacent to the site, areas which have been designated as flood zone, with no residential development proposed.

4.4.2 Head

The Head is highly varied with a wide range of soil strengths evident across a wide range of depths. The Head was generally located in the northern half of the site, to the north of the central water course, as shown on Figure 1. With the occasional exception these soils are unlikely to provide a suitable bearing stratum for the proposed development, with soils of very low cohesive strength / density (zero blow counts in DPs) noted to depths of greater than 3.00m bgl in several locations.

4.4.3 River Terrace Deposits

The River Terrace Deposits and Raised Beach Deposits have been considered together given they are both predominately granular soils, although are also recorded as cohesive with high gravel content. The River Terrace Deposits were located in the southwest of the site, to the south and west of the water courses, and also to the far north of the site, as shown on Figure 1. These soils could be suitable as a founding stratum for the proposed development, although some areas were noted with poor engineering properties (DP04).

In addition to the designated flood zone area, the site can be broadly divided into three areas:

- Zone 1 - The southwest section, which is marked by the cropped field and forms a roughly triangular shaped area west and south of the flood zone (WS/DP01 to WS/DP11).
- Zone 2 – The central section, which forms the centre of the site to the west and north of the flood zone (WS/DP14, 16, 18, 20 to WS/DP24).
- Zone 3 – The northern section, which forms the northern third of the site, west of the flood zone (WS/DP25 to WS/DP28).

These zones are delineated in Figure 6.

4.4.4 Zone 1 – Southwest Section

The soils in the far southwest corner generally comprise River Terrace Deposits with reasonable engineering properties that could provide suitable bearing capacities at depths of around 1.20m bgl. Further north and east Alluvium was noted overlying and deepening of foundation will be required to ensure founding in the River Terrace Deposits, or where they are absent, the London Clay Formation. Based on the data available, foundation depths of up to 2.50m bgl will be required, increasing with proximity to the flood zone to the north and east. Roots were also noted to depths ranging between 0.80m and 2.10m in this zone, and foundations must be deepened accordingly, within cohesive soils.

However, it must be noted that shallow groundwater was recorded in several boreholes within this zone, noted at depths between 0.76m and 1.70m bgl. As such, shallow foundations may not be feasible. It must also be noted that soils of poor engineering properties were encountered in DP04 with zero blow counts recorded at 2.70m and 3.20m bgl. If a shallow foundation option is preferred, further investigation is required in this area to delineate any problematic areas. It is recommended that a review of the foundation options is undertaken following the winter groundwater monitoring that is planned, when a greater understanding of the groundwater conditions is gained.

4.4.5 Zone 2 – Central Section

The soils underlying this area of the site were predominately Head, which as noted above are highly variable, but generally provide an unsuitable founding stratum. The dynamic probes recorded very low strength soils to depths of at least 3.00m bgl in three locations across this area with poor ground conditions evident elsewhere as well. Shallow groundwater was also noted in this zone and as such, it is recommended that piled foundations be adopted.

Alternatively, and subject to groundwater levels being manageable, further investigation may allow shallow foundations to be adopted in some parts of this zone. Dynamic probes undertaken on a plot-by-plot basis would provide greater certainty of the ground conditions and allow specific foundation options to be considered.

4.4.6 Zone 3 – Northern Section

The soils encountered in this area included Head and River Terrace Deposits and were predominately granular. Typically, a dense upper layer was noted to depths of between 1.00m and 1.50m bgl, underlain by loose to medium dense soils to depths ranging from 2.50m to 3.00m bgl, before becoming dense and very dense again. These shallow soils are likely to be suitable for the adoption of shallow foundations, with sufficient bearing capacities provided at around 1.00m bgl.

However, one of the four dynamic probes undertaken in this zone (DP27) recorded zero blow counts at depths between 2.30m and 3.10m bgl. Given the four dynamic probes generally follow the same profile, these very loose soils may also present

elsewhere. As such, further investigation is recommended to provide greater certainty of ground conditions. A plot-by-plot approach could also be taken here to delineate any problematic areas.

Groundwater was not recorded during the investigation within this zone but may be present during the winter monitoring.

4.4.7 Summary

The poor and highly variable ground conditions, shallow groundwater and significant root depths recorded dictate that the use of shallow or deepened trench fill foundations is not feasible across all areas of the site. Further investigation including winter groundwater monitoring and additional intrusive investigation may provide sufficient confidence to allow shallow foundations to be adopted in certain areas, but at this stage there remains too much uncertainty to propose such an approach.

4.4.8 Ground Floor Slab

NHBC Standards 2019 states ground floors should be constructed as suspended floors where:

- *“the foundation depth dictated by the NHBC Standards 2019, Chapter 4.2.10 would exceed 1.5m bgl;”*
- *“ground floor construction is undertaken when the surface soils are seasonally desiccated;”*
- *“the depth of fill exceeds 600mm;”*
- *“there is shrinkable soil that could be subject to movement, expansive material or other unstable soils;”*
- *“the ground has been subject to vibratory improvement;” or*
- *“ground or fill is not suitable to support ground-bearing slabs.”*

Given the highly variable ground conditions encountered, including cohesive soils of up to high volume change potential, suspended ground floor slabs are recommended.

4.4.9 Piled Foundations

If adopted the piled foundations must be taken through any Made Ground/Topsoil and superficial deposits into suitable strength soils of the London Clay Formation.

The construction of a piled foundation is a specialist job with the actual pile working load depending on the particular type pile and installation method. Prior to finalising the foundation design the advice from a reputable contractor who is familiar with the ground and groundwater conditions present at the site should be sought.

To prevent necking of the green concrete, temporary casing may be required where the pile passes through the Made Ground/Topsoil and superficial deposits or

London Clay Formation and below the groundwater table (if encountered). To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

4.5 Subsurface Concrete

Sulphate concentration measured in 2:1 water/soil extracts fell into Class **DS-1** of the BRE Special Digest 1 2005, *'Concrete in Aggressive Ground'*. Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of **AC-1**. The pH of the soils tested ranged between 7.5 and 8.1. The classification given was determined using the mobile groundwater case, in view of groundwater being encountered. The laboratory results are presented in Appendix B.3.

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, *'Concrete in Aggressive Ground'* taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

4.6 Excavations

Shallow excavations in the Made Ground/Topsoil and superficial deposits are likely to be marginally stable in the short term at best.

Deeper excavations taken into the London Clay Formation are likely to be stable in the short term, depending on the thickness of overlying superficial deposits. Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported or battered back to a safe angle of repose.

Excavations beneath the groundwater table are likely to be unstable and dewatering of foundation trenches may be necessary.

4.7 Pavements

The results from DCP testing indicated CBR values of between 2% and 212% for what were assumed to be the soils of the Made Ground, Topsoil and superficial deposits based on the findings of the windowless sampler boreholes. The high CBR values encountered were anticipated to be large gravel clasts struck during the test.

CBR values within the Made Ground are expected to be highly variable due to changes in moisture content and marked variations within ground conditions, therefore **in-situ testing must be undertaken** immediately prior to the installation of pavements/roads.

Any soft spots at formation level, within the Made Ground, must be dug out and replaced with a suitably compacted granular fill. Prior to construction the formation level should be proof rolled.

The percentage of material passing the 75um BS test sieve within the granular River Terrace deposits was noted to be greater than 10% in three out of four samples; in the granular Head in four out of five samples; and in the granular Alluvium not in one sample. Therefore, and in accordance with the Road Research Laboratory LR90, the granular soils of the River Terrace Deposits and Head are likely to be **frost susceptible**.

The cohesive soils of the Alluvium recorded modified plasticity index ranging between 15% and 38%. The cohesive soils of the Head recorded modified plasticity index ranging between 6% and 48%. The cohesive soils of the River Terrace Deposits recorded modified plasticity index ranging between 17% and 47%. Therefore, and in accordance with the Road Research Laboratory LR90, the cohesive superficial deposits must be treated as **frost susceptible**, as in each case their plasticity index may be less than 20%.

The thickness of any pavements are likely to be dictated by the frost susceptibility of the sub-grade.

Section 5 Determination of Chemical Analysis

5.1 Site Characterisation and Revised Conceptual Site Model

The Preliminary Investigation Report undertaken by Soils Limited (report ref: 19522/PIR dated September 2021) did not identify any risk of ground contamination and from previous usage of the site and offsite sources. However, intrusive investigation was recommended to confirm these findings.

The Main Investigation Report identified Made Ground to depths between 0.30m and 0.60m bgl, typically comprising soft grey and orangish brown slightly clayey slightly sandy SILT with occasional rootlets. Locally with rare angular to sub-angular fine gravel.

There were no visual or olfactory indicators of contamination noted during the investigation.

Shallow groundwater was recorded on site within the superficial deposits, as anticipated.

The conceptual site model was updated to take account of the above findings and presented in Appendix C.1.

5.2 Soil Sampling

Trial hole locations were set out to provide an overview of ground conditions across the site, 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 trial holes at depths of between 0.10m and 1.00m bgl to allow a representation of the materials encountered, with additional samples to be obtained, if necessary, where there was visual or olfactory evidence of contamination.

The analytical testing was based on a suite of commonly occurring inorganic and organic contaminants, considering the Conceptual Site Model and the ground conditions encountered.

5.3 Determination of Chemical Analysis

The suite of chemical analyses has been based upon the findings of the Preliminary Investigation Report (PIR) and this investigation, to examine the potential sources of contamination identified in the conceptual site model. The chemical analyses were carried out on twenty-seven samples prepared from the Made Ground, Topsoil and subsoil from across the site. The nature of the analyses is detailed below:

- 27 No. Metal suites: Arsenic, Boron, Cadmium, Chromium (trivalent & hexavalent), Copper, Lead, Mercury, Nickel, Vanadium, Selenium, Zinc

- 27 No. pH values
- 27 No. Polycyclic aromatic hydrocarbons (PAH) – USEPA 16 suite
- 27 No. Organic matter contents
- 27 No. Asbestos screens
- 27 No. Monohydric Phenols
- 27 No. Texas banded Total Petroleum Hydrocarbons

The soil testing was carried out in accordance with the MCERTS performance standard, and the results are shown in Appendix C.2, Test Report 21-09625.

Section 6 Qualitative Risk Assessment

6.1 Assessment Criteria

The assessment criteria used to determine risks to human health are derived and explained within Appendix C.3.

6.2 Representative Contamination Criteria - Soil

The proposal comprised redevelopment of the site from farmland to housing with gardens and areas of open recreational space. At time of writing only a speculative plan has been provided for the development and this report must be reviewed and revised in relation to actual site-specific proposals if it is to be presented as evidence in pursuit of a planning application. All conclusions and findings in this report will therefore be essentially generic in nature and should be viewed in this light.

In compiling this report reliance was placed on drawing number 00163_CALA_CN_01, dated October 2020 and was prepared by the client. The recommendations provided within this report must be reviewed and revised when a finalised scheme is prepared and must not be applied without further consultation with Soils Limited.

Based on the proposed development, the results of the chemical analysis have been compared against generic guidance values for a '**Residential with home grown produce**' 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, generic screening values 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 0.4% and 13.0%. For each soil sample tested, the resultant Soil Organic Matter allowed for the correct comparison to be made with the appropriate guideline value for each organic determinants analysed.

Table 6-1 outlines the samples that have exceeded their relevant assessment criteria. The full laboratory report is presented in Appendix C.2.

Table 6-1 Summary of Chemical Analysis of Soils Sample Exceedance

Substance	Sample locations where SGV, C4SL or S4UL adopted were exceeded for the 'Residential with home grown produce' land-use scenario
None recorded	

Asbestos locations where material found (no threshold just presence)

None recorded

The guideline values are assessed against the 'Residential with home grown produce' land-use scenario, which was considered the most appropriate land-use scenario, given the type of the proposed redevelopment.

In summary, none of the samples tested recorded concentrations above the 'Residential with home grown produce' end-use screening values.

6.2.1 Asbestos

Asbestos Containing Material (ACM) was not detected within any of the samples tested.

As asbestos containing material was identified in one of the samples tested it is possible that asbestos is present in other areas of the site. If encountered, care must be taken to ensure any such material is separated and disposed of in an appropriate manner to a licensed waste facility.

6.3 Risk to Groundwater

The site was located on secondary aquifers, both Secondary A and Undifferentiated, with Unproductive Strata of the London Clay Formation underlying. The superficial aquifers are medium to highly vulnerable. The site was not located within a Source Protection Zone and there are no potable abstraction points noted within 1km.

There are five inland rivers noted on the site principally through the centre running west to east and along the eastern boundary from north to south.

The vulnerability of controlled waters was low to moderate given the absence of identified sources or elevated concentrations recorded in the shallow soils analyses undertaken across the site, the risk to controlled waters is deemed to be low to negligible.

6.4 Risk Assessment

Risk assessments are undertaken for the soil, groundwater and soil gas. The CSM has been updated to take account of the assessments below and presented in Appendix C.1. The full laboratory chemical report is presented in Appendix D.2.

6.4.1 Soils

None of the samples tested recorded concentrations above the 'Residential with home grown produce' end-use screening values.

Asbestos Containing Material (ACM) was not detected within any of the samples tested.

The Tier 1 Quantitative risk assessment therefore established that there was **no risk to the human health receptors** of construction workers or future end-users.

6.4.2 Groundwater

An assessment based on the soils analysis and the vulnerability of the site established that **there was no risk** to the groundwater receptor.

6.4.3 Soil Gas

The Preliminary Investigation Report did not identify any potential sources of gas on or around the site. However, the investigation has recorded soils with organic content as high as 13%, and Alluvium was present in significant parts of the site, particularly along the eastern side.

Whilst the risk was relatively low, this does pose a possible soil gas risk to the site (strata >1m and >2.5% organic matter) and further works are therefore advised, as detailed in Section 6.5, to further investigate this unknown.

6.5 Recommendations

Soil chemical analysis did not record any elevated concentrations when compared to 'Residential with home grown produce' end-use screening values and the risk to groundwater was deemed to be negligible.

As such, no further work in respect of soils or controlled water is considered necessary, subject to approval from the local authority, which should be sought at the earliest opportunity.

A site-specific soil gas risk assessment is recommended to establish any risk posed by the naturally organic-rich soils present on site. In conjunction with the winter groundwater monitoring, the wells installed on site should be monitored for soil gas on 6No. occasions (residential low risk) and a risk assessment undertaken in accordance with BS8485:2016, CIRIA and NHBC guidance.

6.6 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.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust is generated as a result of construction activities. The site should be securely fenced at all times to prevent unauthorised access.

Washing facilities should be provided and eating restricted to mess huts.

6.7 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 should always be sought.

The amount, type and nature of the material to be removed will in part determine the amount and type of analysis that may be required to comply with current waste guidance, and thereby allow a competent person to suitably classify the material. Often this data is uncertain or unavailable, especially in the early stages of a project, and therefore further investigation, testing and analysis may be required as additional information regarding the development becomes available.

Wastes must be classified and defined by their solid characteristics to comply with current waste guidance. Existing information and analysis derived for environmental purposes may therefore be suitable for use in this context. Waste Acceptance Criteria (WAC) report the leachability of materials and therefore cannot be used to classify, characterise or define wastes. The only purpose of a WAC analysis is to determine the suitability of a given material for acceptance at one of the three different types of available licenced landfills (inert, stable non-reactive hazardous or hazardous).

Other options are available that may lead to significant savings against disposal to landfill and expert advice should always be sought from a competent person to advise on their relative costs or benefits and advise on any additional analysis, sampling or investigation that may be required to reduce remaining uncertainties and comply with current guidance. Further consideration of results using HazWasteOnline™ can be undertaken on request to give an indication of potentially hazardous properties in the materials analysed.

6.8 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.

Under the EPR, material that is contaminated but otherwise suitable for re-use is also classified as waste and its re-use should be in accordance with the Environmental Permitting Regulations 2007 (EPR). Environmental Permit Exemptions (EPE) are for the re-use of non-hazardous or inert waste only; hazardous waste cannot be re-used under a permit exemption. EPE apply only to imported inert waste materials; inert material arising on site and recovered on site is not classified as waste and does not require an exemption. It is possible that materials arising on-site will be classified as inert and would

not need an exemption.

Environmental Permit Exemptions are only allowed for certain activities, placing controls on the quantities that can be stored and re-used. The re-use of waste shall be within areas and levels defined in planning applications and permissions for the development. An EPE requires a site-specific risk assessment for the receptor site to demonstrate that the materials are suitable for use, i.e. that they will not give rise to harm to human health or pollution of the environment.

Under the CL:AIRE voluntary code of practice (CoP) materials excavated on-site are not deemed contaminated if suitable for re-use at specified locations or generally within the site.

Material that may have been classified as hazardous waste under the EPR may be re-used. The CoP regime requires that a 'Qualified Person' as defined under the CoP reviews the development of the Materials Management Plan, including review of Risk Assessments and Remediation Strategy/Design Statement together with documentation relating to Planning and Regulatory issues, and signs a Declaration which is forwarded to the Environment Agency and which confirms compliance with the CoP.

Should it be necessary to import materials from another site where materials are excavated and which is not material from a quarry or produced under a WRAP protocol, then an EPE would be necessary for the imported material whether the work was managed under the CoP or the EPR.

6.9 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.

6.10 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.

Care should be taken during excavation works especially to investigate any soils, which appear by eye (e.g. such as fibrous materials, large amounts of ash and unusual discolouration), odour (e.g. fuel, oil and chemical type odours or unusual odours such as sweet odours or fishy odours) or wellbeing (e.g. light headedness and/or nausea, burning of nasal passages and blistering or reddening of skin due to contact with soil) to be contaminated or of unusual and/or different character to standard soils or those analysed.

In the event of any discovery of potentially contaminated soils or materials, this discovery should be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity must be recorded and the Local Authority, and a competent and appropriate third party Engineer/Environmental consultant notified immediately. An approval from the Local authority must be sought prior to implementing any proposed mitigation action.

The discovery strategy must remain on site at all times and must demonstrate a clear allocation of responsibility for reporting and dealing with contamination. A copy of the strategy must be placed on the health and safety notice board and /or displayed in a prominent area where all site staff are able to take note of and consult the document at any time. Any member of the workforce entering the site to undertake any excavation must be made aware of the potential to discover contamination and the discovery strategy.

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Appendix A Field Work

Appendix A.1 Engineers Logs

Appendix B Geotechnical In-Situ and Laboratory Testing

Appendix B.1 Classification

Appendix B.2 Interpretation

Appendix B.3 Geotechnical In-Situ and Laboratory Results

Appendix C Chemical Laboratory Testing

Appendix C.1 Conceptual Site Model

Appendix C.2 Chemical Laboratory Results

Appendix C.3 General Assessment Criteria

Appendix D Information Provided by the Client



Figure 2 – Site Location Map



Job Number
19522

Project
Land east of Westergate, West Sussex PO20 3RD

Client
CALA Homes

Date
September 2021



Figure 3 – Aerial Photograph

Project
Land east of Westergate, West
Sussex PO20 3RD

Client
CALA Homes

Date
September 2021

Job Number
19522



Figure 4 – Trial Hole Plan - North

Project
Land east of Westergate, West
Sussex PO20 3RD

Client
CALA Homes

Date
September 2021

Job Number
19522



Figure 5 – Trial Hole Location - South

Project
Land east of Westergate, West Sussex PO20 3RD
Client
CALA Homes
Date
September 2021
Job Number
19522



Figure 6 – Site Zones

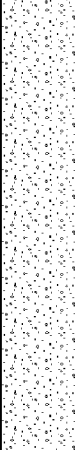
Project
Land east of Westergate, West Sussex PO20 3RD
Client
CALA Homes
Date
September 2021
Job Number
19522

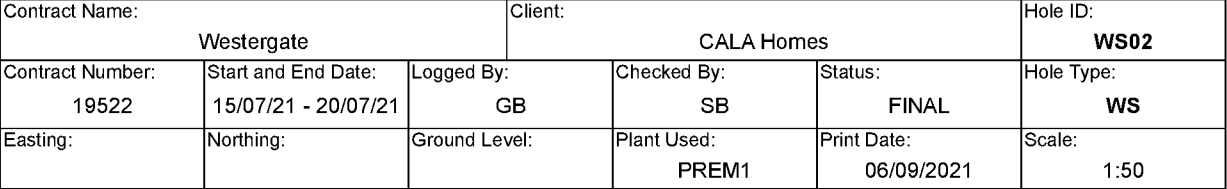


Appendix A

Field Work

Appendix A.I Engineers Logs

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS01					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.60	ES			(0.30)		Soft grey orange brown slightly desiccated slightly sandy slightly clayey SILT. Rare occasional rootlets. Rare fine angular to sub angular gravel. Rare fine brick fragments. MADE GROUND.								
				0.30										
1.10	ES			(1.10)		Soft orangish brown slightly desiccated slightly sandy CLAY. Rare rootlets. Rare occasional intermittent pockets of light orange brown fine to coarse sand. Rare fine angular to sub angular gravel. Rare fine black discolouration. RIVER TERRACE DEPOSITS						1		
1.50	D			1.40										
2.00	D			(3.30)		Fine to coarse orangish brown slightly gravelly SAND. Gravel is fine to coarse angular to sub angular flint. RIVER TERRACE DEPOSITS						2		
2.50	D													
3.00	D													
3.50	D													
4.00	D													
4.50	D			4.70 (0.30)		Soft dark grey silty CLAY. Rare fine to coarse calcareous fragments. Rare fine selenite. LONDON CLAY FORMATION						3		
5.00	D													
						End of Borehole at 5.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.40m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	50	2.00			20	1.70	
					1.00	4.00	SLOTTED	50						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														



Weather:	Termination:		Sheet 1 of 1
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Samples & In Situ Testing			Strata Details						Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
0.20	ES			(0.30)		Soft grey orangish brown slightly desiccated slightly sandy slightly clayey SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND.				
0.50	ES			0.30		Soft orange brown slightly desiccated slightly sandy CLAY. Rare rootlets. Rare occasional intermittent pockets of light orangish brown fine to coarse sand. Rare fine angular to sub angular gravel. Occasional fine black discolouration. RIVER TERRACE DEPOSITS				
1.00	ES			(1.30)						
1.50	D			1.60			Soft orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular to sub angular flint gravel. Occasional intermittent pockets of light orangish brown fine to coarse sand. Occasional fine black staining. RIVER TERRACE DEPOSITS			
2.00	D			(0.70)						
2.50	D			2.30			Fine to coarse light dark orangish brown slightly gravelly SAND. Gravel is fine to coarse angular to sub angular flint. RIVER TERRACE DEPOSITS			
3.00	D			(1.10)						
3.50	D			3.40			Soft dark grey silty CLAY. Rare fine to coarse calcareous fragments. Rare fine selenite. LONDON CLAY FORMATION			
4.00	D			(0.60)						
				4.00		End of Borehole at 4.00m			4	
									5	
									6	
									7	
									8	
									9	
									10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Fine roots and rootlets to 1.60m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									1.10			20	0.76	
RUN DISTRICT COUNCIL AL/11/24/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS03					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: DANDO		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.40)		Soft grey orangish brown slightly clayey slightly sandy SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND.								
0.50	ES			0.40										
				(0.60)		Soft orange brown slightly sandy slightly gravelly CLAY. Rare rootlets. Rare intermittent pockets of light orangish brown fine to coarse sand. Gravel is fine angular to sub angular flint. Occasional fine black staining. ALLUVIUM								
1.00	ES			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		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.00m bgl (base of hole).					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS04					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.30)		Soft grey orangish brown slightly desiccated slightly sandy slightly clayey SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND.								
0.50	ES			0.30										
1.00	ES			(1.00)		Soft orangish brown slightly desiccated slightly sandy slightly gravelly CLAY. Rare rootlets. Rare occasional intermittent pockets of light orange brown fine to coarse sand. Gravel is fine angular to sub angular flint. Occasional fine black discolouration. RIVER TERRACE DEPOSITS						1		
1.40	D			1.30										
1.90	D			1.50		Fine to coarse orangish brown slightly gravelly SAND. Gravel is fine to coarse angular to sub angular flint. RIVER TERRACE DEPOSITS						2		
2.40	D			(1.50)										
3.00	D			3.00		End of Borehole at 3.00m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.30m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									2.00			20	0.76	
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

ARUN DISTRICT COUNCIL AL/11/24/OUT

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS05					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.30)		Soft grey orangish brown slightly desiccated slightly sandy slightly clayey SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND. Soft grey orangish brown slightly sandy gravelly CLAY. Rare rootlets. Occasional rare intermittent pockets of light orangish brown fine to coarse sand. Gravel is angular to sub angular flint gravel. RIVER TERRACE DEPOSITS Fine to coarse dark orangish brown slightly clayey slightly gravelly SAND. Gravel is fine to coarse angular to sub angular flint. RIVER TERRACE DEPOSITS						1		
0.60	ES			(0.50)										
1.10	ES			0.80										
1.60	D			(1.40)		Soft dark grey sandy CLAY. Sand is fine to coarse. RIVER TERRACE DEPOSITS						2		
2.10	D			2.20										
2.40	D			2.40										
						End of Borehole at 2.40m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 0.80m bgl.					
Chiselling					Installation		Water Strikes							
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									2.00			20	1.76	
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS06					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.40)		Soft grey orangish brown slightly clayey slightly sandy SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND.								
0.60	ES			(0.40)		Soft grey orangish brown slightly sandy slightly gravelly CLAY. Rare rootlets. Rare occasional intermittent pockets of light orangish brown fine to coarse sand. Gravel is fine to coarse angular to sub angular flint. ALLUVIUM								
1.10	ES			0.80		Soft grey orangish brown slightly sandy CLAY. Rare rootlets to 1.5m BGL. Occasional intermittent pockets of light orange brown fine to coarse sand. ALLUVIUM						1		
1.60	D			(1.80)										
2.10	D											2		
2.50	D			2.60										
3.00	D			(1.40)		Soft dark grey slightly sandy CLAY. Occasional intermittent pockets of light grey fine to coarse sand. Rare fine calcareous fragments. Rare fine shell fragments. Rare fine selenite. LONDON CLAY FORMATION						3		
3.50	D													
4.00	D			4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.50m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	50	2.00			20	1.70	
					1.00	4.00	SLOTTED	50						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

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	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS07					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: DANDO		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.30)		Soft grey orangish brown slightly clayey slightly sandy SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND.								
0.50	ES			0.30										Soft to firm grey orangish brown slightly desiccated slightly sandy CLAY. Rare rootlets to 1.5m BGL. Occasional intermittent pockets of light orange brown fine to coarse sand. ALLUVIUM
1.00	ES			(1.50)		Soft grey orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular to sub angular flint. Occasional intermittent pockets of light grey fine to coarse sand. RIVER TERRACE DEPOSITS						1		
1.50	D			1.80										
1.90	D			2.00		Soft grey orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular to sub angular flint. Occasional intermittent pockets of light grey fine to coarse sand. RIVER TERRACE DEPOSITS						2		
2.40	D			(1.00)										
3.00	D			3.00		End of Borehole at 3.00m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.50m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS08					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: DANDO		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.40)		Soft grey orangish brown slightly sandy slightly clayey SILT. Rare occasional rootlets. Rare fine angular to sub angular brick gravel. MADE GROUND.								
0.50	ES			0.40		Firm grey orangish brown slightly desiccated sandy gravelly CLAY. Rare rootlets. Gravel is fine to coarse angular to sub angular flint. Occasional intermittent pockets of light orange brown fine to coarse sand. ALLUVIUM								
				(0.70)										
1.00	ES			1.10		Soft to firm grey orangish brown sandy CLAY. Rare rootlets to 1.5m BGL. Occasional intermittent pockets of light orangish brown fine to coarse sand. ALLUVIUM						1		
				(0.90)										
1.50	D					Firm orangish brown sandy gravelly CLAY. Gravel is angular to sub-angular fine to coarse flint. RIVER TERRACE DEPOSITS						2		
				2.00										
2.00	D													
				(1.00)										
2.50	D													
				3.00										
3.00	D					End of Borehole at 3.00m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.50m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

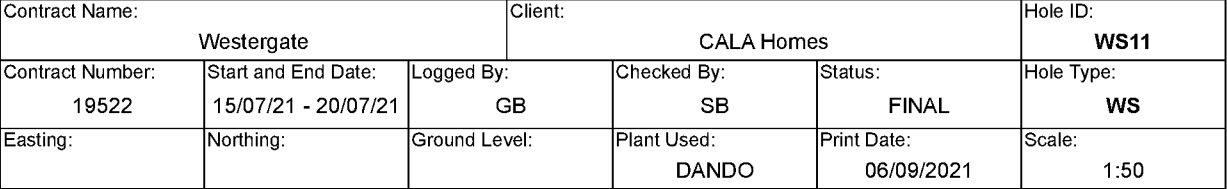
ARUN DISTRICT COUNCIL AL/11/24/OUT

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS09					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: DANDO		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.30)		Soft grey orangish brown slightly sandy slightly clayey SILT. Rare occasional rootlets. Rare fine angular to sub-angular brick gravel. MADE GROUND.								
0.30				0.30										
0.50	ES			(0.40)		Firm grey orangish brown slightly desiccated sandy CLAY. Rare rootlets. Occasional intermittent pockets of light orangish brown fine to coarse sand. RIVER TERRACE DEPOSITS								
0.70				0.70										
1.00	ES			(0.60)		Firm grey orangish brown sandy gravelly CLAY. Rare rootlets to 1.30m bgl. Gravel is fine to coarse angular to sub angular flint gravel. Occasional intermittent pockets of light orange brown fine to coarse sand. Occasional fine black discolouration. RIVER TERRACE DEPOSITS						1		
1.30				1.30										
1.50	D			(0.60)		Fine to coarse dark orangish brown slightly gravelly SAND. Gravel is fine to coarse angular to sub angular flint. RIVER TERRACE DEPOSITS								
1.90				1.90										
2.00	D			(0.60)		Soft to firm dark grey sandy CLAY. Rare fine calcareous fragments. Rare fine shell fragments. Rare fine selenite. Occasional intermittent pockets of dark grey fine to coarse sand. LONDON CLAY FORMATION						2		
2.50	D			2.50										
						End of Borehole at 2.50m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.30m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

ARUN DISTRICT COUNCIL AL/11/24/OUT

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS10					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: DANDO		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.60)		Soft grey orangish brown slightly clayey slightly sandy SILT. Rare occasional rootlets. Rare fine angular to sub angular gravel. MADE GROUND.								
0.70	ES			0.60		Soft to firm grey orangish brown slightly sandy slightly gravelly CLAY. Rare rootlets. Gravel is fine to coarse angular to sub angular flint. Occasional intermittent pockets of light orange brown fine to coarse sand. ALLUVIUM						1		
1.20	ES			(1.40)										
1.70	D													
2.20	D			2.00		Firm dark grey orangish brown slightly sandy CLAY. Rare desiccated rootlets to 3.40m bgl. Occasional intermittent pockets of orangish brown fine to coarse sand. Occasional intermittent pockets of light grey fine to coarse sand. Rare fine selenite. LONDON CLAY FORMATION						2		
2.70	D			(1.40)								3		
3.30	D			3.40		Soft to firm dark grey sandy CLAY. Rare fine calcareous fragments. Rare fine shell fragments. Rare fine selenite. Occasional intermittent pockets of dark grey fine to coarse sand. LONDON CLAY FORMATION								
3.70	D			(0.60)										
4.00	D			4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 2.00m bgl. Desiccated roots to 3.40m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

ARUN DISTRICT COUNCIL AL/11/24/OUT



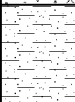
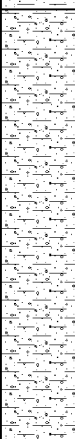
Weather:	Termination:		Sheet 1 of 1
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Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation
0.20	ES			(0.30)		Soft grey orangish brown slightly clayey slightly sandy SILT. Rare occasional rootlets. Rare fine brick fragments. Rare fine angular to sub angular gravel. MADE GROUND.			
0.60	ES			(0.60)		Soft to firm grey orangish brown slightly sandy slightly gravelly CLAY. Rare rootlets. Gravel is fine to coarse angular to sub angular flint gravel. Occasional light orangish brown fine to coarse sand. ALLUVIUM			
1.10	ES			0.90		Soft to firm dark grey orange brown slightly sandy CLAY. Rare desiccated rootlets to 2.10m bgl. Occasional intermittent pockets of light orangish brown fine to coarse sand. ALLUVIUM	1		
1.60	D			(1.40)					
2.10	D						2		
2.60	D			2.30		Soft to firm dark grey sandy CLAY. Rare fine calcareous fragments. Rare fine shell fragments. Rare fine selenite. Occasional intermittent pockets of dark grey fine to coarse sand. LONDON CLAY FORMATION			
3.10	D			(1.70)			3		
3.60	D								
4.00	D			4.00			4		
							End of Borehole at 4.00m		
							6		
							7		
							8		
							9		
							10		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Fine roots and rootlets to 2.10m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
RUN DISTRICT COUNCIL AL/11/24/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS12					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.30	ES			(0.60)		Soft to firm dark grey brown silty slightly gravelly CLAY. Occasional rootlets. Gravel is fine angular to sub angular flint. TOPSOIL								
0.70	ES			0.60 (0.60)										
1.10	ES			1.20		Fine to coarse angular to sub angular dark grey brown clayey flint GRAVEL. Rare rootlets. ALLUVIUM						1		
1.60	D			(0.70)										
2.10	D			1.90		Fine to coarse angular to sub angular light grey brown slightly clayey sandy flint GRAVEL. Occasional intermittent pockets of light orangish brown fine to coarse sand. ALLUVIUM						2		
2.60	D			(1.10)										
3.10	D			3.00		Soft dark grey slightly sandy CLAY. Rare fine selenite. Occasional intermittent pockets of dark grey fine to coarse sand. LONDON CLAY FORMATION						3		
3.60	D			(0.60)										
						End of Borehole at 3.60m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.20m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	50	2.00			20	1.70	
					1.00	2.20	SLOTTED	50						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														
ARUN DISTRICT COUNCIL AL/11/24/OUT														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS13					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.50)		Soft dark grey brown silty CLAY. Occasional rootlets. Rare fine ash fragments. Rare fine to coarse angular to sub angular flint gravel. MADE GROUND								
0.60	ES			0.50 (0.50)		Soft dark orange grey brown slightly sandy CLAY. Rare rootlets. Occasional intermittent pockets of light orange brown fine to coarse sand. RIVER TERRACE DEPOSITS								
1.10	ES			1.00 (0.70)		Brown slightly sandy fine to coarse angular to sub rounded flint GRAVEL. Sand is fine to coarse. RIVER TERRACE DEPOSITS						1		
1.60	D			1.70		Soft dark orange grey brown slightly gravelly CLAY. Rare desiccated rootlets to 2.7m bgl. Rare fine calcareous fragments. Gravel is fine to coarse angular to sub angular flint. RIVER TERRACE DEPOSITS						2		
2.10	D			(1.00)										
2.70	D			2.70		End of Borehole at 2.70m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.00m bgl. Desiccated roots to 2.70m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									1.10			20	0.76	
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS14					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.40)		Soft dark orangish brown slightly gravelly silty CLAY. Frequent rootlets. Gravel is angular to sub angular flint. TOPSOIL								
0.60	ES			0.40		Soft to firm dark grey orangish brown slightly sandy CLAY. Rare rootlets. Occasional intermittent pockets of light orange brown fine to coarse sand. Rare fine angular to sub angular calcareous gravel. HEAD								
				(0.70)										
1.00	ES			1.10		Firm dark grey orangish brown slightly sandy CLAY. Rare desiccated rootlets to 4.50m bgl. Occasional intermittent pockets of light dark orange brown fine to coarse sand. Rare intermittent pockets of fine to coarse angular to sub angular calcareous gravel. Rare fine selenite. HEAD						1		
				(2.90)										
1.50	D													
2.00	D											2		
2.50	D													
3.00	D											3		
3.50	D													
4.00	D			4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.50m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					



Contract Name: Westergate			Client: CALA Homes			Hole ID: WS15
Contract Number: 19522	Start and End Date: 15/07/21 - 20/07/21	Logged By: GB	Checked By: SB	Status: FINAL	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: PREM1	Print Date: 06/09/2021	Scale: 1:50	

Weather:	Termination:	Sheet 1 of 1
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Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.20	ES			(0.50)		Turf over firm, slightly gravelly, silty CLAY. Gravel is fine to medium angular flint. Rare fragments of brick. Frequent fine roots and rootlets. MADE GROUND		
0.60	ES			0.50 (0.40)		Brown, clayey silty fine to coarse angular flint GRAVEL. Occasional rootlets. RIVER TERRACE DEPOSITS		
0.95	ES			0.90		Firm brown mottled blueish grey and yellow, CLAY with occasional white and yellow pockets of fine to coarse sand sized calcareous nodules. Becoming stiff at 1.70m bgl. Very rare rootlets to 1.00m bgl. Rare fine sand sized selenite crystal nodules at 2.50m to 4.00m bgl.	1	
1.20	D							
1.80	D			(1.60)		A pocket of fine to medium angular mudstone GRAVEL	2	
2.20	D					A thin band of fine to medium orange SAND		
2.80	D			2.50		Firm brown grey silty CLAY with rare fine sand sized selenite crystal nodules. LONDON CLAY FORMATION	3	
3.20	D			(1.50)				
3.80	D			4.00		End of Borehole at 4.00m	4	
							5	
							6	
							7	
							8	
							9	
							10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
RUN DISTRICT COUNCIL AL/11/24/OUT									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS16			
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL	Hole Type: WS		
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021	Scale: 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
0.20	ES			(0.30)		Turf over brown slightly gravelly, clayey SILT. Gravel is fine to medium angular flint. Frequent fine roots and rootlets. TOPSOIL						
0.50	ES			0.30								
0.80	ES			(0.70)		Stiff to very stiff, brown mottled blueish grey and yellow friable CLAY with occasional white and yellow pockets of fine to coarse sand sized calcareous nodules to 2.00m bgl. Rare rootlets to 2.00m bgl. Very rare fine sand sized selenite crystal nodules. LONDON CLAY FORMATION						
1.20	D			1.00								
1.80	D			(2.65)								
2.20	D											
2.80	D											
3.20	D											
3.50	D				3.65		End of Borehole at 3.65m					
												7

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS17					
	Contract Number: 19522		Start and End Date: 16/07/21		Logged By: JC		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.30	ES			0.25 (0.33)		Wheat over brown, slightly silty, slightly gravelly CLAY. Gravel is fine to coarse angular flint. Frequent fine rootlets. TOPSOIL								
0.60	ES			0.58 (0.32)		Brown and orange, sandy gravelly CLAY. Sand is course. Gravel is fine to coarse angular flint. Frequent black silt spotting. Frequent fine rootlets. HEAD								
0.90	D			0.90 (0.32)		Brown and orange, slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular flint. frequent fine black silt spots. Fine rootlets. HEAD								
				1.00		Brown and orange, sandy gravelly CLAY. Sand is course. Gravel is fine to medium angular flint. Frequent black silt spotting. Frequent fine rootlets. HEAD						1		
1.50	D			(1.00)		Orangish brown SAND. HEAD								
				2.00		Orange, brown SAND AND GRAVEL. Sand is fine to coarse. Gravel is fine to medium angular to sub-angular flint. Occasional coarse sub-angular flint. HEAD						2		
2.20	D			(0.50)										
2.60	D			2.50		Firm dark grey CLAY. HEAD								
				2.70		Orangish brown, brown SAND AND GRAVEL. Sand is fine to coarse, Gravel is fine to medium sub-angular flint. Occasional medium well rounded chalk clasts. HEAD						3		
				(1.10)										
3.50	D													
3.90	D			3.80		Firm dark grey silty CLAY. LONDON CLAY FORMATION						4		
				4.00		End of Borehole at 4.00m								
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.00m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	50	1.20			20	1.42	
					1.00	3.10	SLOTTED	50						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														
ARUN DISTRICT COUNCIL AL/11/24/OUT														

	Contract Name: Westergate			Client: CALA Homes			Hole ID: WS18							
	Contract Number: 19522		Start and End Date: 16/07/21		Logged By: JC		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.50)		Wheat over brown, slightly silty, slightly gravelly CLAY. Gravel is fine to coarse angular flint. Frequent fine rootlets. TOPSOIL								
0.60	D			0.50 0.60		Brown, grey brown, sandy gravelly CLAY. Sand is course. Gravel is fine to coarse angular flint. Rare fine rootlets. HEAD								
				0.80		Brown, grey and orange, sandy, slightly gravelly CLAY. Gravel is fine to medium sub-angular flint. Rare fine rootlets. HEAD								
1.20	D			1.00		Brown and orange, sandy gravelly CLAY. Sand is course. Gravel is fine to medium angular flint. HEAD						1		
1.70	D					Orangish brown and grey mottled, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium claystone. HEAD								
2.20	D			(2.00)		Orange brown, brown, slightly sandy slightly gravelly CLAY. Gravel is fine angular flint. Rare rootlets. HEAD						2		
2.70	D					Firm grey brown silty CLAY. LONDON CLAY FORMATION								
3.00	D			3.00 3.10		Firm grey brown silty CLAY. LONDON CLAY FORMATION						3		
3.50	D			(0.90)		Firm grey brown silty CLAY. LONDON CLAY FORMATION								
				4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 3.10m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

ARUN DISTRICT COUNCIL AL/11/24/OUT

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS19					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.15	ES			(0.30)		Turf over brown gravelly, clayey SILT. Gravel is fine to medium angular flint. Frequent fine roots and rootlets. TOPSOIL								
0.40	ES			0.30 (0.30)		Stiff, brown, gravelly silty CLAY. Gravel is fine to medium angular flint. Occasional fine roots and rootlets. RIVER TERRACE DEPOSITS								
0.80	ES			0.60 (0.30)		Brown, slightly silty, clayey fine to coarse angular flint GRAVEL. Rare rootlets. RIVER TERRACE DEPOSITS								
1.20	D			0.90 1.00 (0.60)		Whitish brown, slightly silty, sandy fine to coarse angular flint GRAVEL. Sand is fine to medium. RIVER TERRACE DEPOSITS						1		
1.80	D			1.60 (0.30)		Whitish brown, clayey very sandy fine to coarse angular flint GRAVEL. Sand is fine to coarse. RIVER TERRACE DEPOSITS								
2.20	D			1.90 (1.10)		Stiff grey silty CLAY. LONDON CLAY FORMATION						2		
2.80	D			3.00		End of Borehole at 3.00m						3		
4														
5														
6														
7														
8														
9														
10														
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 0.90m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	50	2.00			20	1.55	
					1.00	1.70	SLOTTED	50						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

ARUN DISTRICT COUNCIL AL/11/24/OUT

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS20					
	Contract Number: 19522		Start and End Date: 16/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.20	ES			(0.40)		Wheat over brown, slightly silty, slightly gravelly CLAY. Gravel is fine to coarse angular flint. Frequent fine rootlets. TOPSOIL								
0.60	D			0.40 (0.60)		Brown, sandy gravelly CLAY. Sand is course. Gravel is fine to coarse angular flint. Frequent fine rootlets. HEAD								
1.20	D			1.00 (0.60)		Orange SAND. HEAD						1		
1.70	D			1.60 (0.40)		Brown, sandy gravelly CLAY. Sand is course. Gravel is fine to medium angular flint. HEAD								
				2.00		End of Borehole at 2.00m						2		
												3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.00m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

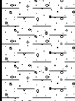
ARUN DISTRICT COUNCIL AL/11/24/OUT

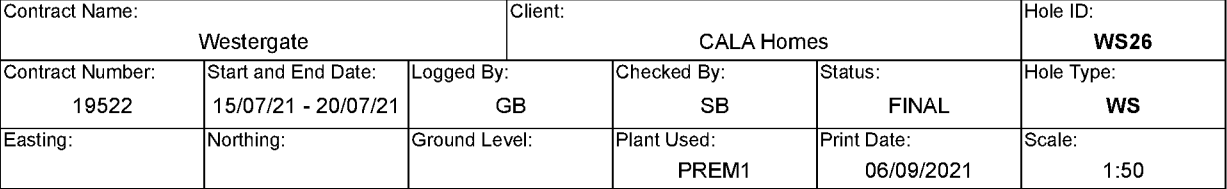
	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS21					
	Contract Number: 19522		Start and End Date: 16/07/21		Logged By: GB		Checked By: SB		Status: FINAL	Hole Type: WS				
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021	Scale: 1:50				
Weather:			Termination:							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		
0.15	ES			0.20		Turf over brown slightly clayey, gravelly SILT. Gravel is fine to medium sub-angular to sub rounded flint. Frequent fine roots and rootlets. TOPSOIL								
0.30	ES			(0.30)		Brown slightly clayey, very gravelly SILT. Gravel is fine to coarse angular to sub angular flint. Frequent fine roots and rootlets. HEAD								
0.60	ES			0.50		Firm, orangish brown slightly sandy, very gravelly CLAY. Sand is fine. Gravel is fine to coarse sub angular flint. Occasional fine roots and rootlets. HEAD								
0.90	D			0.75		Soft orangish brown gravelly, very sandy CLAY. Sand is fine. Gravel is fine to coarse sub-angular flint. HEAD								
				1.00		Greyish brown, slightly clayey, gravelly fine SAND. Gravel is fine to medium angular flint. HEAD					1	▼		
1.30	D			(0.80)										
				1.80		Soft grey CLAY. A pocket of gravelly fine SAND at 2.30 to 2.50m bgl. Gravel is fine to medium sub angular flint. HEAD					2			
2.00	D			(0.80)										
2.40	D			2.60		End of Borehole at 2.60m								
											3			
											4			
											5			
											6			
											7			
											8			
											9			
											10			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 0.75m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									1.10			20	1.10	
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS22					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.15	ES			0.20		Turf over brown slightly clayey, gravelly SILT. Gravel is fine to medium angular flint. Frequent fine roots and rootlets. TOPSOIL Stiff, brown, gravelly, very silty friable CLAY. Gravel is fine to medium angular flint. A pocket of very stiff CLAY at 0.70 to 0.80m bgl. Occasional fine roots and rootlets. HEAD								
0.30	ES			(0.60)										
0.60	ES			0.80		Stiff very gravelly CLAY. Gravel is fine to coarse angular flint. HEAD						1		
1.20	D			(1.20)										
1.80	D			2.00		End of Borehole at 2.00m						2		
												3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 0.80m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS23					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.15	ES			(0.30)		Brown slightly clayey, gravelly SILT. Gravel is fine to medium angular flint. Frequent fine roots and rootlets. TOPSOIL								
0.30	ES			0.30		Stiff, brown, gravelly, very silty friable CLAY becoming slightly silty at 1.00m. Gravel is fine to medium sub angular to angular flint. Occasional fine roots and rootlets becoming rare at 0.80m bgl. Occasional black discolouration at 1.00 to 1.40m bgl. HEAD								
0.60	ES													
				(1.10)		Stiff very gravelly CLAY. Gravel is fine to coarse angular flint. HEAD						1		
1.20	D													
				1.40 (0.30)		Orangish brown silty fine SAND. HEAD								
1.70	D			1.70										
				(0.80)		End of Borehole at 2.50m						2		
2.10	D													
				2.50										
												3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 1.40m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS24					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL	Hole Type: WS				
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021	Scale: 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		
0.10	ES			0.15		Dark brown gravelly CLAY. Gravel is angular, fine to medium. Abundant rootlets. TOPSOIL								
0.30	ES			0.40		Dark brown clayey silty GRAVEL. Gravel is angular to subangular, fine to coarse flint. Frequent rootlets. HEAD								
0.60	ES			(0.40)		Brown silty sandy clayey GRAVEL. Gravel is subangular to subrounded, fine to coarse flint. Sand is coarse to fine. Frequent rootlets. HEAD								
0.90	D			0.80		Orangish brown gravelly SAND. Sand is fine to coarse. Gravel is subrounded, fine to coarse flint. HEAD								
1.00	D			1.00		Brown clayey silty sandy GRAVEL. Gravel is subangular to subrounded, fine to coarse flint. Sand is coarse to fine. Frequent rootlets. HEAD					1			
				1.10		Dark grey slightly mottled light brown slightly silty CLAY. Pockets of fine to medium sand. HEAD								
1.60	D													
2.10	D										2			
2.60	D			(2.90)										
3.10	D										3			
3.60	D													
				4.00		End of Borehole at 4.00m					4			
											5			
											6			
											7			
											8			
											9			
											10			
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets to a depth of 1.10m.					
Chiselling				Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS25					
	Contract Number: 19522		Start and End Date: 16/07/21		Logged By: JC		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	
0.30	ES			(0.40)		Wheat over brown, slightly silty, slightly gravelly CLAY. Gravel is fine to coarse angular flint. Frequent fine rootlets. TOPSOIL								
				0.40 (0.30)		Brown, sandy gravelly CLAY. Sand is coarse. Gravel is fine to coarse angular flint. occasional rootlets. HEAD								
0.80	D			0.70		Brown, grey and orange, sandy, gravelly CLAY. Gravel is fine to coarse sub-angular to well-rounded flint. Occasional fine rootlets. Rare fine black silt spotting. HEAD						1		
				(1.20)		Fine orange SAND. HEAD						2		
1.50	D			1.90		Fine orange slightly gravelly SAND. Gravel is fine to medium sub-angular flint. Rare fine rootlets. HEAD								
2.00	D			(0.50)		End of Borehole at 2.50m								
2.40	D			2.40 2.50										
												3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Fine roots and rootlets to 2.50m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														



Weather:	Termination:		Sheet 1 of 1
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Samples & In Situ Testing			Strata Details					Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		Water Strike	Backfill/ Installation	
0.10	ES			(0.40)		Dark brown mottled light brown slightly gravelly silty CLAY. Gravel is angular, fine to coarse flint. Frequent rootlets. TOPSOIL	1			
0.50	ES			0.40		Brown slightly gravelly silty CLAY. Gravel is sub angular to subrounded, fine to medium flint. Occasional rootlets. HEAD				
0.90	ES			(0.70)						
1.20	D			1.10		Brown mottled black slightly silty gravelly CLAY. Gravel is subangular to subrounded, fine to coarse flint. HEAD	2			
1.70	D			(0.50)						
2.10	D			1.60		Pale light brown slightly clayey silty GRAVEL. Gravel is subangular to subrounded, fine to coarse flint. HEAD				
				(0.30)		Light yellowish brown silty SAND. Sand is fine. HEAD				
				(0.30)						
				2.20			End of Borehole at 2.20m			
							4			
							5			
							6			
							7			
							8			
							9			
							10			

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
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)	
RUN DISTRICT COUNCIL AL/11/24/OUT									

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					



Contract Name: Westergate			Client: CALA Homes			Hole ID: WS27
Contract Number: 19522	Start and End Date: 15/07/21 - 20/07/21	Logged By: GB	Checked By: SB	Status: FINAL	Hole Type: WS	
Easting:	Northing:	Ground Level:	Plant Used: PREM1	Print Date: 06/09/2021	Scale: 1:50	

Weather:	Termination:	Sheet 1 of 1
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Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/Installation
0.10	ES			0.20		Soft dark grey slightly gravelly CLAY. Frequent rootlets. Gravel is angular to sub angular medium flint. TOPSOIL		
0.30	ES			0.40		Light brown slightly gravelly silty SAND. Sand is fine to coarse. Occasional rootlets. Gravel is sub angular medium flint. HEAD		
0.60	ES			(0.30)		Light brown silty clayey GRAVEL. Gravel is angular to subangular, fine to coarse flint. Occasional rootlets. HEAD		
0.80	D			0.70		Light brown slightly clayey silty SAND. Sand is fine. Occasional rootlets. HEAD		
				0.90		Light yellowish brown slightly clayey silty SAND. Sand is fine to medium. Rare rootlets. HEAD	1	
1.20	D					Pore gravel subrounded, medium flint.		
				(1.10)				
1.70	D							
				2.00		Light yellowish brown mottled reddish orange slightly clayey very silty SAND. Sand is fine to medium. HEAD	2	
2.10	D			(0.40)				
				2.40		End of Borehole at 2.40m		
							3	
							4	
							5	
							6	
							7	
							8	
							9	
							10	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Rootlets to a depth of 1.60m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Westergate				Client: CALA Homes				Hole ID: WS28					
	Contract Number: 19522		Start and End Date: 15/07/21 - 20/07/21		Logged By: GB		Checked By: SB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM1		Print Date: 06/09/2021		Scale: 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	ES			0.12		Soft dark grey CLAY. Abundant rootlets. TOPSOIL						1		
0.20	ES				Dark grey slightly silty clayey GRAVEL. Gravel is subangular to subrounded, fine to coarse flint. Abundant rootlets. Reworked. HEAD									
0.50	ES				Dark grey slightly clayey GRAVEL. Gravel is sub angular medium to coarse flint. Frequent rootlets.									
0.60					Dark to light brown clayey GRAVEL. Gravel is fine to coarse. Occasional rootlets.									
0.90	D			(0.40)										
						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		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	No recovery 1.00m to 2.00m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	Not Encountered
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

ARUN DISTRICT COUNCIL AL/11/24/OUT

Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	1 3 				



Soils Limited

Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP03

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	1				0
1	1				
2	1				
3	1				
4	1				
5	1				
6	1				
7	1				
8	1				
9	1				
10	1				
Remarks					
Fall Height		mm	Cone Base Diameter		mm
Hammer Weight		63.5kg	Final Depth		6m
Probe Type			Energy Ratio (Er)		%



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Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP04

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	2				5
0.1	2				
0.2	3				
0.3	2				
0.4	2				
0.5	2				
0.6	2				
0.7	2				
0.8	2				
0.9	2				
1	1				5
1.1	2				
1.2	3				
1.3	4				
1.4	5				
1.5	5				
1.6	4				
1.7	4				
1.8	2				
1.9	2				
2	1				10
2.1	1				
2.2	0				
2.3	1				
2.4	3				
2.5	3				
2.6	1				
2.7	2				
2.8	4				
2.9	3				
3	1				5
3.1	1				
3.2	1				
3.3	2				
3.4	2				
3.5	1				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4	3				30
4.1	3				
4.2	3				
4.3	3				
4.4	3				
4.5	3				
4.6	4				
4.7	4				
4.8	6				
4.9	5				
5	7				30
5.1	7				
5.2					
5.3					
5.4					
5.5					
5.6					
5.7					
5.8					
5.9					
6					
6.1					
6.2					
6.3					
6.4					
6.5					
6.6					
6.7					
6.8					
6.9					
7					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10					
Remarks		Fall Height	mm	Cone Base Diameter	mm
		Hammer Weight 63.5kg		Final Depth	6m
		Probe Type		Energy Ratio (Er)	%
					



Soils Limited

Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP05

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	1 2				

Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	1				5
0.1	2				
0.2	1				
0.3	2				
0.4	1				
0.5	1				5
0.6	1				
0.7	1				
0.8	1				
0.9	1				
1.0	1				10
1.1	1				
1.2	1				
1.3	1				
1.4	1				
1.5	1				20
1.6	1				
1.7	1				
1.8	1				
1.9	1				
2.0	1				20
2.1	1				
2.2	1				
2.3	1				
2.4	1				
2.5	2				20
2.6	2				
2.7	2				
2.8	2				
2.9	2				
3.0	2				20
3.1	2				
3.2	2				
3.3	2				
3.4	2				
3.5	2				20
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4.0	2				20
4.1	2				
4.2	2				
4.3	2				
4.4	2				
4.5	2				20
4.6	2				
4.7	2				
4.8	2				
4.9	2				
5.0	2				20
5.1	2				
5.2	2				
5.3	2				
5.4	2				
5.5	2				20
5.6	2				
5.7	2				
5.8	2				
5.9	2				
6.0	2				20
6.1	2				
6.2	2				
6.3	2				
6.4	2				
6.5	2				20
6.6	2				
6.7	2				
6.8	2				
6.9	2				
7.0	2				20
7.1	2				
7.2	2				
7.3	2				
7.4	2				
7.5	2				20
7.6	2				
7.7	2				
7.8	2				
7.9	2				
8.0	2				20
8.1	2				
8.2	2				
8.3	2				
8.4	2				
8.5	2				20
8.6	2				
8.7	2				
8.8	2				
8.9	2				
9.0	2				20
9.1	2				
9.2	2				
9.3	2				
9.4	2				
9.5	2				20
9.6	2				
9.7	2				
9.8	2				
9.9	2				
10.0	2				20
10.1	2				
10.2	2				
10.3	2				
10.4	2				

Remarks	Fall Height mm	Cone Base Diameter mm	
	Hammer Weight 63.5kg	Final Depth 6m	
	Probe Type	Energy Ratio (Er) %	



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Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP07

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					0
1					
2					15
3					35
4					35
5					40
6					45
7					
8					
9					
10					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%



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Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					0
1					
2					15
3					20
4					40
5					45
6					45
7					
8					
9					
10					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%



AGS
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Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					0
1					
2					5
3					25
4					35
5					35
6					40
7					
8					
9					
10					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%



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Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP10

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					0
1					
2					10
3					30
4					35
5					40
6					40
7					
8					
9					
10					

Remarks

Fall Heightmm

Hammer Weight 63.5kg

Probe Type

Cone Base Diametermm

Final Depth6m

Energy Ratio (Er)%

AGS

REGISTERED USER 2020

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	3				0
1	1				
2	1				5
3	3				30
4	4				35
5	3				45
6	4				0
7					
8					
9					
10					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%

Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	1				5
0.1	1				
0.2	3				
0.3	6				
0.4	5				
0.5	5				10
0.6	4				
0.7	2				
0.8	3				
0.9	3				
1	3				5
1.1	3				
1.2	3				
1.3	3				
1.4	5				
1.5	5				10
1.6	5				
1.7	5				
1.8	5				
1.9	3				
2	1				5
2.1	1				
2.2	2				
2.3	2				
2.4	2				
2.5	2				10
2.6	1				
2.7	2				
2.8	2				
2.9	3				
3	2				10
3.1	2				
3.2	3				
3.3	2				
3.4	2				
3.5	3				20
3.6	2				
3.7	2				
3.8	2				
3.9	3				
4	2				10
4.1	2				
4.2	2				
4.3	2				
4.4	3				
4.5	2				20
4.6	2				
4.7	2				
4.8	2				
4.9	4				
5	4				10
5.1	4				
5.2	4				
5.3	4				
5.4	3				
5.5	4				20
5.6	4				
5.7	3				
5.8	4				
5.9	3				
6	2				10
6.1	3				
6.2	2				
6.3					
6.4					
6.5					20
6.6					
6.7					
6.8					
6.9					
7					20
7.1					
7.2					
7.3					
7.4					
7.5					20
7.6					
7.7					
7.8					
7.9					
8					20
8.1					
8.2					
8.3					
8.4					
8.5					20
8.6					
8.7					
8.8					
8.9					
9					20
9.1					
9.2					
9.3					
9.4					
9.5					20
9.6					
9.7					
9.8					
9.9					
10					20
10.1					
10.2					
10.3					
10.4					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%



AGS
REGISTERED USER 2023

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
0.1					
0.2					
0.3					
0.4					
0.5					
0.6					
0.7					
0.8					
0.9					
1					10
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2					10
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3					15
3.1					
3.2					
3.3					
3.4					
3.5					
3.6					
3.7					
3.8					
3.9					
4					25
4.1					
4.2					
4.3					
4.4					
4.5					
4.6					
4.7					
4.8					
4.9					
5					15
5.1					
5.2					
5.3					
5.4					
5.5					
5.6					
5.7					
5.8					
5.9					
6					10
6.1					
6.2					
6.3					
6.4					
6.5					
6.6					
6.7					
6.8					
6.9					
7					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10					
Remarks	Fall Height mm		Cone Base Diameter mm		
	Hammer Weight 63.5kg		Final Depth 6m		
	Probe Type		Energy Ratio (Er) %		

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	1				10
0	1				
0	1				
0	1				
0	1				
1	1				5
1	1				
1	1				
1	1				
1	1				
2	1				5
2	1				
2	1				
2	1				
2	1				
3	2				15
3	1				
3	2				
3	1				
3	2				
4	3				5
4	3				
4	3				
4	3				
4	3				
5	3				5
5	3				
5	3				
5	3				
5	3				
6	3				
6	3				
6	3				
6	3				
6	3				
7					
7					
7					
7					
7					
8					
8					
8					
8					
8					
9					
9					
9					
9					
9					
10					
10					
10					
10					
10					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%

Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	1 4 9 11 11 11 8 6 3				15
2	1 2				15
3	2 2 2 2 3 2 3 2 3 2 3 2 3 2 3 5 2 3				



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Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP17

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	16/07/2021			Logged By	JC

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	1				5
0.1	4				
0.2	5				
0.3	4				
0.4	1				
0.5	1				5
0.6	1				
0.7	2				
0.8	2				
0.9	2				
1	2				15
1.1	2				
1.2	2				
1.3	2				
1.4	2				
1.5	3				25
1.6	3				
1.7	3				
1.8	3				
1.9	3				
2	3				40
2.1	3				
2.2	3				
2.3	3				
2.4	3				
2.5	3				45
2.6	3				
2.7	3				
2.8	3				
2.9	3				
3	3				
3.1	2				
3.2	2				
3.3	2				
3.4	2				
3.5	2				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4	2				
4.1	2				
4.2	2				
4.3	2				
4.4	2				
4.5	2				
4.6	2				
4.7	2				
4.8	2				
4.9	2				
5	2				
5.1	2				
5.2	2				
5.3	2				
5.4	2				
5.5	2				
5.6	2				
5.7	2				
5.8	2				
5.9	2				
6	2				
6.1	2				
6.2	2				
6.3	2				
6.4	2				
6.5	2				
6.6	2				
6.7	2				
6.8	2				
6.9	2				
7	2				
7.1	2				
7.2	2				
7.3	2				
7.4	2				
7.5	2				
7.6	2				
7.7	2				
7.8	2				
7.9	2				
8	2				
8.1	2				
8.2	2				
8.3	2				
8.4	2				
8.5	2				
8.6	2				
8.7	2				
8.8	2				
8.9	2				
9	2				
9.1	2				
9.2	2				
9.3	2				
9.4	2				
9.5	2				
9.6	2				
9.7	2				
9.8	2				
9.9	2				
10	2				
Remarks	Fall Height mm		Cone Base Diameter mm		
	Hammer Weight 63.5kg		Final Depth 6m		
	Probe Type		Energy Ratio (Er) %		



Soils Limited

Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP18

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	16/07/2021			Logged By	JC

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
0.1					
0.2					
0.3					
0.4					
0.5					
0.6					
0.7					
0.8					
0.9					
1.0					5
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					10
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					10
3.1					
3.2					
3.3					
3.4					
3.5					
3.6					
3.7					
3.8					
3.9					
4.0					10
4.1					
4.2					
4.3					
4.4					
4.5					
4.6					
4.7					
4.8					
4.9					
5.0					10
5.1					
5.2					
5.3					
5.4					
5.5					
5.6					
5.7					
5.8					
5.9					
6.0					10
6.1					
6.2					
6.3					
6.4					
6.5					
6.6					
6.7					
6.8					
6.9					
7.0					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8.0					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9.0					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10.0					
Remarks		Fall Height	mm	Cone Base Diameter	mm
		Hammer Weight	63.5kg	Final Depth	6m
		Probe Type		Energy Ratio (Er)	%



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Newton House Cross Road Tadworth KT20 5SR

Probe Log

Probe No.

DP19

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	1 2 4 4 5 6 7 8 7 8 5 7 8				5
2	3				5
3	2				10
4	2 2				



Soils Limited

Newton House, Cross Road, Tadworth KT20 5SP

Probe Log

Probe No.

DP20

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	16/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	2				20
0.1	1				
0.2	1				10
0.3	2				
0.4	1				25
0.5	1				
0.6	1				30
0.7	2				
0.8	2				30
0.9	2				
1.0	2				35
1.1	2				
1.2	2				
1.3	2				
1.4	2				
1.5	2				
1.6	2				
1.7	2				
1.8	2				
1.9	2				
2.0	2				
2.1	2				
2.2	2				
2.3	2				
2.4	2				
2.5	2				
2.6	2				
2.7	2				
2.8	2				
2.9	2				
3.0	2				
3.1	2				
3.2	2				
3.3	2				
3.4	2				
3.5	2				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4.0	2				
4.1	2				
4.2	2				
4.3	2				
4.4	2				
4.5	2				
4.6	2				
4.7	2				
4.8	2				
4.9	2				
5.0	2				
5.1	2				
5.2	2				
5.3	2				
5.4	2				
5.5	2				
5.6	2				
5.7	2				
5.8	2				
5.9	2				
6.0	2				
6.1	2				
6.2	2				
6.3	2				
6.4	2				
6.5	2				
6.6	2				
6.7	2				
6.8	2				
6.9	2				
7.0	2				
7.1	2				
7.2	2				
7.3	2				
7.4	2				
7.5	2				
7.6	2				
7.7	2				
7.8	2				
7.9	2				
8.0	2				
8.1	2				
8.2	2				
8.3	2				
8.4	2				
8.5	2				
8.6	2				
8.7	2				
8.8	2				
8.9	2				
9.0	2				
9.1	2				
9.2	2				
9.3	2				
9.4	2				
9.5	2				
9.6	2				
9.7	2				
9.8	2				
9.9	2				
10.0	2				
Remarks	Fall Height mm				Cone Base Diameter mm
	Hammer Weight 63.5kg				Final Depth 6m
	Probe Type				Energy Ratio (Er) %
					

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	16/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)	
	10	20	30	40		
0	1				5	
0.1	3					
0.2	4					
0.3	4					
0.4	3					
0.5	2				10	
0.6	1					
0.7	1					
0.8	2					
0.9	3					
1.0	4					
1.1	7					
1.2	6					
1.3	5					
1.4	6					
1.5	7					
1.6	9					
1.7	7					
1.8	8					
1.9	4					
2.0	2				10	
2.1	1					
2.2	2					
2.3	1					
2.4	2					
2.5	1					
2.6	2					
2.7	1					
2.8	2					
2.9	1					
3.0	2				25	
3.1	1					
3.2	2					
3.3	2					
3.4	2					
3.5	2					
3.6	2					
3.7	2					
3.8	2					
3.9	2					
4.0	2				20	
4.1	2					
4.2	2					
4.3	2					
4.4	2					
4.5	2					
4.6	2					
4.7	2					
4.8	2					
4.9	2					
5.0	2				20	
5.1	2					
5.2	2					
5.3	2					
5.4	2					
5.5	2					
5.6	2					
5.7	2					
5.8	2					
5.9	2					
6.0	2					
6.1	2					
6.2	2					
6.3	2					
6.4	2					
6.5	2					
6.6	2					
6.7	2					
6.8	2					
6.9	2					
7.0						
7.1						
7.2						
7.3						
7.4						
7.5						
7.6						
7.7						
7.8						
7.9						
8.0						
8.1						
8.2						
8.3						
8.4						
8.5						
8.6						
8.7						
8.8						
8.9						
9.0						
9.1						
9.2						
9.3						
9.4						
9.5						
9.6						
9.7						
9.8						
9.9						
10.0						
Remarks		Fall Height mm		Cone Base Diameter mm		
		Hammer Weight 63.5kg		Final Depth 6m		
		Probe Type		Energy Ratio (Er) %		

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	2				0
1	2				
2	2				15
3	3				20
4	4				30
5	4				45
6	5				50
7					
8					
9					
10					
Remarks		Fall Height	mm	Cone Base Diameter	mm
		Hammer Weight	63.5kg	Final Depth	6m
		Probe Type		Energy Ratio (Er)	%



Soils Limited

Newton House, Cross Road, Tadworth KT20 5SR

Probe Log

Probe No.

DP23

Sheet 1 of 1

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	3				5
0.1	2				
0.2	2				
0.3	1				
0.4	1				
0.5	0				15
0.6	1				
0.7	1				
0.8	0				
0.9	0				
1	1				30
1.1	2				
1.2	1				
1.3	2				
1.4	2				
1.5	1				35
1.6	2				
1.7	2				
1.8	2				
1.9	2				
2	2				40
2.1	2				
2.2	2				
2.3	2				
2.4	2				
2.5	2				50
2.6	2				
2.7	2				
2.8	2				
2.9	2				
3	2				
3.1	2				
3.2	2				
3.3	2				
3.4	2				
3.5	2				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4	2				
4.1	2				
4.2	2				
4.3	2				
4.4	2				
4.5	2				
4.6	2				
4.7	2				
4.8	2				
4.9	2				
5	2				
5.1	2				
5.2	2				
5.3	2				
5.4	2				
5.5	2				
5.6	2				
5.7	2				
5.8	2				
5.9	2				
6	2				
6.1	2				
6.2	2				
6.3	2				
6.4	2				
6.5	2				
6.6	2				
6.7	2				
6.8	2				
6.9	2				
7	2				
7.1	2				
7.2	2				
7.3	2				
7.4	2				
7.5	2				
7.6	2				
7.7	2				
7.8	2				
7.9	2				
8	2				
8.1	2				
8.2	2				
8.3	2				
8.4	2				
8.5	2				
8.6	2				
8.7	2				
8.8	2				
8.9	2				
9	2				
9.1	2				
9.2	2				
9.3	2				
9.4	2				
9.5	2				
9.6	2				
9.7	2				
9.8	2				
9.9	2				
10	2				

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type		Energy Ratio (Er)	%



AGS
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Newton House, Cross Road, Teddworth, KT20 5BP

Probe Log

Probe No.

DP24

Sheet 1 of 1

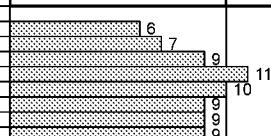
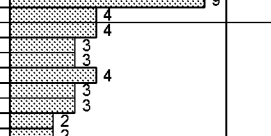
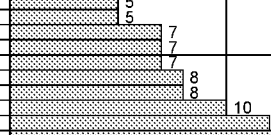
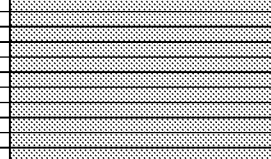
Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	3				20
0.1	3				
0.2	3				
0.3	1				
0.4	1				
0.5	0				
0.6	1				
0.7	2				
0.8	2				
0.9	3				
1					
1.1	0				
1.2	0				
1.3	0				
1.4	0				
1.5	0				
1.6	0				
1.7	0				
1.8	0				
1.9	0				
2	1				20
2.1	0				
2.2	0				
2.3	1				
2.4	1				
2.5	1				
2.6	1				
2.7	1				
2.8	1				
2.9	1				30
3	2				
3.1	2				
3.2	1				
3.3	1				
3.4	2				
3.5	2				
3.6	3				
3.7	4				30
3.8	6	10			
3.9	3				
4	4				
4.1	3				
4.2	3				
4.3	3				
4.4	4				
4.5	4				
4.6	4				50
4.7	3				
4.8	4				
4.9	4				
5	4				
5.1	3				
5.2	3				
5.3	3				
5.4	3				
5.5	3				
5.6	3				
5.7	3				
5.8	3				
5.9	3				0
6	3				
6.1	3				
6.2	3				
6.3	3				
6.4	3				
6.5	3				
6.6	3				
6.7	3				
6.8	3				
6.9	3				
7					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10					
Remarks	Fall Height mm		Cone Base Diameter mm		
	Hammer Weight 63.5kg		Final Depth 6m		
	Probe Type		Energy Ratio (Er) %		

Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	16/07/2021			Logged By	JC

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	6 7 11 8 7 9 7 8 5				0
2	3 3 3 1 2 2 1 2 2 3 3 4 5 7 7 6 7 8 11 12 16 18 23 30 33 42				0
3					0
4					60
5					
6					
7					
8					
9					
10					
Remarks	Fall Height mm		Cone Base Diameter mm		 REGISTERED USER 2020
	Hammer Weight 63.5kg		Final Depth 4m		
	Probe Type		Energy Ratio (Er) %		

Project Name: Westergate	Project No. 19522	Co-ords:	Hole Type DP
Location: Land East of Westergate West Sussex PO20 3RQ	Level: m AOD		Scale 1:50
Client: CALA Homes	Dates: 15/07/2021 - 20/07/2021		Logged By GB

Depth (m)	Blows/100mm	Torque (Nm)
0		0
1		15
2		20
3		40
4		
5		
6		
7		
8		
9		
10		
Remarks	Fall Height mm Hammer Weight 63.5kg Probe Type	Cone Base Diameter mm Final Depth 4.5m Energy Ratio (Er) %

Probe Log

Probe No.

DP27

Sheet 1 of 1

Project Name: Westergate

Project No.	19522
-------------	-------

Co-ords:

Hole Type
DP

Location: Land East of Westergate West Sussex PO20 3RQ

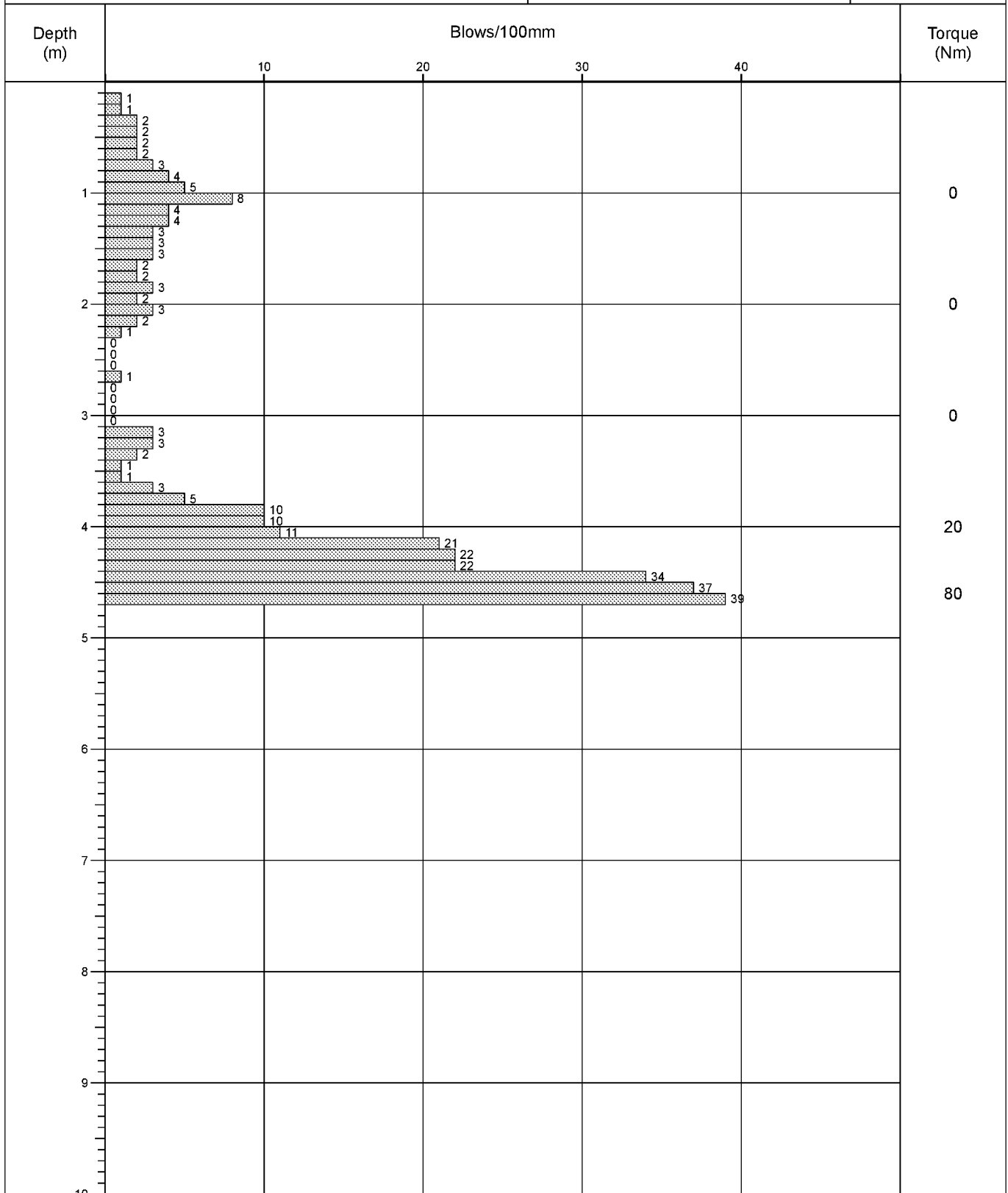
Level: m AOD

Scale
1:50

Client: CALA Homes

Dates: 15/07/2021 - 20/07/2021

Logged By
GB



Remarks

Fall Height	mm
-------------	----

Cone Base Diameter	mm
--------------------	----

Hammer Weight 63.5kg

Final Depth	4.6m
-------------	------

Probe Type

Energy Ratio (Er)	%
-------------------	---



Project Name:	Westergate	Project No.	19522	Co-ords:		Hole Type	DP
Location:	Land East of Westergate West Sussex PO20 3RQ	Level:	m AOD			Scale	1:50
Client:	CALA Homes	Dates:	15/07/2021 - 20/07/2021			Logged By	GB

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	1				0
1	6				
2	4				5
3	2				15
4	6				30
5	36				45
6					
7					
8					
9					
10					

Remarks	Fall Height	mm	Cone Base Diameter	mm
	Hammer Weight	63.5kg	Final Depth	4.9m
	Probe Type		Energy Ratio (Er)	%



AGS
REGISTERED USER 2020

Appendix B Geotechnical In-Situ and Laboratory Testing

Appendix B.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 B.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 B.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: (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 B.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 B.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: (Ref: The Standard Penetration Test (SPT): Methods and Use, CIRIA Report 143, 1995)

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:

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$$

Appendix B.2 Interpretation

Table B.2.1 Interpretation of DPSH Blow Counts

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
DP01	RTD 0.50 – 1.40 Sandy CLAY	4 – 12	Low to medium ($C_u = 20 - 60\text{kPa}$)
	RTD 1.40 – 4.70 Gravelly SAND	4 – 29	Loose to medium dense
	LC 4.70 – 6.00 Silty CLAY ¹	4 – 12	Low to medium ($C_u = 20 - 60\text{kPa}$)
DP02	RTD 0.50 – 2.30 Sandy CLAY	4 – 25	Low to high ($C_u = 20 - 125\text{kPa}$)
	RTD 2.30 – 3.40 Gravelly SAND	4 – 29	Loose to medium dense
	LC 3.40 – 4.00 Silty CLAY ¹	4 – 16	Low to high ($C_u = 20 - 80\text{kPa}$)
DP03	ALV 0.50 – 2.00 Sandy CLAY	4 – 12	Low to medium ($C_u = 20 - 60\text{kPa}$)
	LC 2.00 – 6.00 Silty CLAY ¹	4 – 29	Low to high ($C_u = 20 - 145\text{kPa}$)
DP04	RTD 0.50 – 1.50 Sandy CLAY	4 – 20	Low to high ($C_u = 20 - 100\text{kPa}$)
	RTD 1.50 – 4.20 Gravelly SAND ¹	0 – 20	Very loose to medium dense
	LC 4.20 – 6.00 Silty CLAY ¹	4 – 29	Low to high ($C_u = 20 - 145\text{kPa}$)
DP05	RTD 0.80 – 2.20 Clayey SAND	4 – 8	Loose
	RTD 2.20 – 3.70 Sandy CLAY	4 – 21	Low to high ($C_u = 20 - 105\text{kPa}$)
	LC 3.70 – 6.00 Silty CLAY ¹	4 – 16	Low to high ($C_u = 20 - 80\text{kPa}$)
DP06	ALV 0.50 – 2.60 Sandy CLAY	0 – 8	Extremely low to Low ($C_u = <10 - 40\text{kPa}$)

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
DP07	LC 2.60 – 6.00 Silty CLAY	4 – 16	Low to high ($C_u = 20 - 80\text{kPa}$)
	ALV 0.50 – 1.80 Sandy CLAY	0 – 4	Extremely low to very low ($C_u = <10 - 20\text{kPa}$)
	RTD 1.80 – 2.00 Sandy gravelly CLAY	7	Low ($C_u = 35\text{kPa}$)
	RTD 2.00 – 3.80 SAND	4 – 11	Loose to medium dense
DP08	LC 3.80 – 6.00 Silty CLAY ¹	7 – 14	Low to medium ($C_u = 35 - 70\text{kPa}$)
	ALV 0.50 – 2.00 Sandy CLAY	0 – 7	Extremely low to low ($C_u = <10 - 35\text{kPa}$)
	RTD 2.00 – 3.60 Sandy CLAY	4 – 11	Low to medium ($C_u = 20 - 55\text{kPa}$)
	LC 3.60 – 6.00 Silty CLAY ¹	7 – 11	Low to medium ($C_u = 35 - 55\text{kPa}$)
DP09	RTD 0.50 – 1.30 Sandy gravelly CLAY	0 – 4	Extremely low to very low ($C_u = <10 - 20\text{kPa}$)
	RTD 1.30 – 1.90 Gravelly SAND	4 – 7	Loose
	LC 1.90 – 6.00 Silty CLAY ¹	4 – 14	Low to medium ($C_u = 20 - 70\text{kPa}$)
DPI0	ALV 0.60 – 2.00 Sandy CLAY	0 – 4	Extremely low to very low ($C_u = <10 - 20\text{kPa}$)
	LC 2.00 – 6.00 Silty CLAY ¹	4 – 14	Low to medium ($C_u = 20 - 70\text{kPa}$)
DPI1	ALV 0.50 – 2.30 Sandy CLAY	0 – 7	Extremely low to low ($C_u = <10 - 35\text{kPa}$)
	LC 2.30 – 6.00 Silty CLAY ¹	7 – 14	Low to medium ($C_u = 35 - 70\text{kPa}$)
DPI2	ALV 0.60 – 1.90 Clayey GRAVEL	0 – 8	Very loose to loose
	LC 1.90 – 6.00 Silty CLAY ¹	4 – 16	Low to high ($C_u = 20 - 80\text{kPa}$)

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
DPI3	RTD 1.00 – 1.70 Sandy GRAVEL	0 – 16	Very loose to medium dense
	RTD 1.70 – 3.80 Gravelly CLAY	0 – 8	Extremely low to low ($C_u = <10 - 40\text{kPa}$)
	LC 3.80 – 6.00 Silty CLAY ¹	4 – 12	Low to medium ($C_u = 20 - 60\text{kPa}$)
DPI4	HEAD 0.50 – 4.10 Sandy CLAY ¹	0 – 12	Extremely low to medium ($C_u = <10 - 60\text{kPa}$)
	LC 4.10 – 6.00 Silty CLAY ¹	8 – 12	Medium ($C_u = 40 - 60\text{kPa}$)
DPI5	RTD 0.50 – 0.90 Clayey GRAVEL	0 – 25	Very loose to medium dense
	RTD 0.90 – 2.50 Gravelly CLAY	0 – 8	Extremely low to low ($C_u = <10 - 40\text{kPa}$)
	LC 2.50 – 6.00 Silty CLAY ¹	4 – 12	Low to medium ($C_u = 20 - 60\text{kPa}$)
DPI6	RTD 0.50 – 1.00 Clayey GRAVEL	25 – 45	Medium dense to dense
	LC 1.00 – 6.00 Silty CLAY ¹	4 – 20	Low to high ($C_u = 20 - 100\text{kPa}$)
DPI7	HEAD 1.00 – 2.50 Gravelly SAND	4 – 16	Loose to medium dense
	HEAD 2.50 – 2.70 CLAY	4	Low ($C_u = 20\text{kPa}$)
	HEAD 2.50 – 3.80 SAND and GRAVEL	0 – 8	Very loose to loose
	LC 3.80 – 6.00 Silty CLAY ¹	4 – 12	Low to medium ($C_u = 20 - 60\text{kPa}$)
DPI8	HEAD 0.50 – 3.10 Sandy gravelly CLAY	0 – 8	Extremely low to low ($C_u = <10 - 40\text{kPa}$)
	LC 3.10 – 6.00 Silty CLAY ¹	4 – 8	Low ($C_u = 20 - 40\text{kPa}$)
DPI9	RTD 0.50 – 1.90 Clayey GRAVEL	16 – 29	Medium dense

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
DP20	LC 1.90 – 6.00 Silty CLAY ¹	4 – 16	Low to high ($C_u = 20 - 80\text{kPa}$)
	HEAD 1.00 – 1.60 SAND	0 – 4	Very loose
	HEAD 1.60 – 2.00 Sandy gravelly CLAY	0 – 4	Extremely low to very low ($C_u = <10 - 20\text{kPa}$)
	LC 2.00 – 6.00 Silty CLAY ¹	4 – 14	Low to medium ($C_u = 20 - 70\text{kPa}$)
DP21	HEAD 1.00 – 1.80 Clayey gravelly SAND	12 – 33	Medium dense to dense
	HEAD 1.80 – 2.70 Sandy gravelly CLAY	4	Low ($C_u = 20\text{kPa}$)
	LC 2.70 – 6.00 Silty CLAY ¹	4 – 16	Low to high ($C_u = 20 - 80\text{kPa}$)
	HEAD 0.50 – 2.20 Gravelly CLAY	0 – 7	Extremely low to low ($C_u = <10 - 35\text{kPa}$)
DP22	LC 2.20 – 6.00 Silty CLAY ¹	4 – 18	Low to high ($C_u = 20 - 90\text{kPa}$)
	HEAD 0.50 – 1.70 Gravelly CLAY	0 – 7	Extremely low to low ($C_u = <10 - 35\text{kPa}$)
	HEAD 1.70 – 3.20 Silty SAND	0 – 7	Very loose to loose
	LC 3.20 – 6.00 Silty CLAY ¹	7 – 18	Low to high ($C_u = 35 - 90\text{kPa}$)
DP23	HEAD 0.50 – 1.10 Clayey GRAVEL	0 – 11	Very loose to medium dense
	HEAD 1.10 – 4.10 Silty sandy CLAY	0 – 7	Extremely low to low ($C_u = <10 - 35\text{kPa}$)
	LC 4.10 – 6.00 Silty CLAY ¹	11 – 22	Medium to high ($C_u = 55 - 110\text{kPa}$)
	HEAD 0.50 – 1.90 Sandy gravelly CLAY	4 – 33	Low to very high ($C_u = 20 - 165\text{kPa}$)
DP25	HEAD 1.90 – 2.60 SAND	4 – 18	Loose to medium dense

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength/Granular Density
DP26	RTD 2.60 – 4.00 Gravelly SAND ¹	22 – >50	Medium dense to very dense
	HEAD 0.50 – 1.60 Silty gravelly CLAY	12 – 41	Medium dense to dense
	HEAD 1.60 – 2.50 GRAVEL / SAND	8 – 12	Loose to medium dense
	RTD 2.50 – 4.50 Gravelly SAND ¹	20 – >50	Medium dense to very dense
DP27	HEAD 0.50 – 2.00 GRAVEL / SAND	7 – 29	Loose to medium dense
	HEAD 2.00 – 3.60 Silty SAND	0 – 11	Very loose to medium dense
	RTD 3.60 – 4.60 Gravelly SAND ¹	18 – >50	Medium dense to very dense
	HEAD 0.50 – 1.60 Clayey GRAVEL ¹	7 – 25	Loose to medium dense
DP28	HEAD 1.60 – 3.70 Clayey SAND ¹	4 – 14	Loose to medium dense
	RTD 3.70 – 4.90 Gravelly SAND ¹	22 – >50	Medium dense to very dense

Note: ¹ Ground conditions inferred past the base of windowless sampler boreholes.

Table B.2.2 Interpretation of Atterberg Limit Tests

Stratum	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Soil Classification	Volume Change Potential	
						BRE	NHSC
ALV (6No.)	14 – 33	17 – 38	89 – 100	15 – 38	CL – CH	Low to medium	Low to medium
HEAD (8No.)	15 – 33	12 – 48	39 – 100	6 – 48	CL – CV	Low to high	None to high
RTD (7No.)	12 – 33	19 – 47	87 – 100	17 – 47	CL – CV	Low to high	Low to high
LC (3No.)	25 – 31	38 – 50	100	38 – 50	CH – CV	Medium to high	Medium to high

Stratum	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Soil Classification	Volume Change Potential	
						BRE	NHBC

Note: BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results)

NHBC Volume Change Potential refers to NHBC Standards Chapter 4.2

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 B.2.3 Interpretation of PSD Tests

Location	Depth (m bgl)	Soil Description (Stratum)	Volume Change Potential		Passing 63µm Sieve (%)
			BRE	NHBC	
WS01	2.00	Brown slightly fine gravelly clayey/silty fine to coarse SAND (RTD)	No	No	10
WS04	1.90	Brown clayey/silty fine to coarse SAND (RTD)	No	No	10
WS05	1.60	Brown slightly fine to medium gravelly fine to coarse sandy SILT/CLAY (RTD)	Yes	Yes	53
WS09	1.50	Brown slightly fine to medium gravelly slightly clayey/silty fine to coarse SAND (RTD)	No	No	7
WS12	1.60	Off white slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (ALV)	No	No	6
WS13	1.10	Grey slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (RTD)	No	No	4
WS19	1.20	Off white clayey/silty fine to coarse sandy fine to coarse GRAVEL (RTD)	No	No	10
WS20	1.20	Brown slightly fine to medium gravelly clayey/silty fine to coarse SAND (HEAD)	No	No	15
WS21	1.50	Brown fine to coarse gravelly clayey/silty fine to coarse SAND (HEAD)	Yes	No	18
WS23	2.10	Brown slightly fine gravelly clayey/silty fine to coarse SAND (HEAD)	Yes	No	29

Location	Depth (m bgl)	Soil Description (Stratum)	Volume Change Potential		Passing 63µm Sieve (%)
			BRE	NHBC	
WS25	2.00	Brown slightly fine to coarse gravelly clayey/silty fine to coarse SAND (HEAD)	No	No	14
WS27	1.70	Orange brown clayey/silty fine to coarse SAND (HEAD)	Yes	No	17
WS28	0.90	Brown slightly clayey/silty slightly fine to coarse sandy fine to coarse GRAVEL (HEAD)	No	No	4

Note: 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 B.3 Geotechnical In-Situ and Laboratory Results

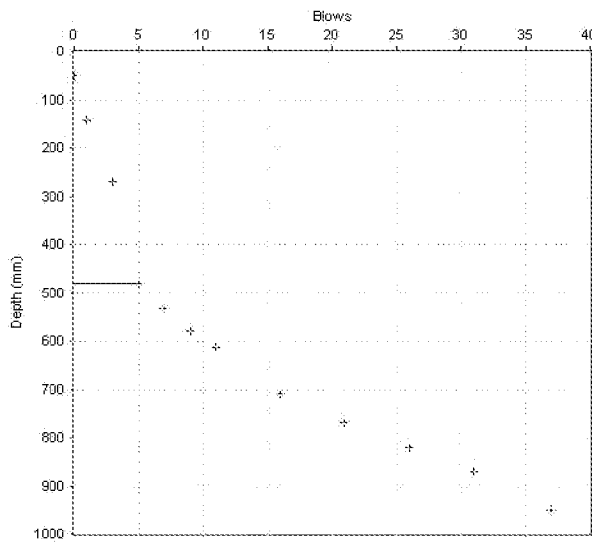
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

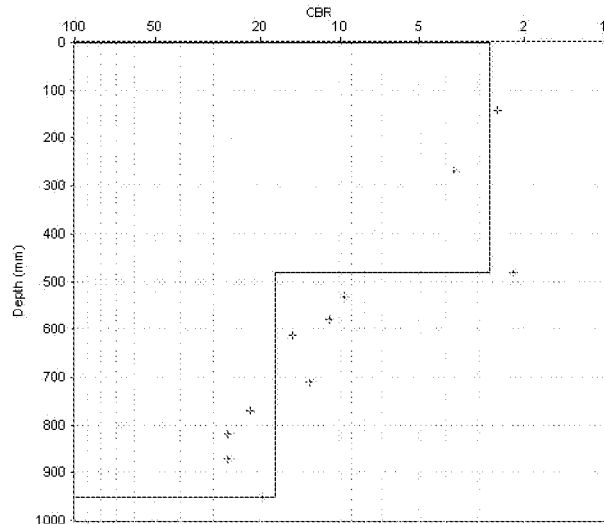
Chainage (km): 1.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 1.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	86.00	3	480	480
2	14.69	18	470	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

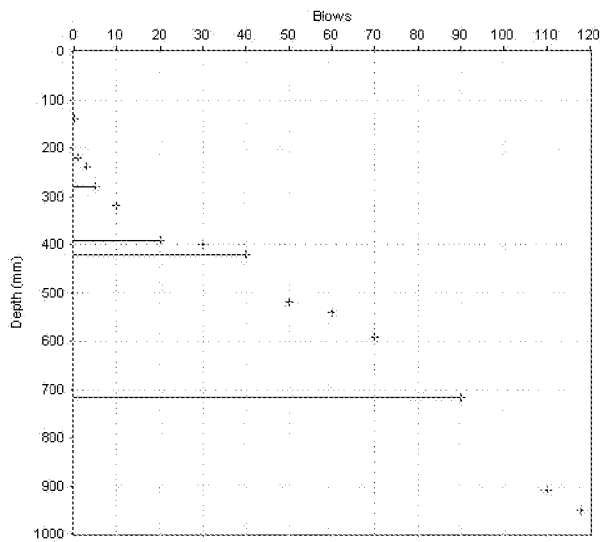
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

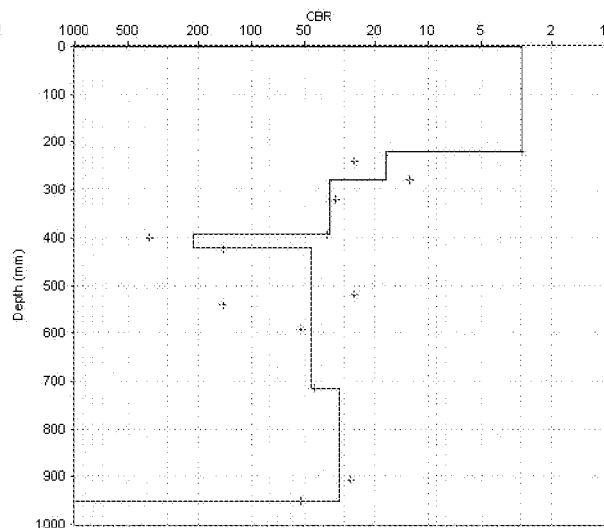
Chainage (km): 2.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 2.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	80.00	3	220	220
2	15.00	17	60	280
3	7.47	36	112	392
4	1.40	212	28	420
5	5.92	46	296	716
6	8.36	32	234	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

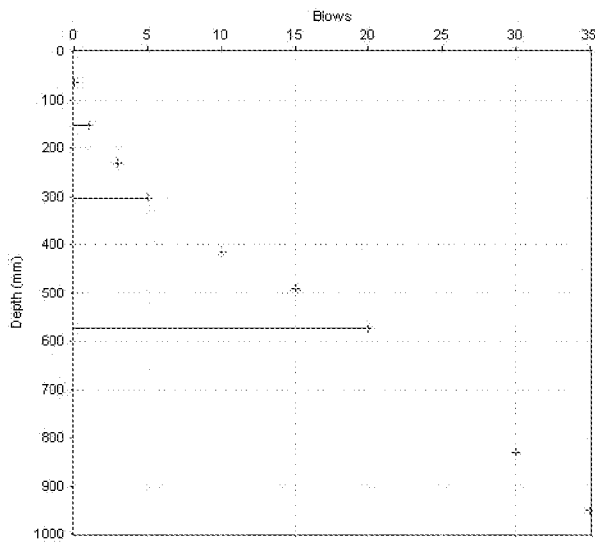
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

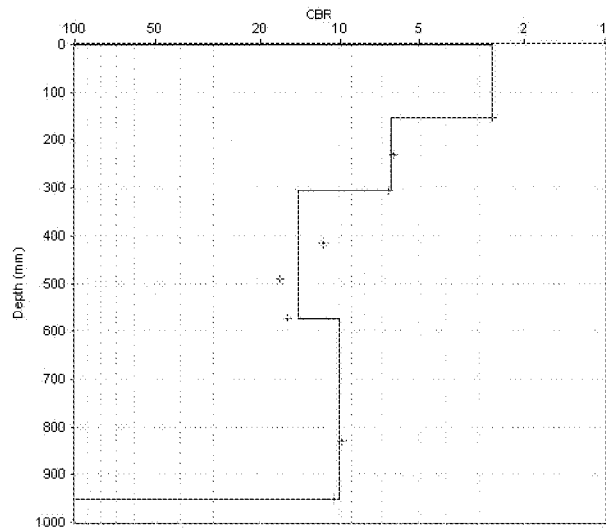
Chainage (km): 3.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 3.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	88.00	3	152	152
2	38.25	6	153	305
3	17.93	14	269	574
4	25.07	10	376	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

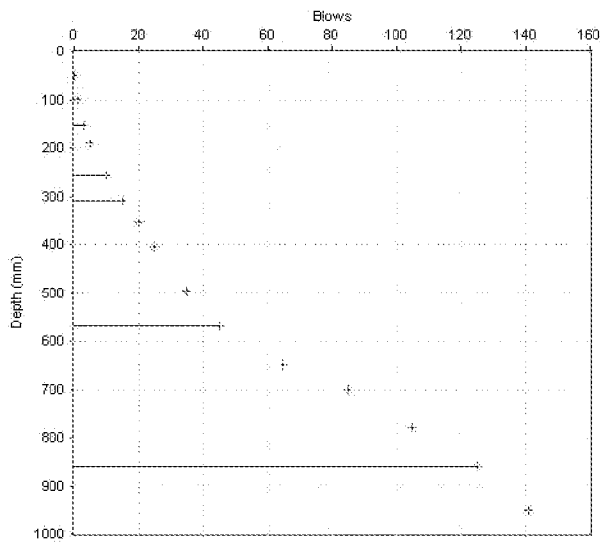
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

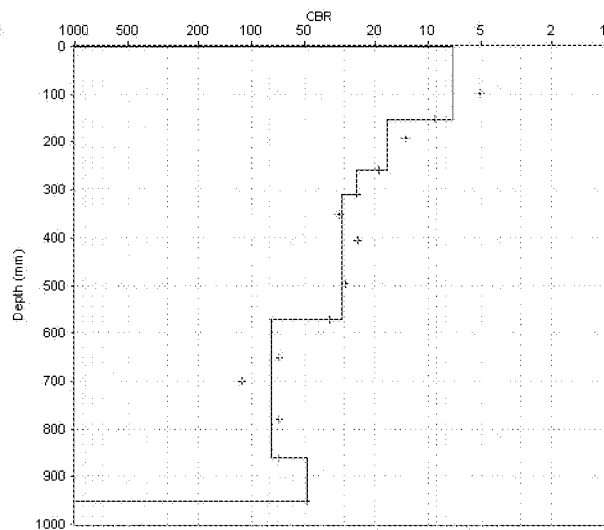
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 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 4.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	34.00	7	152	152
2	15.14	17	106	258
3	10.40	25	52	310
4	8.67	31	260	570
5	3.63	77	290	860
6	5.63	49	90	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

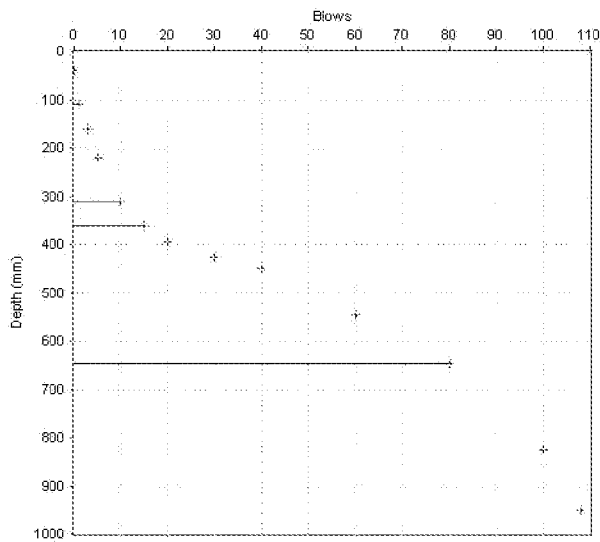
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

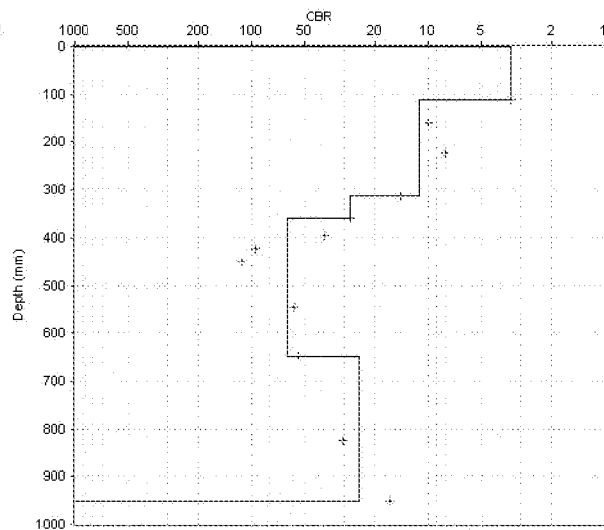
Chainage (km): 5.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 5.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	70.00	3	110	110
2	22.44	11	202	312
3	9.60	28	48	360
4	4.43	63	288	648
5	10.79	24	302	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

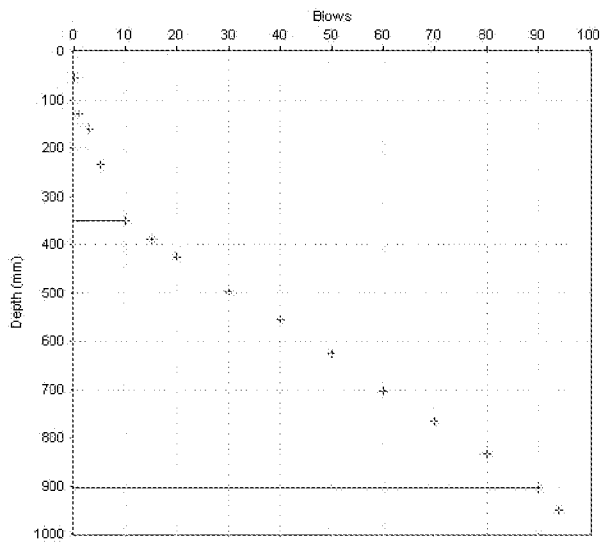
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

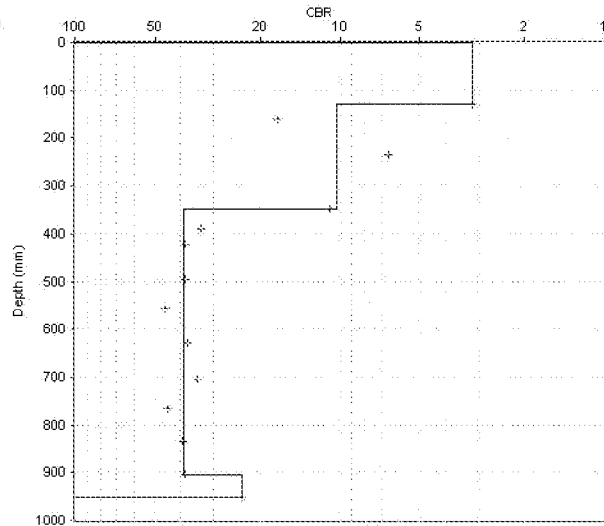
Chainage (km): 6.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 6.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	75.00	3	130	130
2	24.44	10	220	350
3	6.94	39	555	905
4	11.25	23	45	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

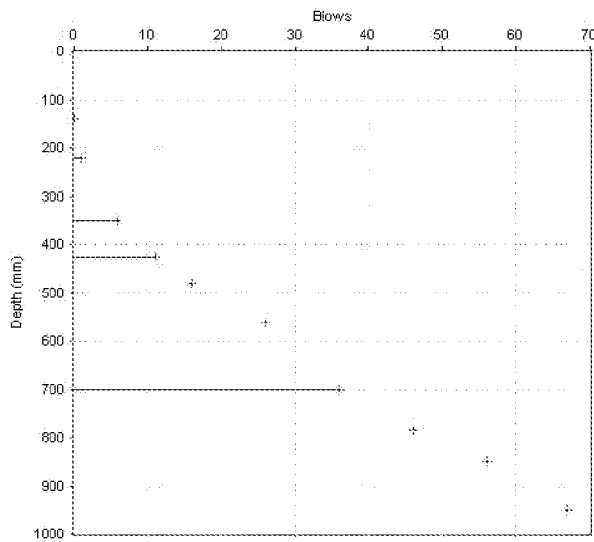
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

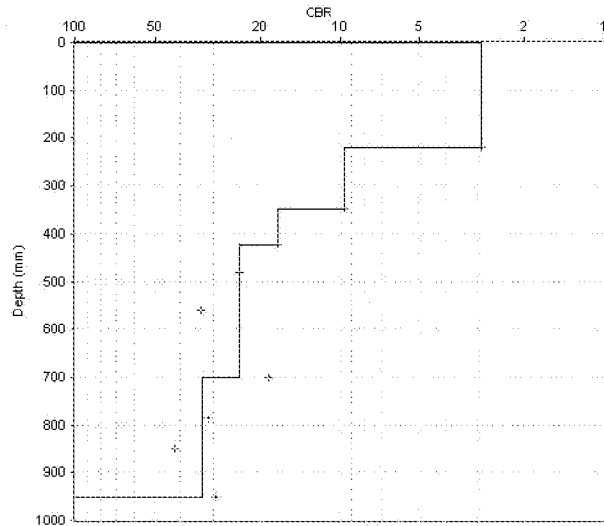
Chainage (km): 7.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 7.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	80.00	3	220	220
2	26.00	10	130	350
3	15.00	17	75	425
4	11.00	24	275	700
5	8.06	33	250	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

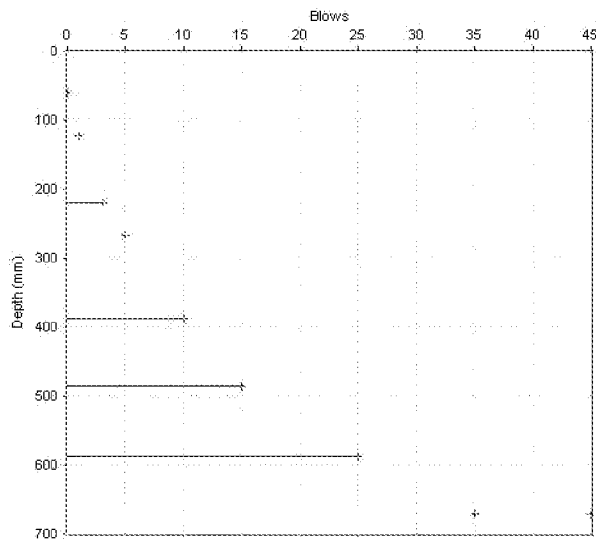
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

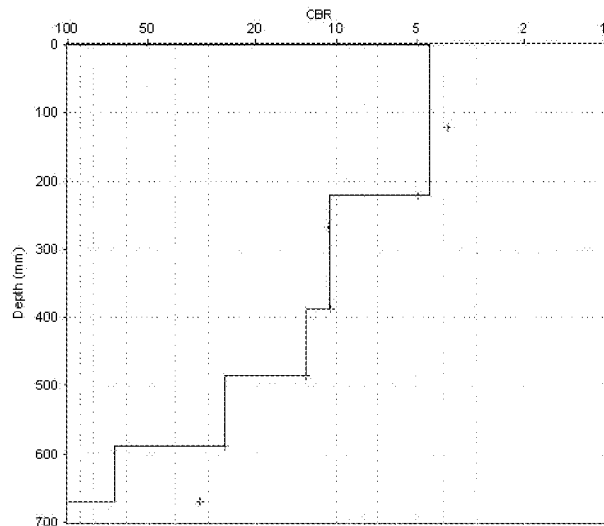
Chainage (km): 8.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 8.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	53.33	5	220	220
2	23.86	11	167	387
3	19.60	13	98	485
4	10.20	26	102	587
5	4.15	67	83	670

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

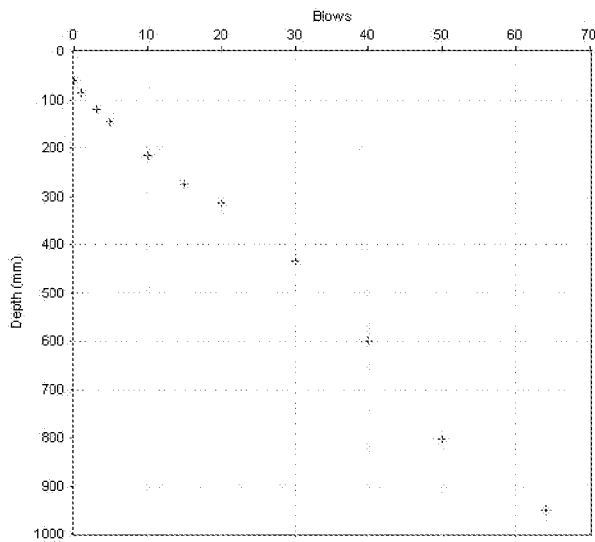
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

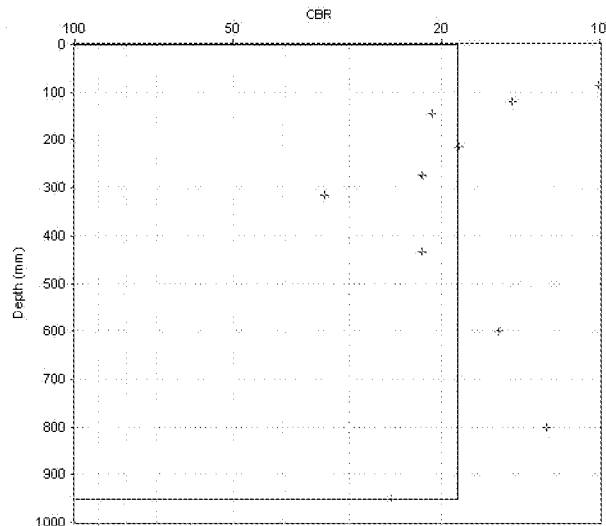
Chainage (km): 9.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 9.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	13.91	19	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

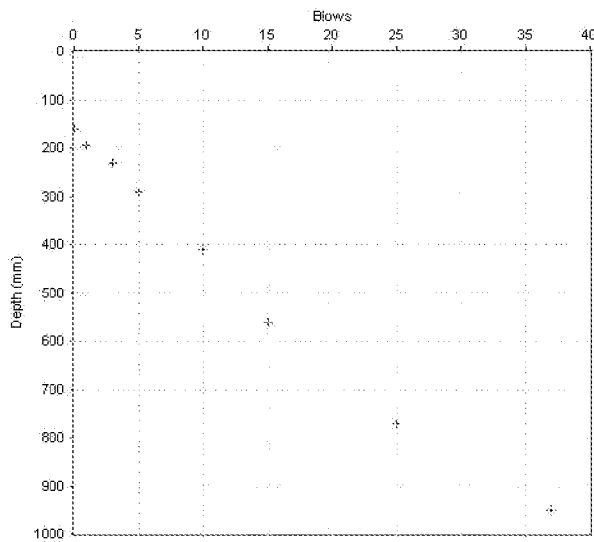
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

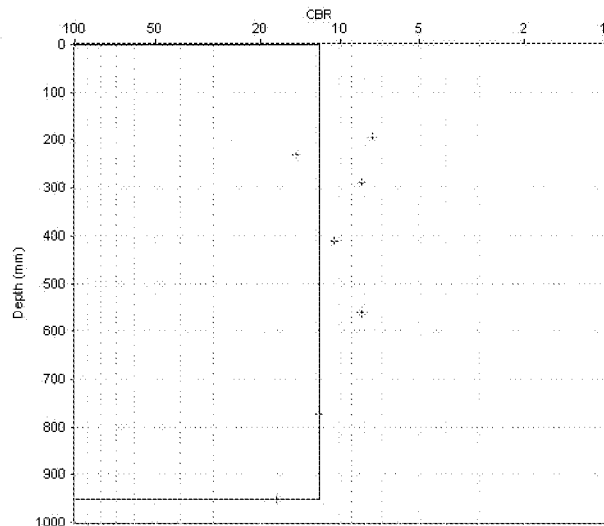
Chainage (km): 10.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 10.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	21.30	12	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

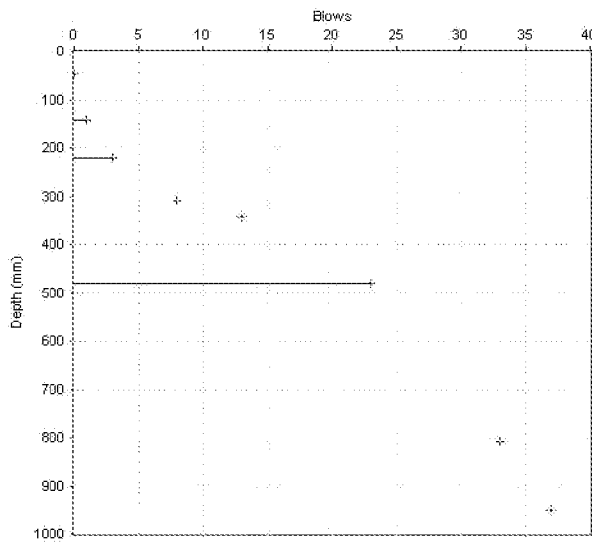
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

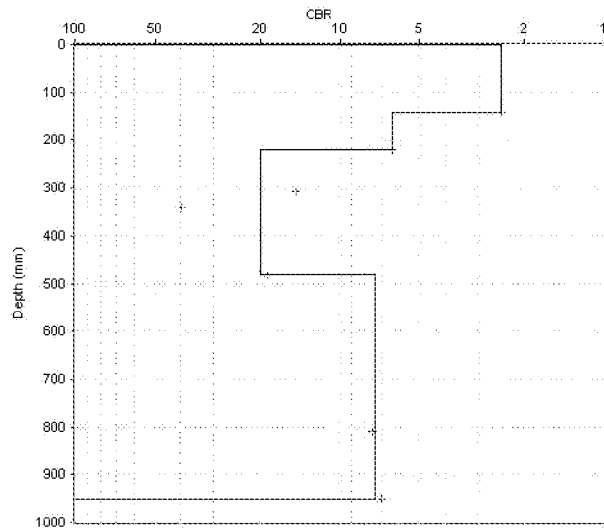
Chainage (km): 11.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 11.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	95.00	2	143	143
2	38.50	6	77	220
3	13.05	20	261	481
4	33.50	7	469	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

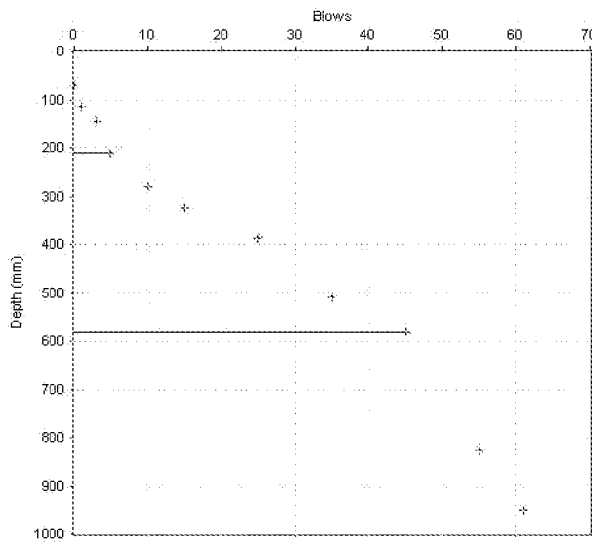
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

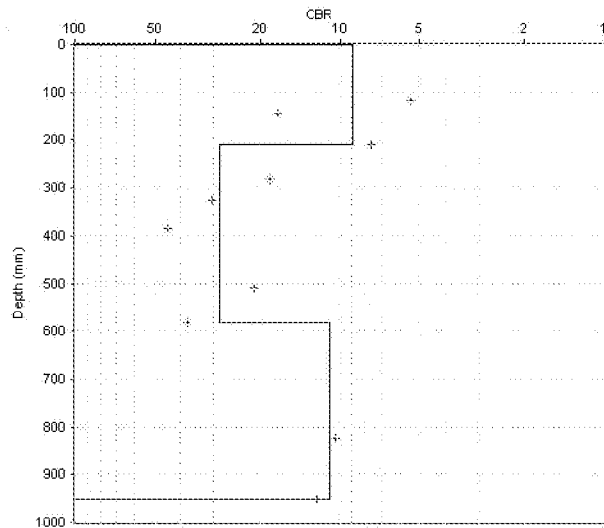
Chainage (km): 12.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 12.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	28.00	9	210	210
2	9.30	29	372	582
3	23.00	11	368	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

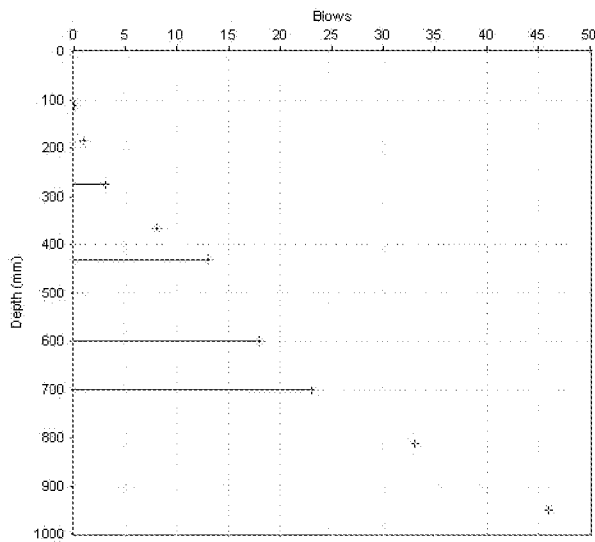
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

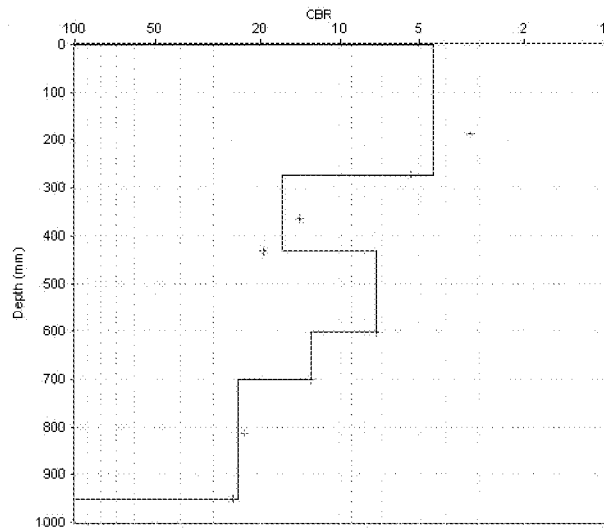
Chainage (km): 13.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 13.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	54.33	4	275	275
2	15.70	16	157	432
3	33.80	7	169	601
4	19.80	13	99	700
5	10.87	24	250	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

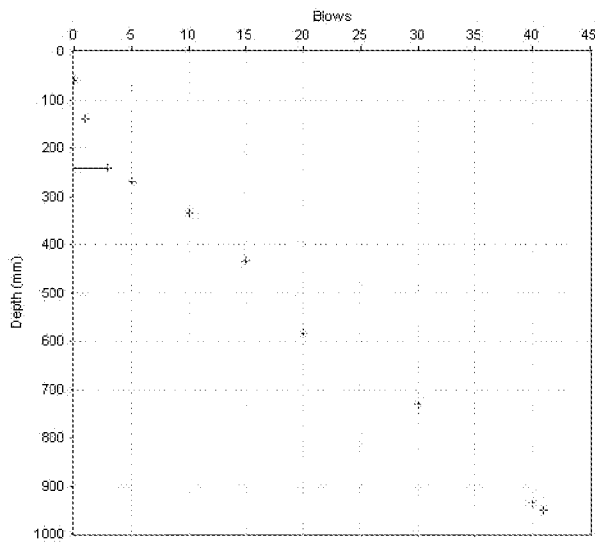
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

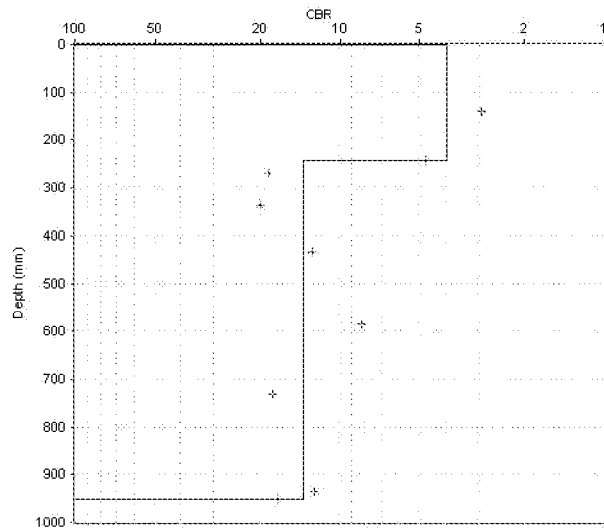
Chainage (km): 14.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 14.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	60.67	4	242	242
2	18.63	14	708	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

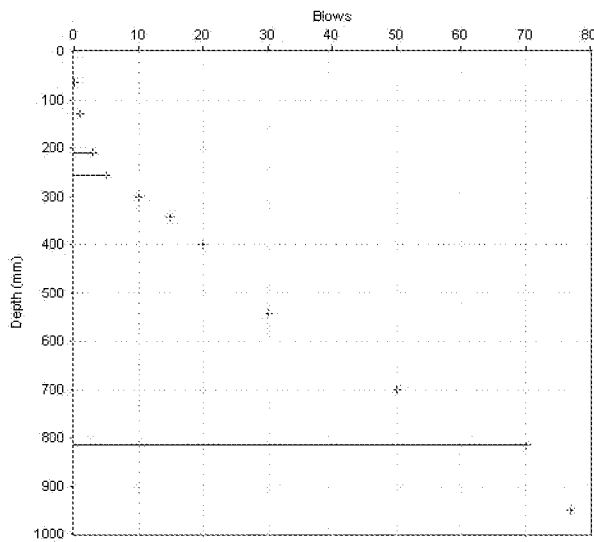
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

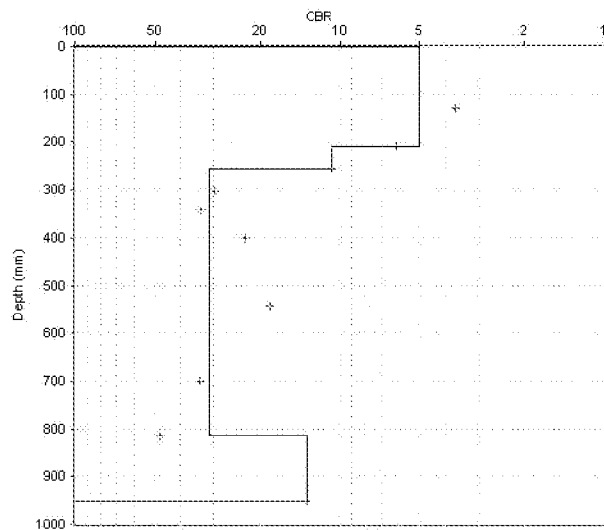
Chainage (km): 15.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 15.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	48.33	5	210	210
2	23.50	11	47	257
3	8.58	31	558	815
4	19.29	13	135	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

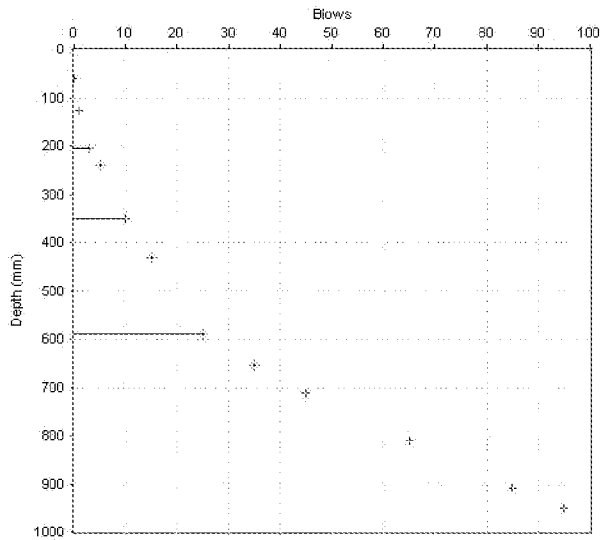
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

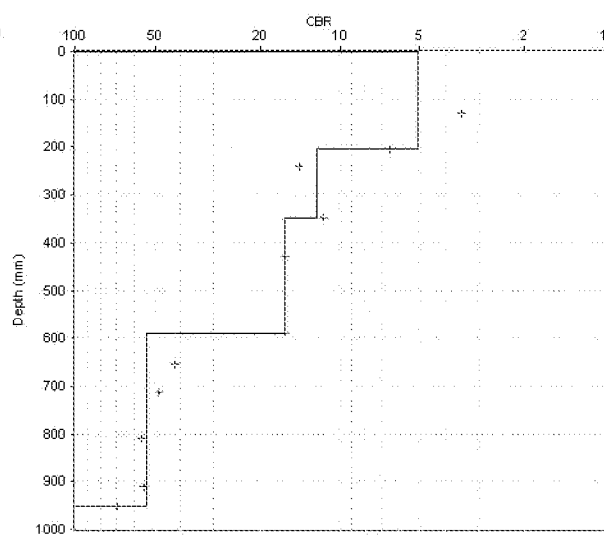
Chainage (km): 16.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 16.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	48.00	5	204	204
2	20.86	12	146	350
3	16.00	16	240	590
4	5.14	53	360	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

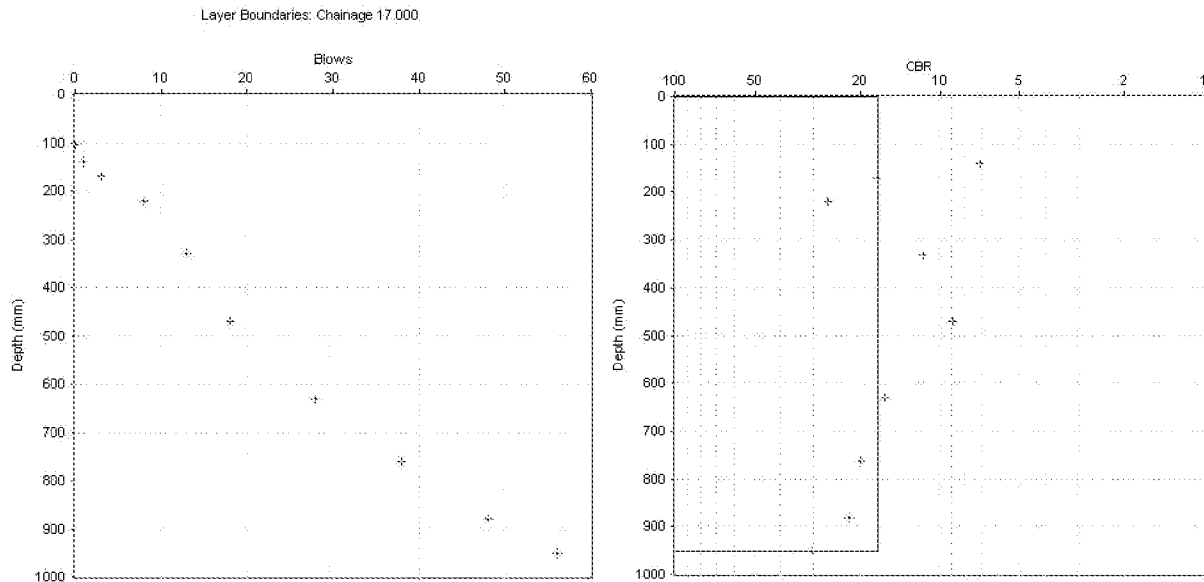
Report produced by

DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

Chainage (km): 17.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted



Layer Boundaries Chart

CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	15.09	17	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

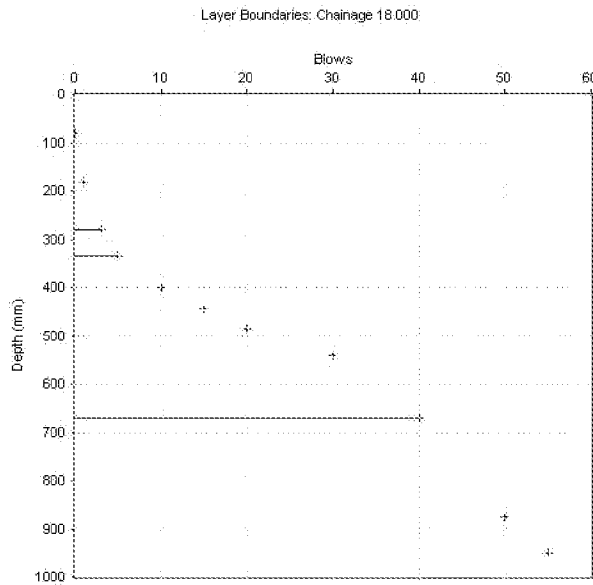
Report produced by

DCP Layer Strength Analysis Report

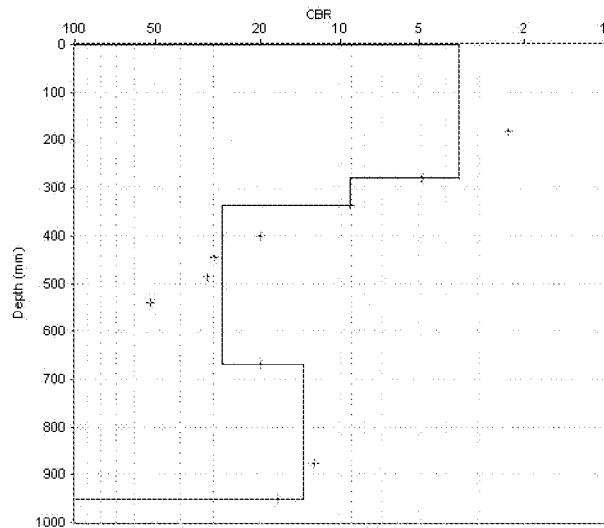
Project Name: 19522 DCPs

Chainage (km): 18.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	66.67	4	280	280
2	27.50	9	55	335
3	9.57	28	335	670
4	18.67	14	280	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

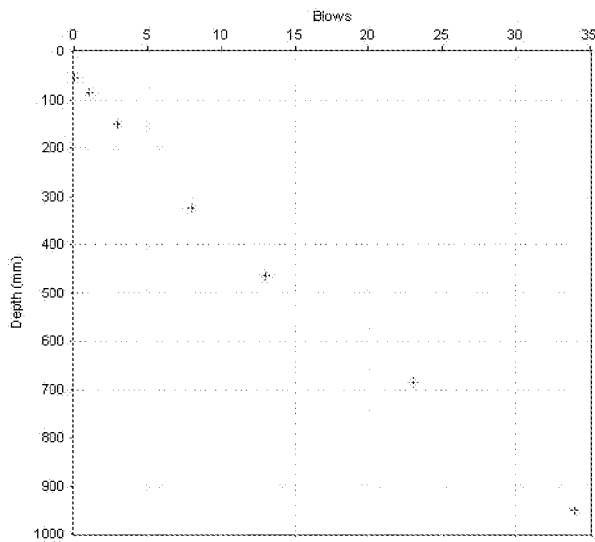
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

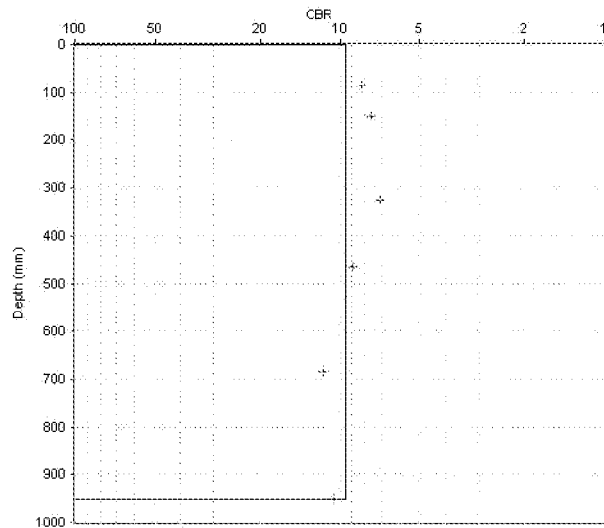
Chainage (km): 19.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 19.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	26.32	10	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

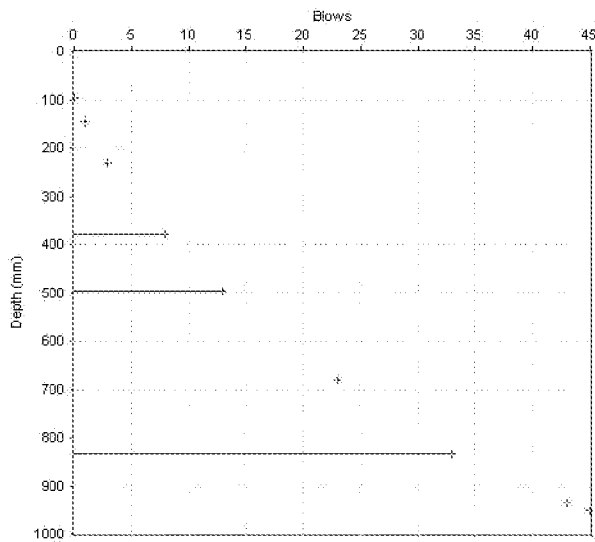
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

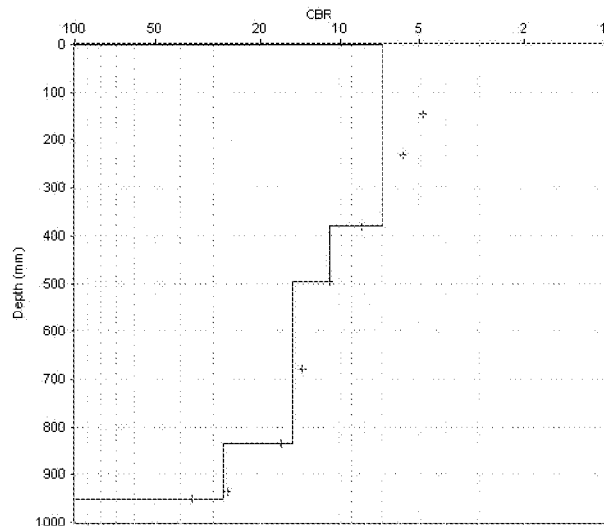
Chainage (km): 20.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 20.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	35.63	7	380	380
2	23.00	11	115	495
3	17.00	15	340	835
4	9.58	28	115	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

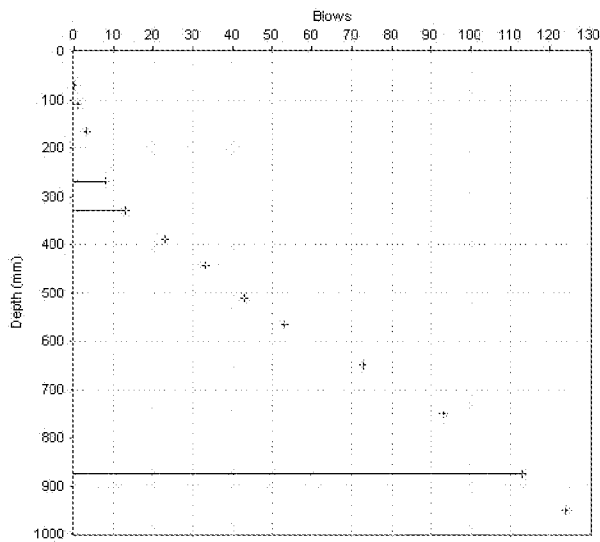
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

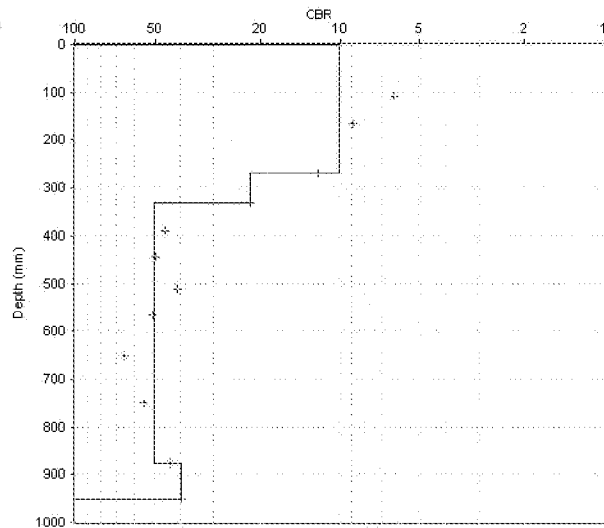
Chainage (km): 21.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 21.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	25.00	10	270	270
2	12.00	22	60	330
3	5.45	50	545	875
4	6.82	40	75	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

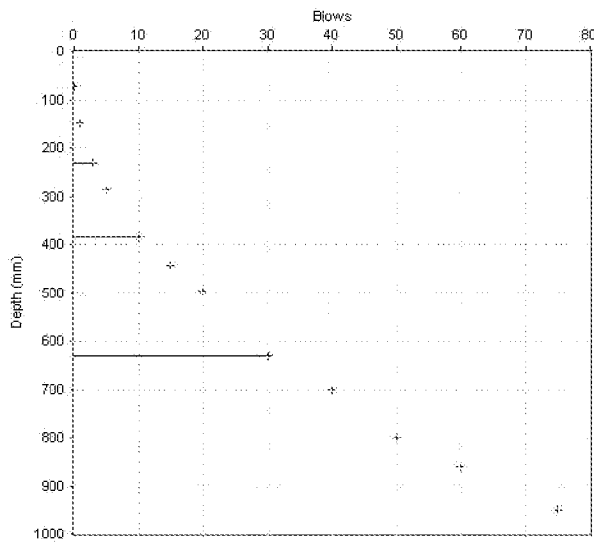
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

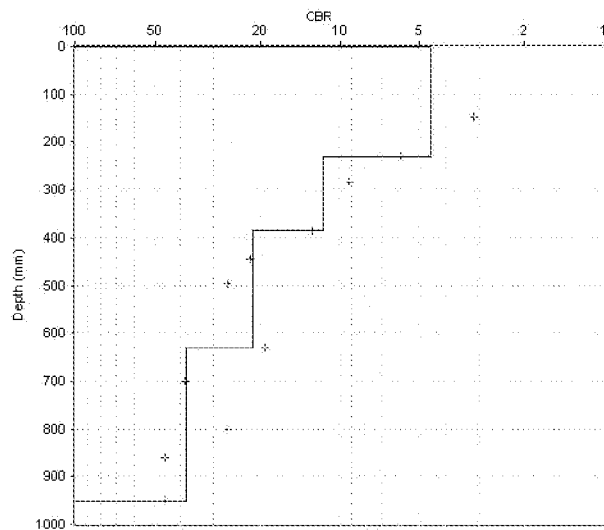
Chainage (km): 22.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 22.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	53.00	5	231	231
2	22.00	12	154	385
3	12.30	21	246	631
4	7.09	38	319	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

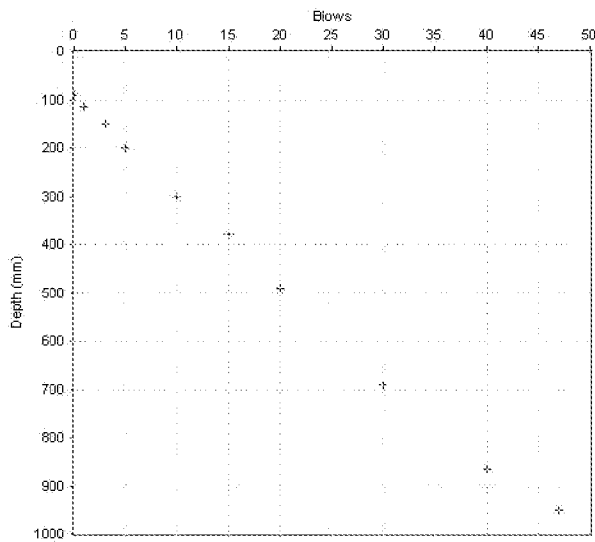
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

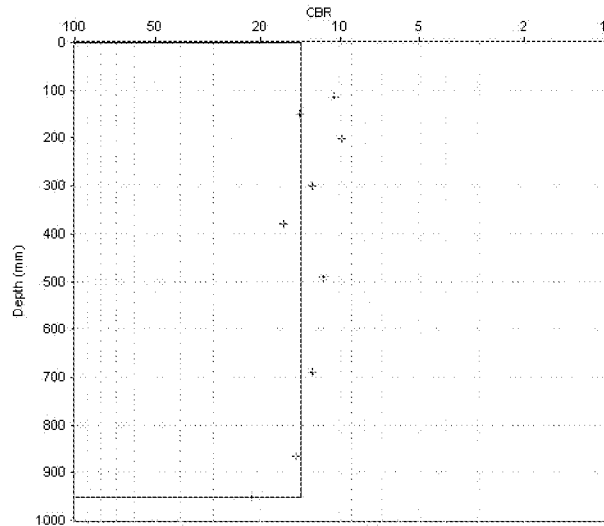
Chainage (km): 23.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 23.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	18.30	14	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

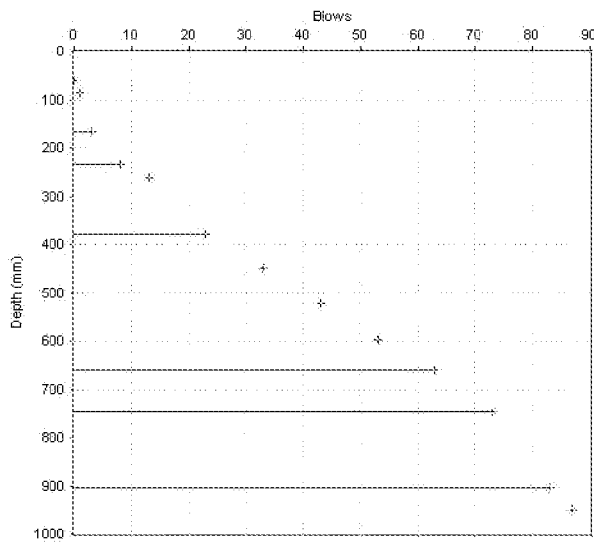
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

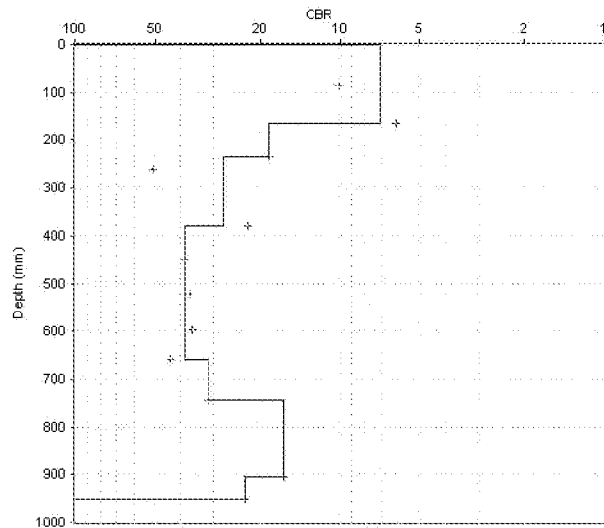
Chainage (km): 24.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 24.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	35.00	7	165	165
2	14.00	19	70	235
3	9.67	27	145	380
4	7.00	39	280	660
5	8.50	31	85	745
6	15.90	16	159	904
7	11.50	23	46	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

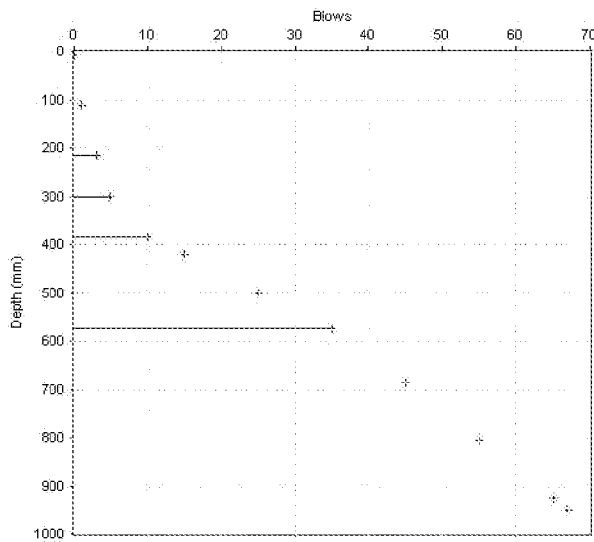
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

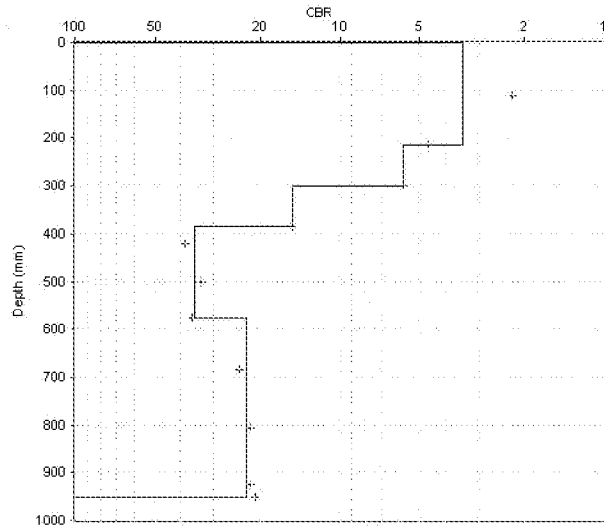
Chainage (km): 25.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 25.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	69.33	3	215	215
2	42.50	6	85	300
3	17.00	15	85	385
4	7.60	35	190	575
5	11.72	22	375	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

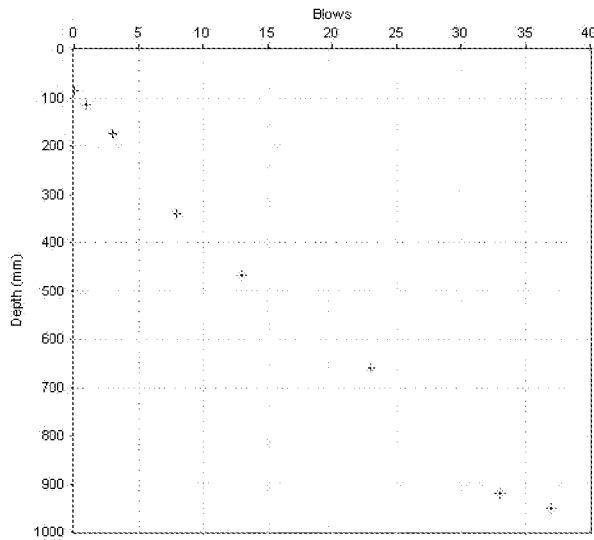
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

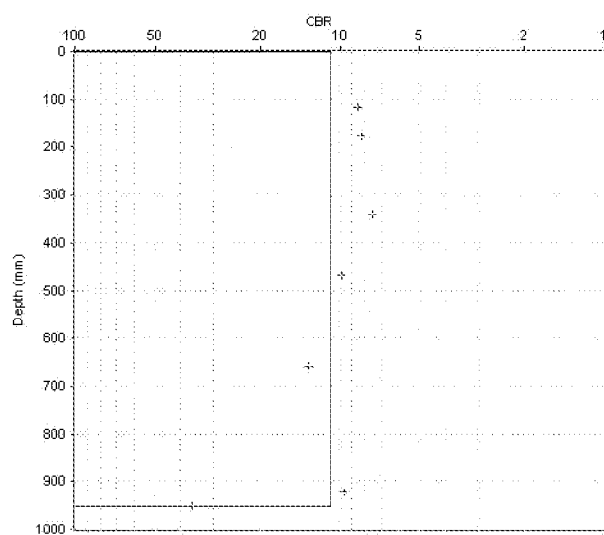
Chainage (km): 26.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 26.000.



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	23.35	11	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

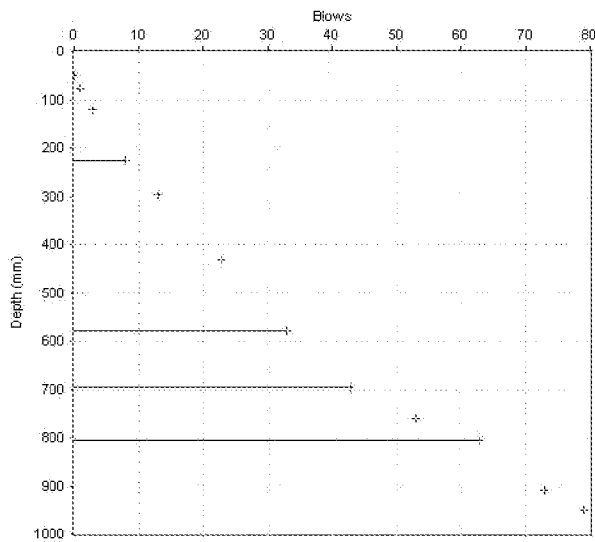
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

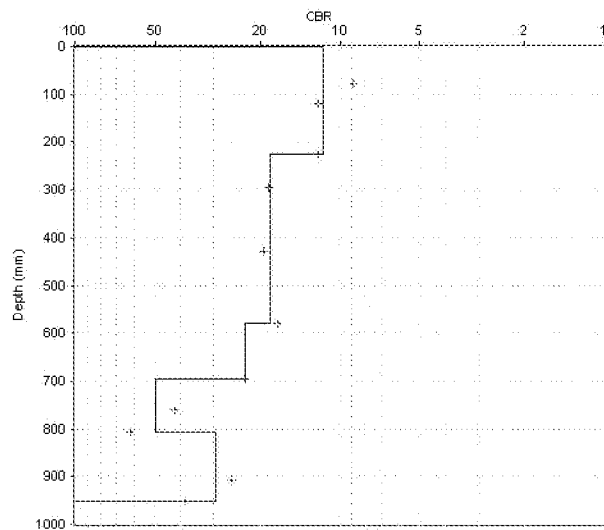
Chainage (km): 27.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 27.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	21.88	12	225	225
2	14.20	18	355	580
3	11.50	23	115	695
4	5.50	50	110	805
5	9.06	29	145	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

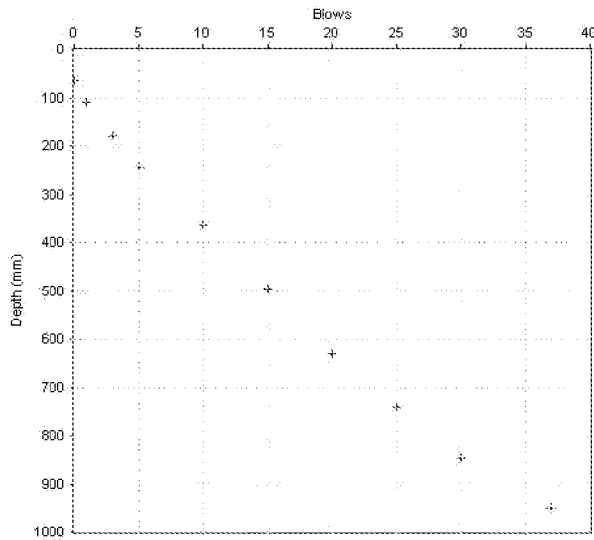
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

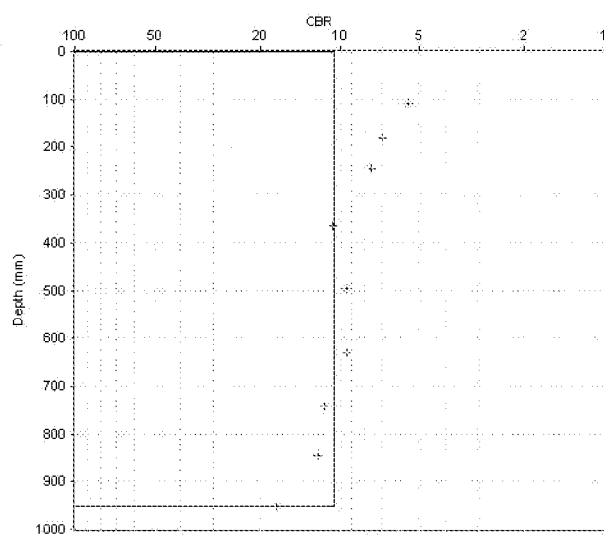
Chainage (km): 28.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 28.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	23.92	11	950	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

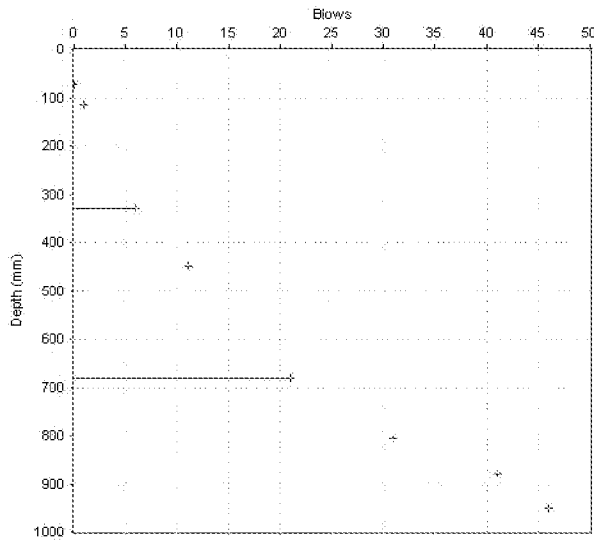
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

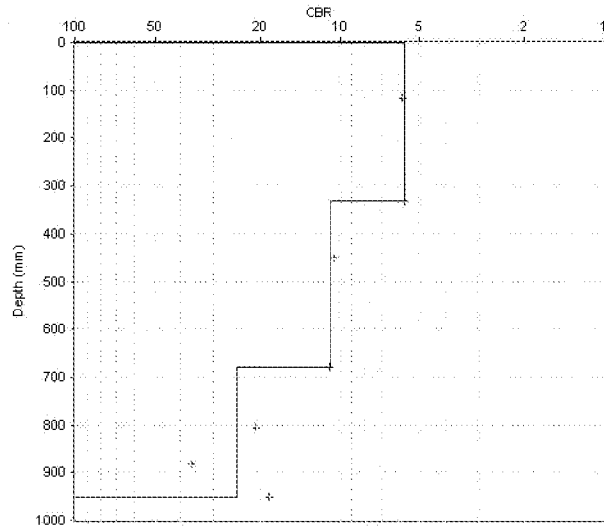
Chainage (km): 29.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 29.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	42.83	6	330	330
2	23.33	11	350	680
3	10.80	24	270	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by

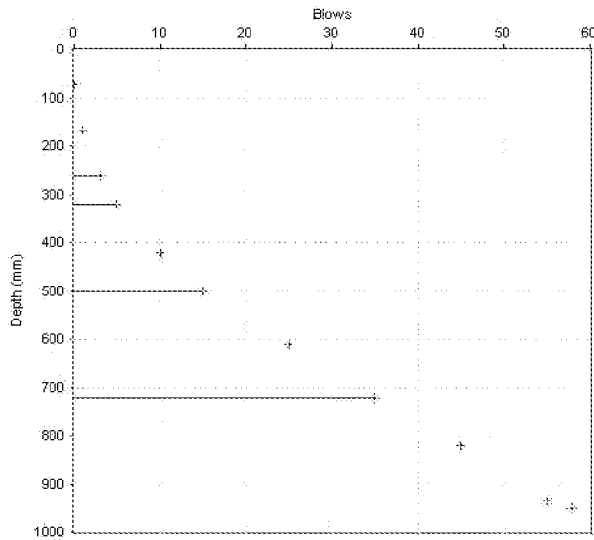
DCP Layer Strength Analysis Report

Project Name: 19522 DCPs

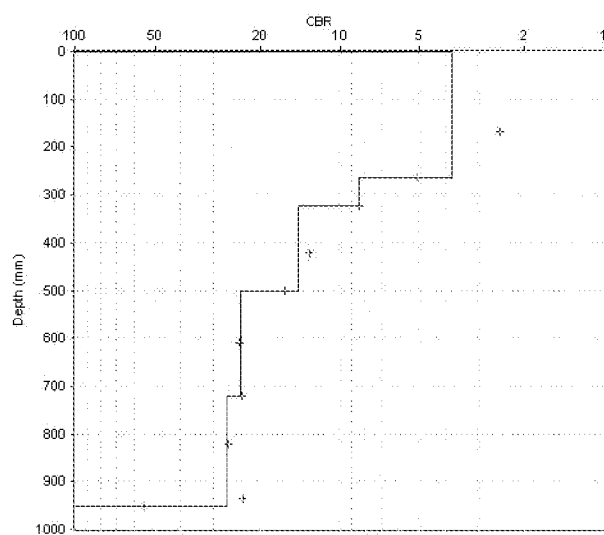
Chainage (km): 30.000
 Direction:
 Location/Offset: Carriageway
 Cone Angle: 60 degrees
 Zero Error (mm): 0
 Test Date: 03/09/2021

Surface Type: Unpaved
 Thickness (mm): 0
 Base Type:
 Thickness (mm):
 Surface Moisture: Unknown
 Moisture adjustment factor: Not adjusted

Layer Boundaries: Chainage 30.000



Layer Boundaries Chart



CBR Chart

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	63.00	4	263	263
2	29.50	8	59	322
3	17.80	14	178	500
4	11.10	24	222	722
5	9.91	27	228	950

CBR Relationship:

TRL equation: $\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{Strength})$

Report produced by



Laboratory Report



Contract Number: 55233

Client Ref: **19522/SB**

Report Date: **17-08-2021**

Client PO: **19522**

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

Contract Title: **Westergate**
For the attention of: **Sam Bevins**

Date Received: **04-08-2021**

Date Completed: **17-08-2021**

Test Description	Qty
Moisture Content of Soil BS1377 : Part 2 : Clause 3.2 : 1990 - * UKAS	24
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	24
PSD Wet & Dry Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	13
Samples Received - @ Non Accredited Test	37
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

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.

Approved Signatories:

Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN



**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)**

Contract Number	55233	
Site Name	Westergate	
Date Tested	16/08/2021	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
WS01		D	1.10	-		Brown sandy silty CLAY
WS02		D	1.00	-		Brown silty CLAY
WS02		D	2.00	-		Brown gravelly sandy silty CLAY
WS03		D	1.00	-		Brown gravelly sandy silty CLAY
WS04		D	1.00	-		Brown sandy silty CLAY
WS06		D	1.10	-		Brown sandy silty CLAY
WS07		D	1.50	-		Brown gravelly sandy silty CLAY
WS08		D	1.50	-		Brown sandy silty CLAY
WS09		D	0.50	-		Brown sandy silty CLAY
WS10		D	1.70	-		Brown gravelly silty CLAY
WS11		D	1.60	-		Brown silty CLAY
WS12		D	2.10	-		Brown silty CLAY
WS13		D	2.10	-		Brown silty CLAY
WS14		D	1.50	-		Brown silty CLAY
WS15		D	1.20	-		Brown silty CLAY
WS16		D	1.80	-		Brown silty CLAY
WS18		D	1.20	-		Brown silty CLAY
WS19		D	2.20	-		Brown silty CLAY
WS21		D	2.00	-		Brown sandy silty CLAY
WS22		D	1.20	-		Brown gravelly sandy silty CLAY
WS23		D	1.20	-		Brown silty CLAY
WS24		D	1.60	-		Brown silty CLAY
WS25		D	1.50	-		Brown gravelly sandy silty CLAY
WS26		D	1.20	-		Brown gravelly sandy silty CLAY

Operators	Checked	17/08/2021	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	17/08/2021	Paul Evans (Quality/Technical Manager)



NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.4 & 5.3)

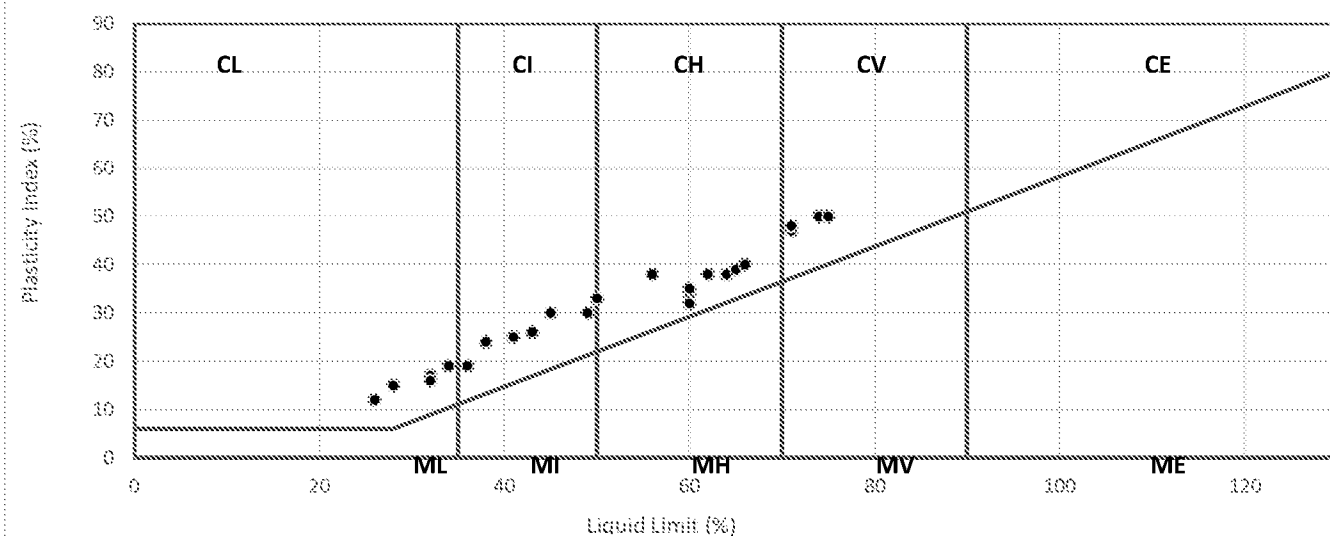
Contract Number	55233	
Project Location	Westergate	
Date Tested	16/08/2021	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
WS01		D	1.10	-		16	45	15	30	100	CI Intermediate Plasticity
WS02		D	1.00	-		17	43	17	26	100	CI Intermediate Plasticity
WS02		D	2.00	-		18	34	15	19	87	CL Low Plasticity
WS03		D	1.00	-		17	32	15	17	90	CL Low Plasticity
WS04		D	1.00	-		16	49	19	30	100	CI Intermediate Plasticity
WS06		D	1.10	-		24	56	18	38	100	CH High Plasticity
WS07		D	1.50	-		14	38	14	24	89	CI Intermediate Plasticity
WS08		D	1.50	-		20	50	17	33	100	CI/H Inter/High Plasticity
WS09		D	0.50	-		12	41	16	25	100	CI Intermediate Plasticity
WS10		D	1.70	-		19	36	17	19	92	CI Intermediate Plasticity
WS11		D	1.60	-		33	60	26	34	100	CH High Plasticity
WS12		D	2.10	-		25	62	24	38	100	CH High Plasticity
WS13		D	2.10	-		33	60	25	35	100	CH High Plasticity
WS14		D	1.50	-		29	64	26	38	100	CH High Plasticity
WS15		D	1.20	-		31	71	24	47	100	CV Very High Plasticity
WS16		D	1.80	-		31	74	24	50	100	CV Very High Plasticity
WS18		D	1.20	-		29	71	23	48	100	CV Very High Plasticity
WS19		D	2.20	-		31	75	25	50	100	CV Very High Plasticity
WS21		D	2.00	-		32	65	26	39	100	CH High Plasticity
WS22		D	1.20	-		17	26	14	12	54	CL Low Plasticity
WS23		D	1.20	-		31	60	28	32	100	CH High Plasticity
WS24		D	1.60	-		33	66	26	40	100	CH High Plasticity
WS25		D	1.50	-		15	28	13	15	39	CL Low Plasticity
WS26		D	1.20	-		18	32	16	16	91	CL Low Plasticity

Symbols: NP : Non Plastic

: Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION BS 5930:1999+A2:2010



Operators	Checked	17/08/2021	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	17/08/2021	Paul Evans (Quality/Technical Manager)





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55233

Borehole/Pit No. WS01

Site Name Westergate

Sample No.

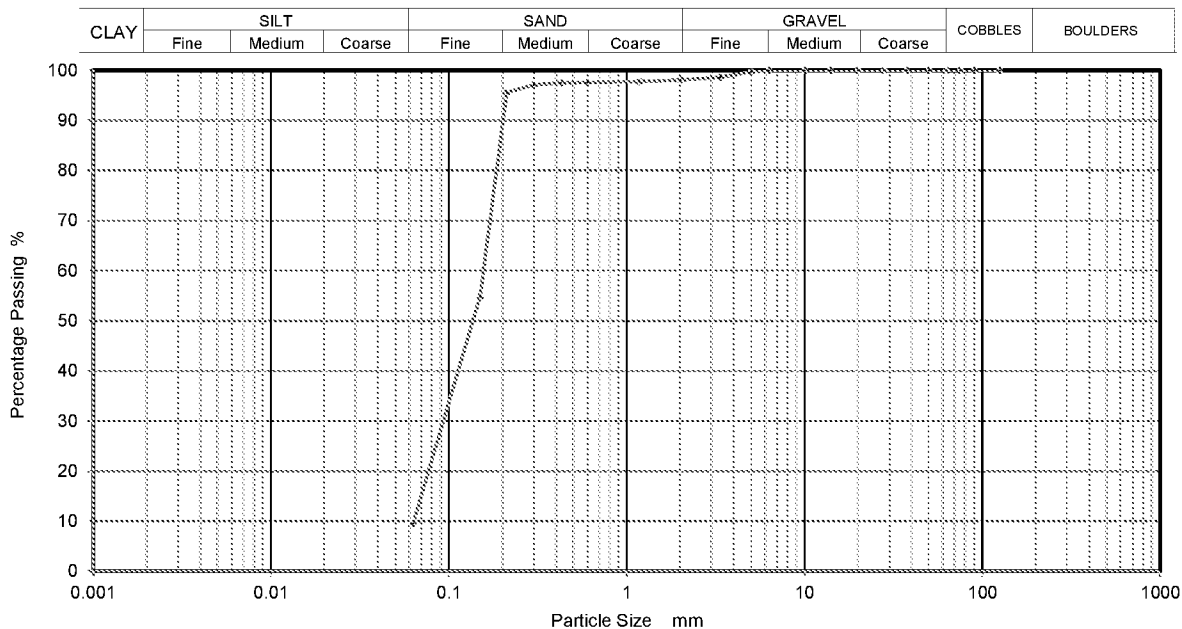
Soil Description Brown slightly fine gravelly clayey/silty fine to coarse SAND

Depth Top 2.00

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	98		
1.18	98		
0.6	98		
0.425	98		
0.3	97		
0.212	96		
0.15	55		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	88
Silt and Clay	10

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John	
David	Approved	17/08/2021	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55233

Borehole/Pit No. WS04

Site Name Westergate

Sample No.

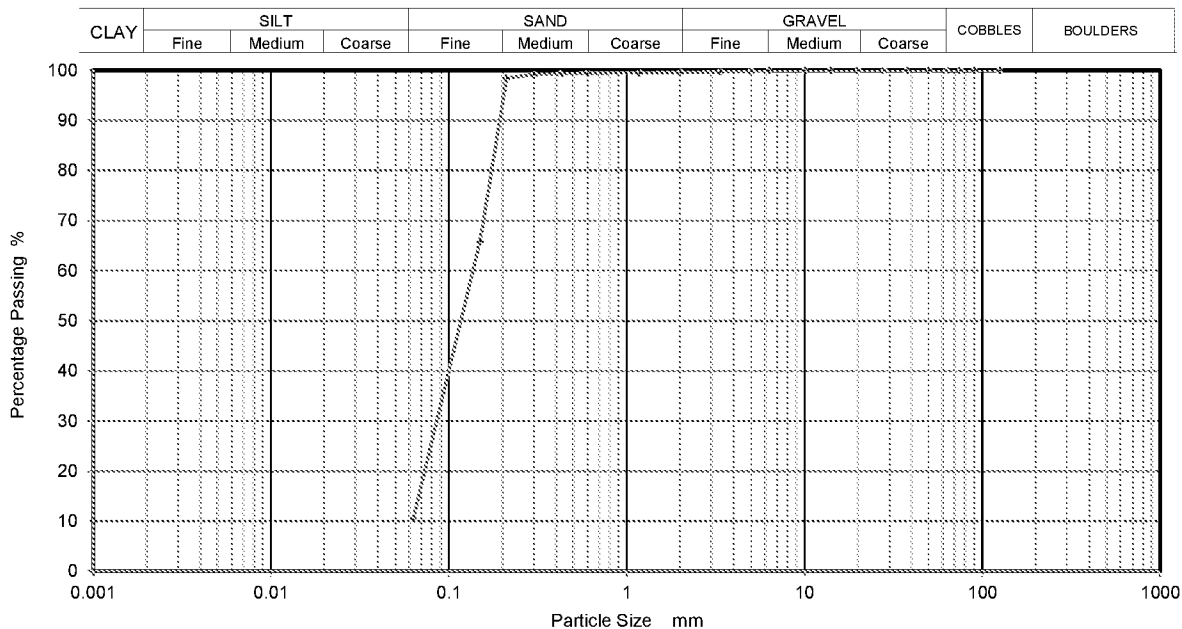
Soil Description Brown clayey/silty fine to coarse SAND

Depth Top 1.90

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	99		
0.15	66		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	90
Silt and Clay	10

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John	
David	Approved	17/08/2021	Paul Evans	





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55233

Borehole/Pit No. WS05

Site Name Westergate

Sample No.

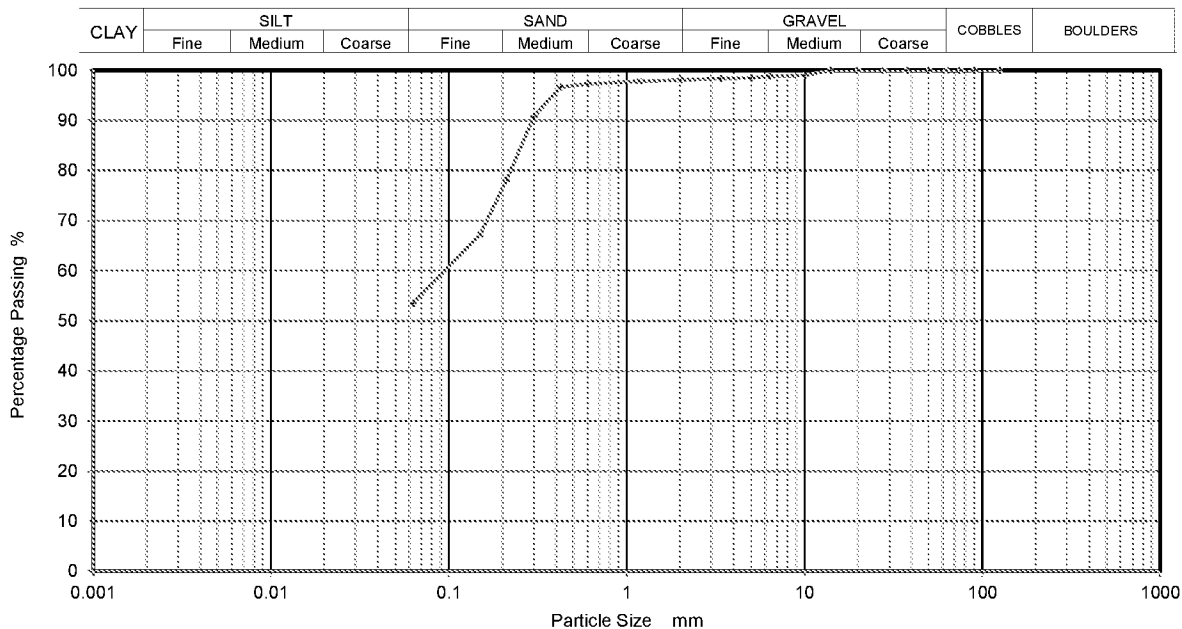
Soil Description Brown slightly fine to medium gravelly fine to coarse sandy
SILT/CLAY

Depth Top 1.60

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	99		
3.35	98		
2	98		
1.18	98		
0.6	97		
0.425	97		
0.3	91		
0.212	78		
0.15	67		
0.063	53		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	45
Silt and Clay	53

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55233

Borehole/Pit No. WS09

Site Name Westergate

Sample No.

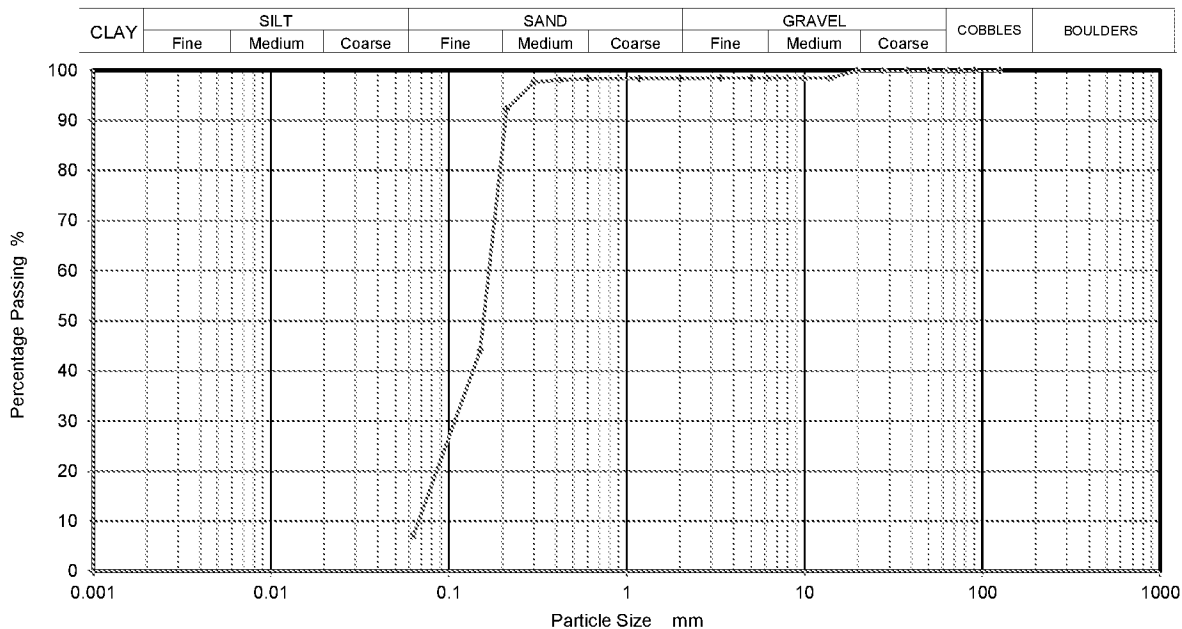
Soil Description Brown slightly fine to medium gravelly slightly clayey/silty fine to coarse SAND

Depth Top 1.50

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	98		
10	98		
6.3	98		
5	98		
3.35	98		
2	98		
1.18	98		
0.6	98		
0.425	98		
0.3	98		
0.212	92		
0.15	44		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	91
Silt and Clay	7

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55233

Borehole/Pit No. WS12

Site Name Westergate

Sample No.

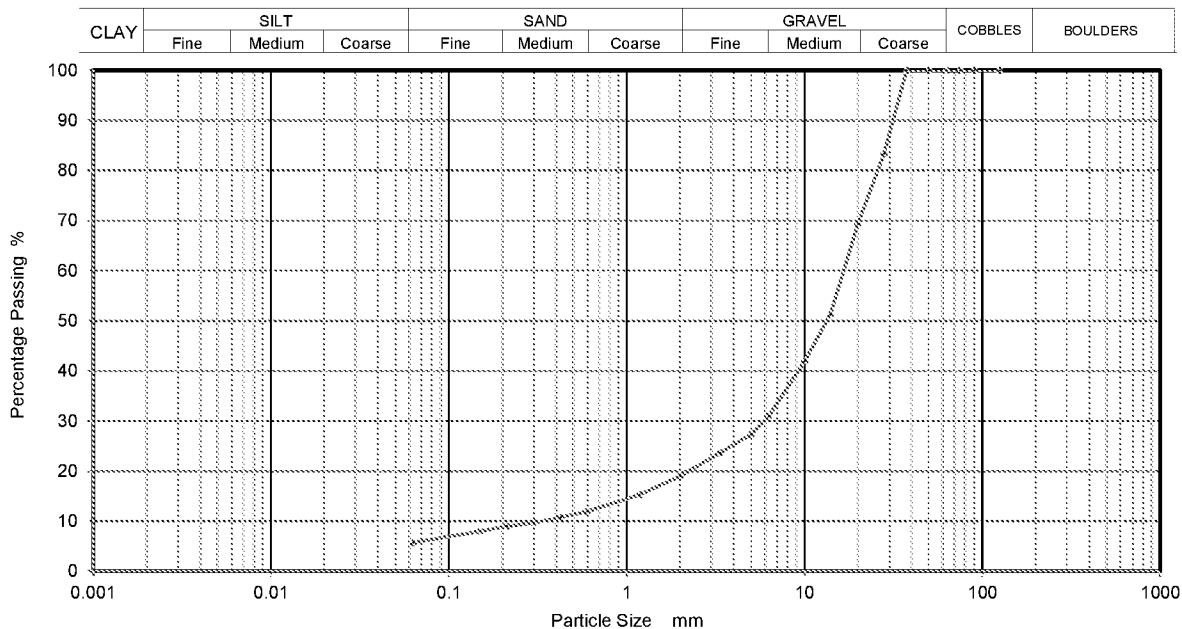
Soil Description Off white slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top 1.60

Depth Base

Date Tested 12/08/2021

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	100		
28	83		
20	69		
14	51		
10	42		
6.3	31		
5	27		
3.35	24		
2	19		
1.18	15		
0.6	12		
0.425	11		
0.3	10		
0.212	9		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	81
Sand	13
Silt and Clay	6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS13

Site Name Westergate

Sample No.

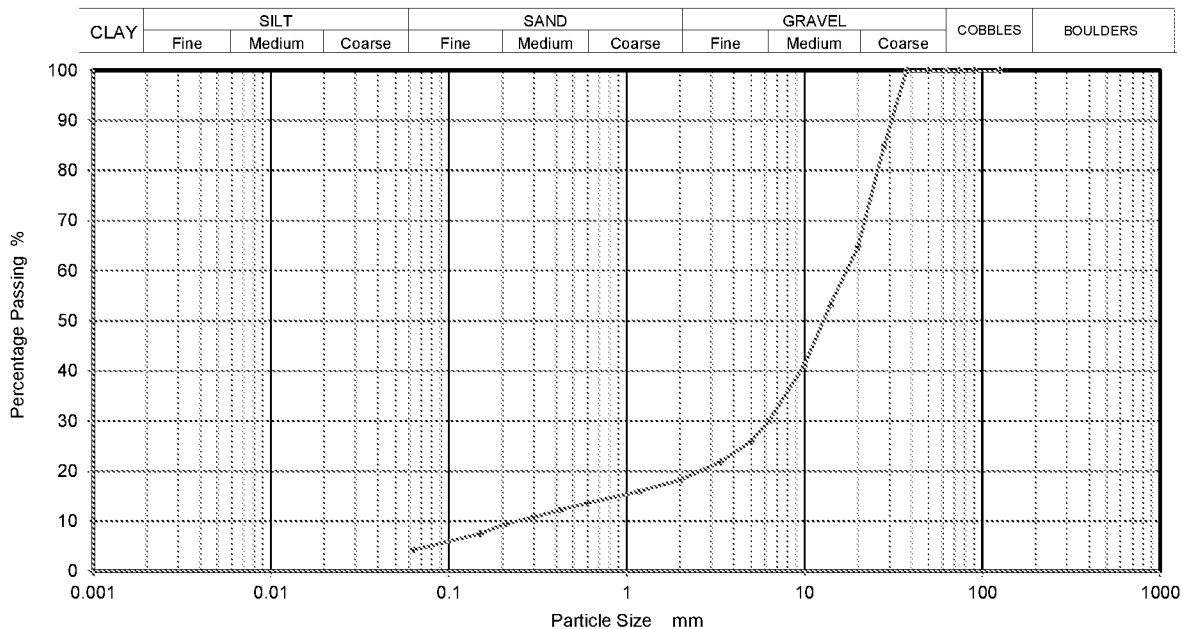
Soil Description Grey slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top 1.10

Depth Base

Date Tested 12/08/2021

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	100		
28	85		
20	65		
14	53		
10	41		
6.3	30		
5	26		
3.35	22		
2	18		
1.18	16		
0.6	14		
0.425	12		
0.3	11		
0.212	10		
0.15	8		
0.063	4		

Sample Proportions	% dry mass
Cobbles	0
Gravel	82
Sand	14
Silt and Clay	4

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number 55233

Borehole/Pit No. WS19

Site Name Westergate

Sample No.

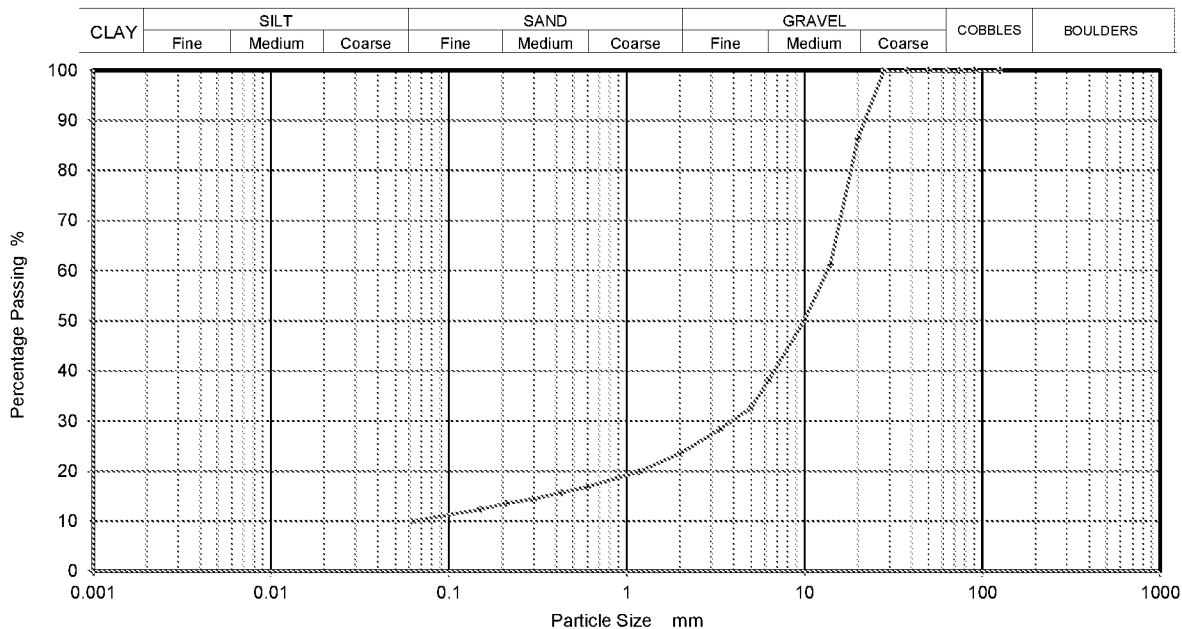
Soil Description Off white clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top 1.20

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	86		
14	61		
10	50		
6.3	38		
5	33		
3.35	28		
2	24		
1.18	20		
0.6	17		
0.425	16		
0.3	14		
0.212	14		
0.15	12		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	76
Sand	14
Silt and Clay	10

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John	
David	Approved	17/08/2021	Paul Evans	





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS20

Site Name Westergate

Sample No.

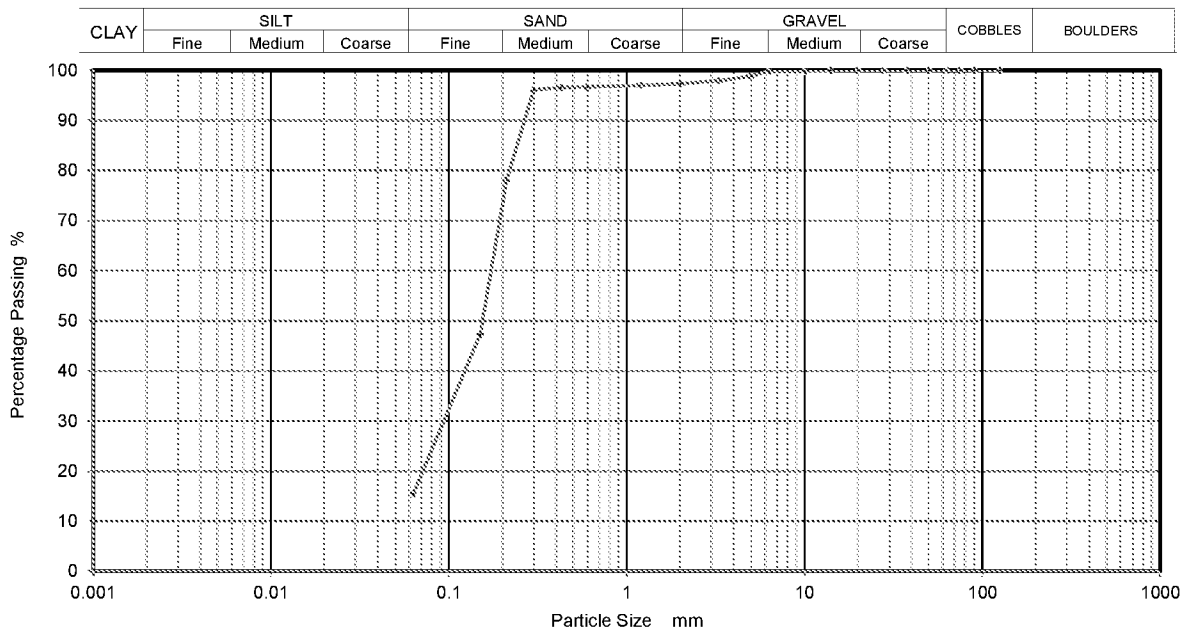
Soil Description Brown slightly fine to medium gravelly clayey/silty fine to coarse SAND

Depth Top 1.20

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	98		
2	97		
1.18	97		
0.6	97		
0.425	97		
0.3	96		
0.212	78		
0.15	47		
0.063	15		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	82
Silt and Clay	15

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS21

Site Name Westergate

Sample No.

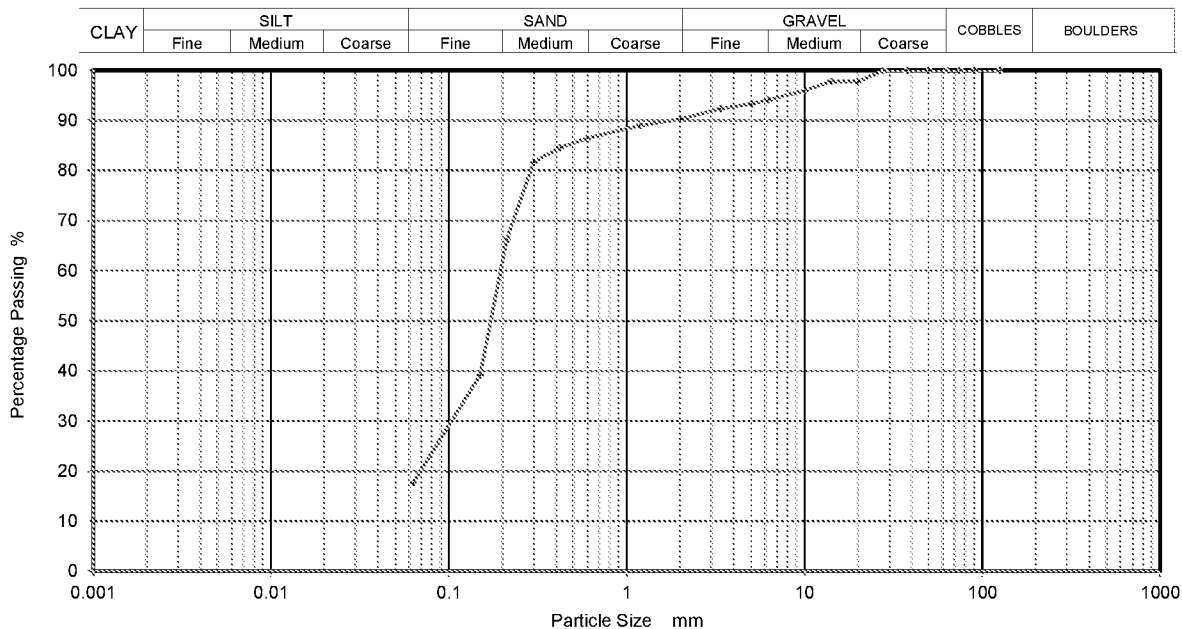
Soil Description Brown fine to coarse gravelly clayey/silty fine to coarse SAND

Depth Top 1.30

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	98		
14	98		
10	96		
6.3	94		
5	93		
3.35	92		
2	90		
1.18	89		
0.6	86		
0.425	85		
0.3	82		
0.212	66		
0.15	39		
0.063	18		

Sample Proportions	% dry mass
Cobbles	0
Gravel	10
Sand	72
Silt and Clay	18

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John	
David	Approved	17/08/2021	Paul Evans	





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS23

Site Name Westergate

Sample No.

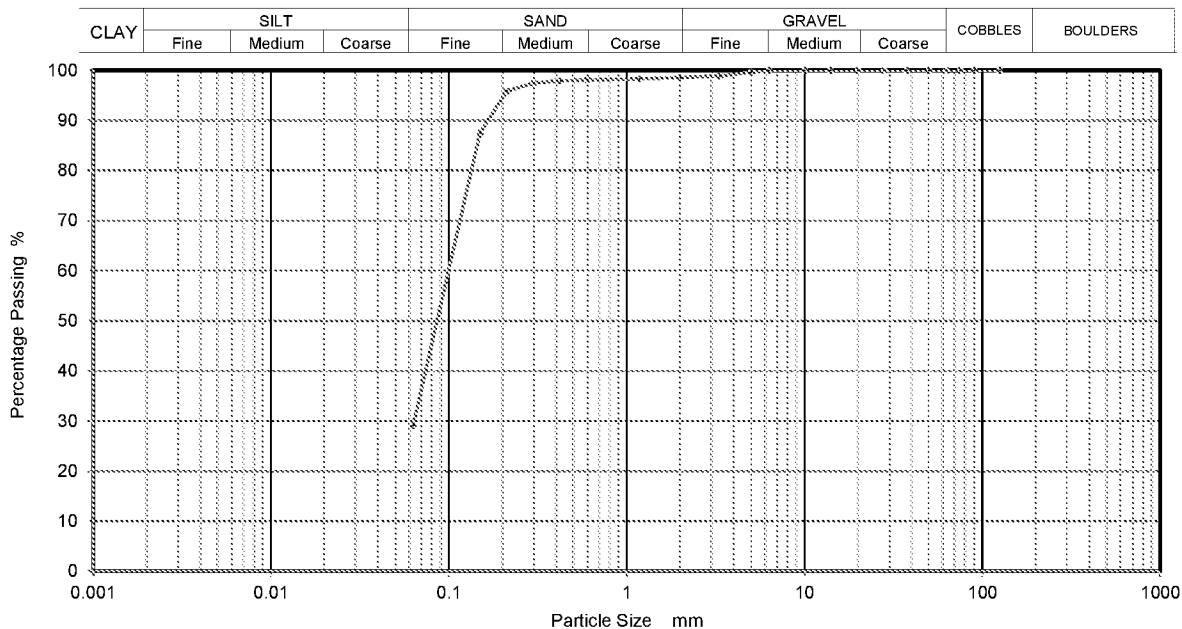
Soil Description Brown slightly fine gravelly clayey/silty fine to coarse SAND

Depth Top 2.10

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99		
1.18	98		
0.6	98		
0.425	98		
0.3	98		
0.212	96		
0.15	88		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	70
Silt and Clay	29

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John	
David	Approved	17/08/2021	Paul Evans	





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS25

Site Name Westergate

Sample No.

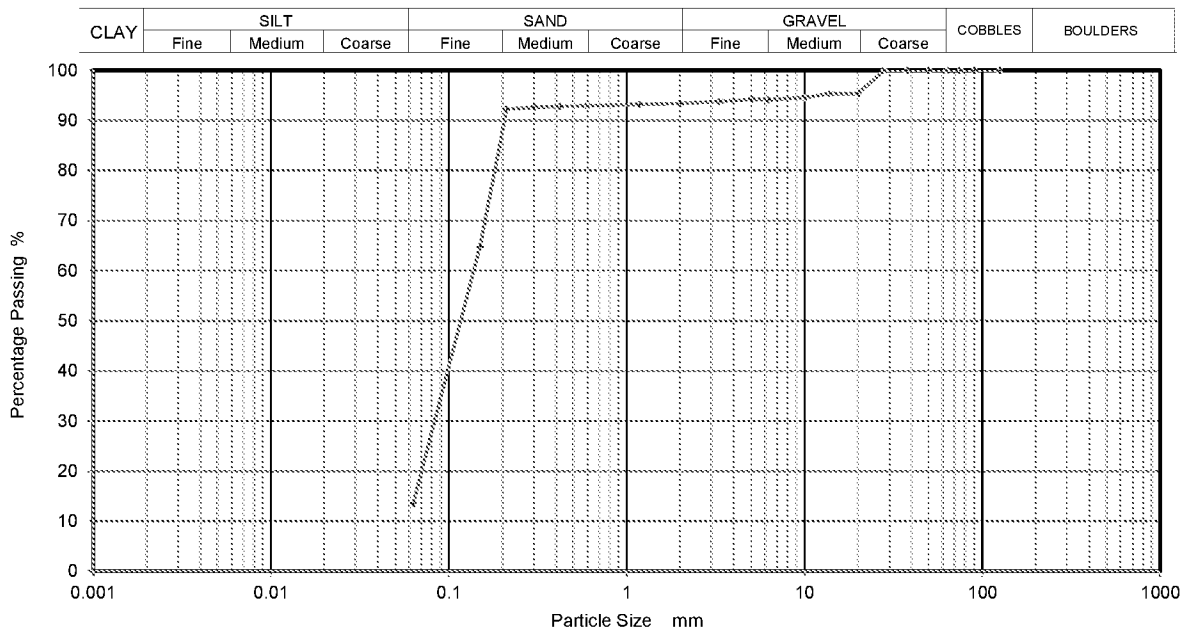
Soil Description Brown slightly fine to coarse gravelly clayey/silty fine to coarse SAND

Depth Top 2.00

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	95		
14	95		
10	95		
6.3	94		
5	94		
3.35	94		
2	93		
1.18	93		
0.6	93		
0.425	93		
0.3	93		
0.212	92		
0.15	65		
0.063	14		

Sample Proportions	% dry mass
Cobbles	0
Gravel	7
Sand	79
Silt and Clay	14

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS27

Site Name Westergate

Sample No.

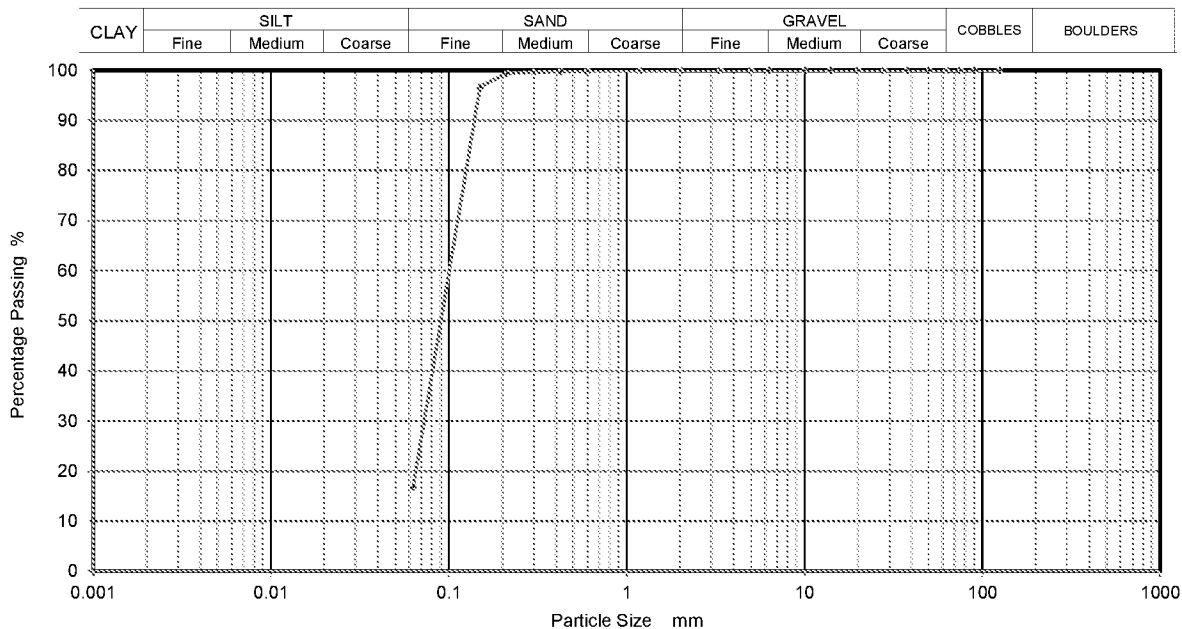
Soil Description Orange brown clayey/silty fine to coarse SAND

Depth Top 1.70

Depth Base

Date Tested 12/08/2021

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	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	97		
0.063	17		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	83
Silt and Clay	17

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 55233

Borehole/Pit No. WS28

Site Name Westergate

Sample No.

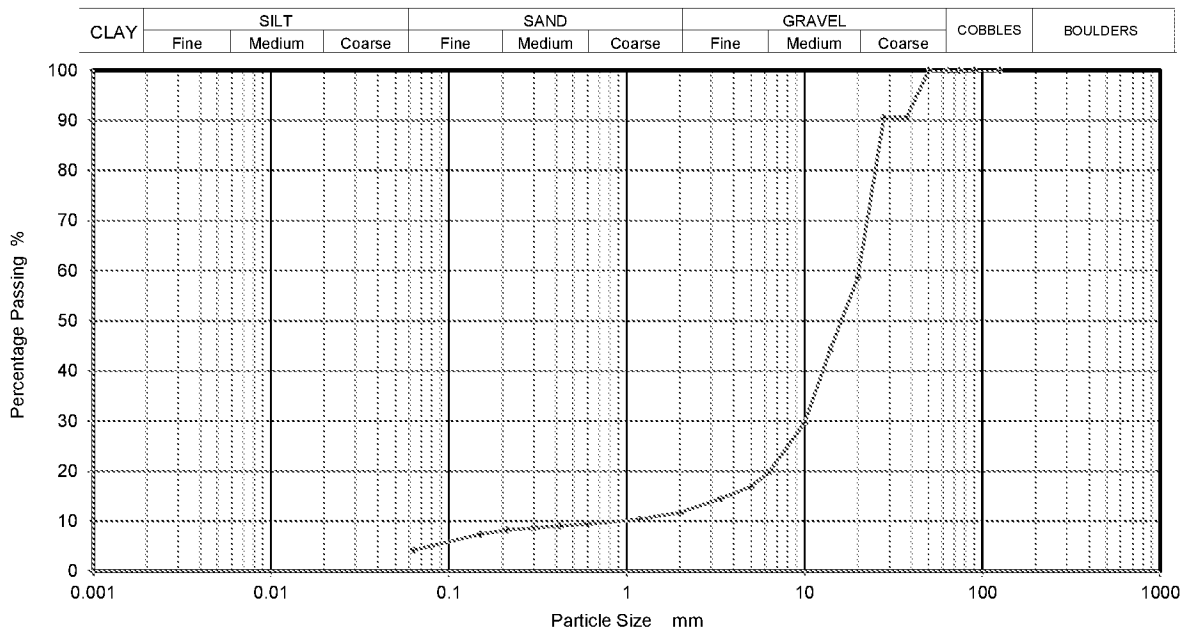
Soil Description Brown slightly clayey/silty slightly fine to coarse sandy fine to coarse GRAVEL

Depth Top 0.90

Depth Base

Date Tested 12/08/2021

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	91		
28	91		
20	59		
14	44		
10	30		
6.3	20		
5	17		
3.35	14		
2	12		
1.18	10		
0.6	9		
0.425	9		
0.3	9		
0.212	8		
0.15	7		
0.063	4		

Sample Proportions	% dry mass
Cobbles	0
Gravel	88
Sand	8
Silt and Clay	4

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	16/08/2021	Richard John
David	Approved	17/08/2021	Paul Evans





Sam Bevins
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 3JN



DETS Report No: 21-09694

Site Reference: Westerqate BRE

Project / Job Ref: 19522

Order No: 19522/SB

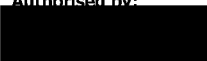
Sample Receipt Date: 04/08/2021

Sample Scheduled Date: 04/08/2021

Report Issue Number: 1

Reporting Date: 10/08/2021

Authorised by:



Dave Ashworth
Technical Manager

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

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



Soil Analysis Certificate						
DETS Report No: 21-09694	Date Sampled	24/07/21	24/07/21	25/07/21	27/07/21	16/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Westergate_BRE	TP / BH No	WS01	WS05	WS11	WS16	WS20
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522/SB	Depth (m)	1.50	2.10	1.10	1.20	0.60
Reporting Date: 10/08/2021	DETS Sample No	558142	558143	558144	558145	558146

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.1	7.9	8.0	7.9	7.9
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	< 200	< 200	< 200	< 200	279
Total Sulphate as SO ₄	%	< 0.02	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	0.03
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	< 10	< 10	19	22	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	< 0.01	< 0.01	0.02	0.02	< 0.01
Total Sulphur	%	< 0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ammonium as NH ₄	mg/kg	< 0.5	MCERTS	2.3	1.8	1.9	2.1	2.4
Ammonium as NH ₄	mg/l	< 0.05	MCERTS	0.23	0.18	0.19	0.21	0.24
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	8	15	15	25	9
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	4.2	7.6	7.4	12.7	4.3
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	< 3	MCERTS	15	< 3	< 3	< 3	7
Water Soluble Nitrate (2:1) as NO ₃	mg/l	< 1.5	MCERTS	7.4	< 1.5	< 1.5	< 1.5	3.7
W/S Magnesium	mg/l	< 0.1	NONE	1	1	2.7	2.1	1.3

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						
DETS Report No: 21-09694		Date Sampled	27/07/21			
Soils Ltd		Time Sampled	None Supplied			
Site Reference: Westergate_BRE		TP / BH No	WS27			
Project / Job Ref: 19522		Additional Refs	None Supplied			
Order No: 19522/SB		Depth (m)	1.20			
Reporting Date: 10/08/2021		DETS Sample No	558147			

Determinand	Unit	RL	Accreditation				
pH	pH Units	N/a	MCERTS	7.5			
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	< 200			
Total Sulphate as SO ₄	%	< 0.02	MCERTS	< 0.02			
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	< 10			
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	< 0.01			
Total Sulphur	%	< 0.02	NONE	< 0.02			
Ammonium as NH ₄	mg/kg	< 0.5	MCERTS	2.2			
Ammonium as NH ₄	mg/l	< 0.05	MCERTS	0.22			
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	5			
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	2.5			
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	< 3	MCERTS	3			
Water Soluble Nitrate (2:1) as NO ₃	mg/l	< 1.5	MCERTS	1.6			
W/S Magnesium	mg/l	< 0.1	NONE	0.8			

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



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-09694	
Soils Ltd	
Site Reference: Westergate_BRE	
Project / Job Ref: 19522	
Order No: 19522/SB	
Reporting Date: 10/08/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
\$ 558142	WS01	None Supplied	1.50	15.4	Brown sand
\$ 558143	WS05	None Supplied	2.10	14	Brown sand
558144	WS11	None Supplied	1.10	14.6	Brown clay
558145	WS16	None Supplied	1.20	16.2	Brown clay
\$ 558146	WS20	None Supplied	0.60	7.4	Brown sandy clay with stones
558147	WS27	None Supplied	1.20	10.2	Brown sand

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}

\$ samples exceeded recommended holding times



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



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-09694

Soils Ltd

Site Reference: Westergate_BRE

Project / Job Ref: 19522

Order No: 19522/SB

Reporting Date: 10/08/2021

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

Appendix C Chemical Laboratory Testing

Appendix C.1 Conceptual Site Model

Table C.I.1 CSM Revised Pre Testing

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Preliminary Investigation Report Information			Comments	Proposed Investigation
				Severity	Probability	Risk		
Made Ground. Alluvium	Metals, PAHs, Asbestos	Inhalation of dust	Site Workers/Site Maintenance	Minor	Unlikely	Very low	Site located on bedrock of the London Clay Formation, which was classified as unproductive strata and would act as an aquiclude to underlying Deep Aquifer groundwater receptors.	Site wide sampling and laboratory testing and subsequent risk assessment.
			End Users	Minor	Unlikely	Very low		
			Off-site Users	Minor	Unlikely	Very low		
	Bulk soil gas (CH ₄ , CO ₂)	Inhalation of Vapour/gases (including Radon)	Site Workers/Site Maintenance	Minor	Unlikely	Very low	Superficial secondary aquifers have medium to high vulnerability.	
			End Users					
			Off-site Users	Minor	Unlikely	Very low		
	Metals, PAHs,	Ingestion and absorption via direct contact	Site Workers/Site Maintenance	Minor	Unlikely	Very low		
			End Users	Minor	Unlikely	Very low		
	Metals, PAHs,	Migration via surface runoff	Surface Water	Minor	Unlikely	Very low		
		Migration in solution via groundwater	Surface Water	Minor	Unlikely	Very low		
			Shallow Aquifer	Minor	Unlikely	Very low		
			Deep Aquifer					
		Direct contact with construction material	Buried structures	Minor	Unlikely	Very low		
	Buried Services							
Bulk soil gas (CH ₄ , CO ₂)	Migration of gases via permeable soils	Site Workers/Site Maintenance	Mild	Low	Low			
		End Users						
		Off-site Users	Mild	Low	Low			
		Building and confined spaces						

Table C.I.2 CSM Revised Post Testing

Source	Potential Contaminant	Exposure Pathway	Receptor	Initial Assessment from Preliminary Investigation Report Information			Comments	Further works
				Severity	Probability	Risk		
Alluvium		Inhalation of dust	Site Workers/Site Maintenance			None	Site located on bedrock of the London Clay Formation, which was classified as unproductive strata and would act as an aquiclude to underlying Deep Aquifer groundwater receptors.	Soil gas monitoring and risk assessment in accordance with BS 8485, CIRIA and NHBC guidance.
			End Users			None		
			Off-site Users			None		
	Bulk soil gas (CH ₄ , CO ₂)	Inhalation of Vapour/gases (including Radon)	Site Workers/Site Maintenance	Minor	Unlikely	Very low		
			End Users					
			Off-site Users	Minor	Unlikely	Very low	Superficial secondary aquifers have medium to high vulnerability.	
		Ingestion and absorption via direct contact	Site Workers/Site Maintenance			None		
			End Users			None		
		Migration via surface runoff	Surface Water			None	Risk assessment established no risk to human health and other receptors from shallow soils. No asbestos recorded. Risk to groundwater deemed negligible.	
		Migration in solution via groundwater	Surface Water			None		
			Shallow Aquifer			None		
			Deep Aquifer			None		
		Direct contact with construction material	Buried structures			None		
			Buried Services					
	Bulk soil gas (CH ₄ , CO ₂)	Migration of gases via permeable soils	Site Workers/Site Maintenance	Mild	Low	Low		
			End Users					
			Off-site Users	Mild	Low	Low		
			Building and confined spaces					

Appendix C.2 Chemical Laboratory Results



Chris Swainston
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

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

DETS Report No: 21-09625

Site Reference: Land East of Westgate

Project / Job Ref: 19522

Order No: 19522

Sample Receipt Date: 03/08/2021

Sample Scheduled Date: 03/08/2021

Report Issue Number: 1

Reporting Date: 10/08/2021

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.



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Soil Analysis Certificate						
DETS Report No: 21-09625	Date Sampled	24/07/21	24/07/21	24/07/21	24/07/21	25/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.60	0.20	0.50	0.20	0.50
Reporting Date: 10/08/2021	DETS Sample No	557764	557765	557766	557767	557768

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO 17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.5	6.6	7.5	6.3	7.3
Organic Matter (SOM)	%	< 0.1	NONE	1.1	2.5	1.1	2.2	0.4
Arsenic (As)	mg/kg	< 2	MCERTS	9	6	9	2	19
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	22	17	23	5	20
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	11	11	11	< 4	9
Lead (Pb)	mg/kg	< 3	MCERTS	10	20	12	6	15
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	5	4	13	< 3	21
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	34	27	35	7	37
Zinc (Zn)	mg/kg	< 3	MCERTS	43	39	39	9	35
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						
DETS Report No: 21-09625	Date Sampled	25/07/21	25/07/21	25/07/21	25/07/21	25/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS6	WS7	WS8	WS9	WS10
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.20	0.50	0.20	1.00	0.20
Reporting Date: 10/08/2021	DETS Sample No	557769	557770	557771	557772	557773

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO 17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.5	7.3	6.5	7.5	7.3
Organic Matter (SOM)	%	< 0.1	NONE	3.7	1.7	2.8	0.6	3.5
Arsenic (As)	mg/kg	< 2	MCERTS	7	8	6	6	7
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2	< 0.2	< 0.2	0.4	0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	19	19	16	11	18
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	8	10	11	5	9
Lead (Pb)	mg/kg	< 3	MCERTS	17	10	24	6	18
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	4	7	4	13	5
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	31	29	24	17	30
Zinc (Zn)	mg/kg	< 3	MCERTS	42	40	39	24	38
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						
DETS Report No: 21-09625	Date Sampled	25/07/21	25/07/21	25/07/21	25/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS11	WS12	WS13	WS14	WS15
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.60	0.30	0.60	0.20	0.20
Reporting Date: 10/08/2021	DETS Sample No	557774	557775	557776	557777	557778

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO 17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.7	6.5	6.4	6.2	6.4
Organic Matter (SOM)	%	< 0.1	NONE	0.5	5.9	5	13	5.8
Arsenic (As)	mg/kg	< 2	MCERTS	9	8	8	8	7
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2	0.6	0.3	0.2	0.3
Chromium (Cr)	mg/kg	< 2	MCERTS	26	27	24	23	24
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	7	11	15	10	10
Lead (Pb)	mg/kg	< 3	MCERTS	9	24	41	39	31
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	17	12	8	8	9
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	40	45	36	38	39
Zinc (Zn)	mg/kg	< 3	MCERTS	35	54	78	58	53
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						
DETS Report No: 21-09625	Date Sampled	27/07/21	16/07/21	27/07/21	16/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS16	WS18	WS19	WS20	WS21
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.50	0.20	0.40	0.20	0.60
Reporting Date: 10/08/2021	DETS Sample No	557779	557780	557781	557782	557783

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO 17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	6.9	7.0	5.7	5.6	6.9
Organic Matter (SOM)	%	< 0.1	NONE	1.4	6.1	4.5	3.7	1.8
Arsenic (As)	mg/kg	< 2	MCERTS	24	4	4	8	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	0.5	0.3	0.6	0.3	0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	33	14	23	16	23
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	9	9	10	13	< 4
Lead (Pb)	mg/kg	< 3	MCERTS	11	27	18	37	14
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	27	3	9	5	7
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	47	19	22	23	31
Zinc (Zn)	mg/kg	< 3	MCERTS	44	36	35	53	29
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						
DETS Report No: 21-09625	Date Sampled	27/07/21	27/07/21	27/07/21	16/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS22	WS23	WS24	WS25	WS26
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.30	0.30	0.60	0.30	0.90
Reporting Date: 10/08/2021	DETS Sample No	557784	557785	557786	557787	557788

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO 17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	5.8	6.8	7.7	6.4	7.2
Organic Matter (SOM)	%	< 0.1	NONE	2.2	1.9	0.6	4	0.6
Arsenic (As)	mg/kg	< 2	MCERTS	8	3	8	8	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	0.2	< 0.2	< 0.2	0.4	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	16	9	12	19	24
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	14	5	< 4	17	14
Lead (Pb)	mg/kg	< 3	MCERTS	29	8	6	34	13
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	7	4	7	7	12
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	24	13	25	31	37
Zinc (Zn)	mg/kg	< 3	MCERTS	44	19	19	56	46
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						
DETS Report No: 21-09625	Date Sampled	27/07/21	27/07/21			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land East of Westgate	TP / BH No	WS27	WS28			
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied			
Order No: 19522	Depth (m)	0.10	0.20			
Reporting Date: 10/08/2021	DETS Sample No	557789	557790			

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO 17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	6.3	6.9			
Organic Matter (SOM)	%	< 0.1	NONE	4.6	5.5			
Arsenic (As)	mg/kg	< 2	MCERTS	8	7			
W/S Boron	mg/kg	< 1	NONE	< 1	< 1			
Cadmium (Cd)	mg/kg	< 0.2	NONE	0.3	0.5			
Chromium (Cr)	mg/kg	< 2	MCERTS	21	20			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	13	15			
Lead (Pb)	mg/kg	< 3	MCERTS	26	66			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	7	9			
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3			
Vanadium (V)	mg/kg	< 1	MCERTS	34	25			
Zinc (Zn)	mg/kg	< 3	MCERTS	55	52			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 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: 21-09625	Date Sampled	24/07/21	24/07/21	24/07/21	24/07/21	25/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.60	0.20	0.50	0.20	0.50
Reporting Date: 10/08/2021	DETS Sample No	557764	557765	557766	557767	557768

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



DETS Ltd
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Maidstone
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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-09625	Date Sampled	25/07/21	25/07/21	25/07/21	25/07/21	25/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS6	WS7	WS8	WS9	WS10
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.20	0.50	0.20	1.00	0.20
Reporting Date: 10/08/2021	DETS Sample No	557769	557770	557771	557772	557773

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-09625	Date Sampled	25/07/21	25/07/21	25/07/21	25/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS11	WS12	WS13	WS14	WS15
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.60	0.30	0.60	0.20	0.20
Reporting Date: 10/08/2021	DETS Sample No	557774	557775	557776	557777	557778

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-09625	Date Sampled	27/07/21	16/07/21	27/07/21	16/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS16	WS18	WS19	WS20	WS21
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.50	0.20	0.40	0.20	0.60
Reporting Date: 10/08/2021	DETS Sample No	557779	557780	557781	557782	557783

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-09625	Date Sampled	27/07/21	27/07/21	27/07/21	16/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS22	WS23	WS24	WS25	WS26
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.30	0.30	0.60	0.30	0.90
Reporting Date: 10/08/2021	DETS Sample No	557784	557785	557786	557787	557788

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.14	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.12	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs

DETS Report No: 21-09625	Date Sampled	27/07/21	27/07/21			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land East of Westgate	TP / BH No	WS27	WS28			
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied			
Order No: 19522	Depth (m)	0.10	0.20			
Reporting Date: 10/08/2021	DETS Sample No	557789	557790			

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.14			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.15			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6			



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09625	Date Sampled	24/07/21	24/07/21	24/07/21	24/07/21	25/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS1	WS2	WS3	WS4	WS5
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.60	0.20	0.50	0.20	0.50
Reporting Date: 10/08/2021	DETS Sample No	557764	557765	557766	557767	557768

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6	< 6	< 6
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	< 6	< 6	< 6	< 6	< 6



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09625	Date Sampled	25/07/21	25/07/21	25/07/21	25/07/21	25/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS6	WS7	WS8	WS9	WS10
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.20	0.50	0.20	1.00	0.20
Reporting Date: 10/08/2021	DETS Sample No	557769	557770	557771	557772	557773

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	11	< 6	< 6	< 6	9
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	11	< 6	< 6	< 6	9



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09625	Date Sampled	25/07/21	25/07/21	25/07/21	25/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS11	WS12	WS13	WS14	WS15
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.60	0.30	0.60	0.20	0.20
Reporting Date: 10/08/2021	DETS Sample No	557774	557775	557776	557777	557778

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6	11	< 6
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	< 6	< 6	< 6	11	< 6



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09625	Date Sampled	27/07/21	16/07/21	27/07/21	16/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS16	WS18	WS19	WS20	WS21
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.50	0.20	0.40	0.20	0.60
Reporting Date: 10/08/2021	DETS Sample No	557779	557780	557781	557782	557783

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6	12	< 6
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	< 6	< 6	< 6	12	< 6



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Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09625	Date Sampled	27/07/21	27/07/21	27/07/21	16/07/21	27/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land East of Westgate	TP / BH No	WS22	WS23	WS24	WS25	WS26
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19522	Depth (m)	0.30	0.30	0.60	0.30	0.90
Reporting Date: 10/08/2021	DETS Sample No	557784	557785	557786	557787	557788

Determinand	Unit	RL	Accreditation					
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6	9	< 6
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	< 6	< 6	< 6	9	< 6



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Soil Analysis Certificate - EPH Texas Banded

DETS Report No: 21-09625	Date Sampled	27/07/21	27/07/21			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land East of Westgate	TP / BH No	WS27	WS28			
Project / Job Ref: 19522	Additional Refs	None Supplied	None Supplied			
Order No: 19522	Depth (m)	0.10	0.20			
Reporting Date: 10/08/2021	DETS Sample No	557789	557790			

Determinand	Unit	RL	Accreditation			
EPH Texas (C6 - C8)	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
EPH Texas (>C8 - C10)	mg/kg	< 1	MCERTS	< 1	< 1	
EPH Texas (>C10 - C12)	mg/kg	< 1	MCERTS	< 1	< 1	
EPH Texas (>C12 - C16)	mg/kg	< 1	MCERTS	< 1	< 1	
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	< 1	< 1	
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	8	8	
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	8	8	



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-09625

Soils Ltd

Site Reference: Land East of Westgate

Project / Job Ref: 19522

Order No: 19522

Reporting Date: 10/08/2021

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
557764	WS1	None Supplied	0.60	10	Brown sandy clay
557765	WS2	None Supplied	0.20	10.1	Brown sandy clay with stones
557766	WS3	None Supplied	0.50	13.5	Brown sandy clay
557767	WS4	None Supplied	0.20	6	Brown sandy clay with stones
557768	WS5	None Supplied	0.50	9.9	Brown gravelly sand with stones and chalk
557769	WS6	None Supplied	0.20	9.7	Brown sandy clay with stones
557770	WS7	None Supplied	0.50	7.2	Brown sandy clay
557771	WS8	None Supplied	0.20	10.8	Brown sandy clay with stones
557772	WS9	None Supplied	1.00	7.8	Brown sandy clay with stones
557773	WS10	None Supplied	0.20	12.1	Brown sandy clay with stones
557774	WS11	None Supplied	0.60	12.3	Brown sandy clay with stones
557775	WS12	None Supplied	0.30	13.7	Brown sandy clay with stones and vegetation
557776	WS13	None Supplied	0.60	27.9	Brown clay
557777	WS14	None Supplied	0.20	29.7	Brown loamy sand with vegetation
557778	WS15	None Supplied	0.20	9.8	Brown sandy clay with vegetation
557779	WS16	None Supplied	0.50	6.4	Brown sandy clay with stones
\$ 557780	WS18	None Supplied	0.20	12.7	Brown sandy clay with stones and vegetation
557781	WS19	None Supplied	0.40	10	Brown sandy clay with stones
\$ 557782	WS20	None Supplied	0.20	11.2	Brown sandy clay with stones and vegetation
557783	WS21	None Supplied	0.60	9.1	Brown sandy clay with stones
557784	WS22	None Supplied	0.30	7	Brown sandy clay with stones
557785	WS23	None Supplied	0.30	8.1	Brown sandy clay with stones
557786	WS24	None Supplied	0.60	8.6	Brown sandy clay with stones
\$ 557787	WS25	None Supplied	0.30	11.1	Brown sandy clay with stones
557788	WS26	None Supplied	0.90	13.8	Brown sandy clay
557789	WS27	None Supplied	0.10	14.6	Brown sandy clay with vegetation
557790	WS28	None Supplied	0.20	11.7	Brown sandy clay with stones and vegetation

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}

\$ samples exceeded recommended holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-09625

Soils Ltd

Site Reference: Land East of Westgate

Project / Job Ref: 19522

Order No: 19522

Reporting Date: 10/08/2021

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 diphénylcarbazine 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

Appendix C.3 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, Nathanail 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.

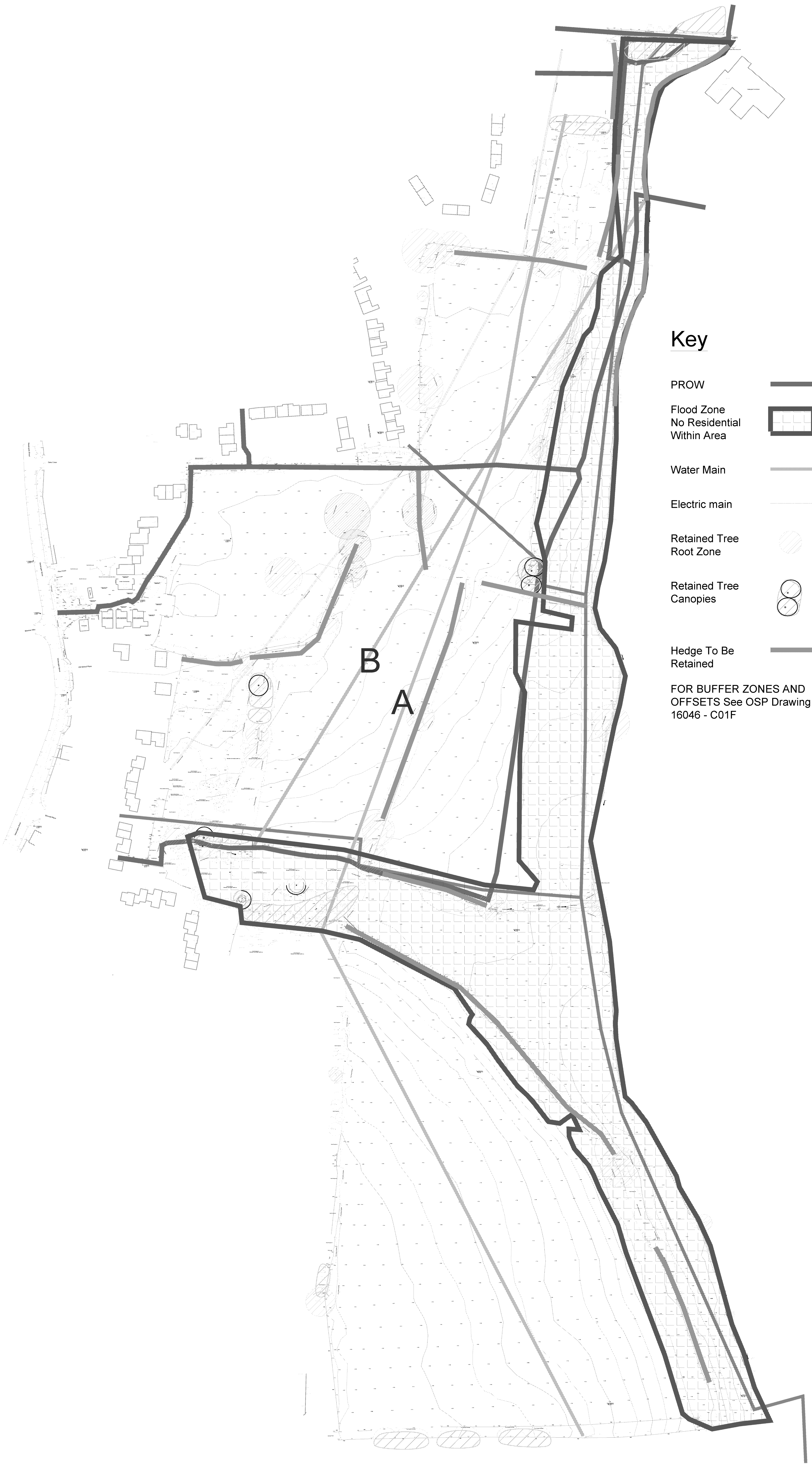
				Residential with home-grown produce			Residential without home-grown produce			Allotments			Commercial			Public Open Space - Resi			Public Open Space -Park					
SOM				1.0	2.5	5	1	2.5	5	1	2.5	5	1	2.5	5	1	2.5	5	1	2.5	5			
Type	Contaminants	Species	Year																					
Metals	Antimony		2010				550						7560									EC/AQS/	CLAIRE	2010
	Arsenic		2014	37			40			49			640			79			166			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	44			85			1.9			190			120			532			S4UL	LQM/CIEH	2015
			2014	24			149			4.9			410			220			860			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	300			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	0.07			3.3			0.10			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	m-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 - C33		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C33 - 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 - C33		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 (PAHs) (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	5	1	2.5	5	1	2.5	5	1	2.5	5	1	2.5	5	1	2.5	5			
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
	Tetrachloroethane		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 (chloroethene)		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
	HMTX (Octogen/1,3,5,7-tetranitro- 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-Tetrachlorobenzene		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-Tetrachlorobenzene		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
	Pentachlorobenzene		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	

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 (CLARE), 2014)																			
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																			
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail <i>et al</i> , 2015)																			
For Generic Risk Assessment, the values in Bold have priority																					
Table reviewed February 2020																					

Appendix D Information Provided by the Client



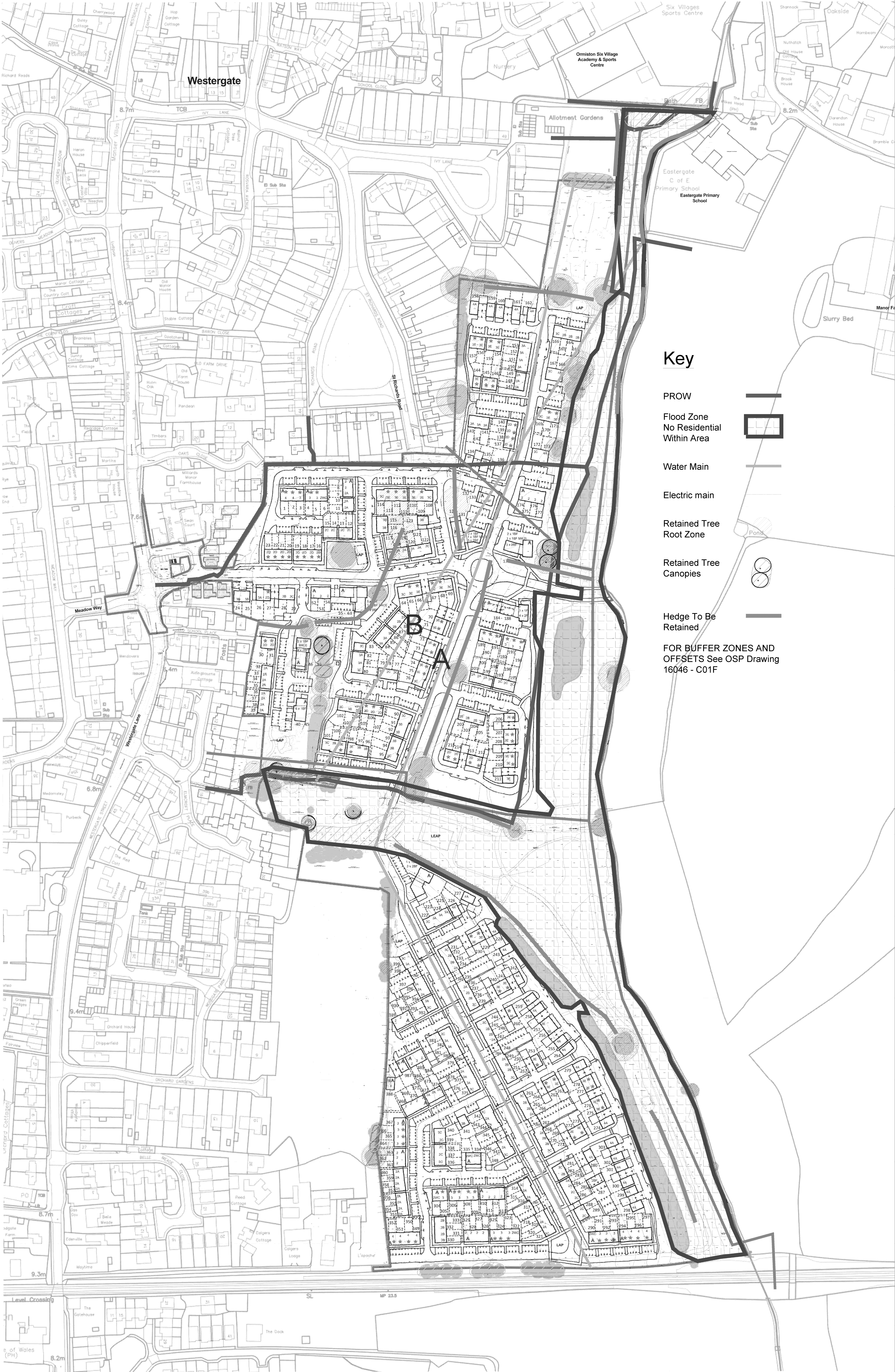
Rev	Date	Description	Int



Job title
LAND EAST OF
WESTERGATE

Drawing title
CONSTRAINTS PLAN

Status For Information			
Scale 1:1000@ A0	Date OCT 20	Drawn LK	
Dwg No. 00163_CALA_CN_01	Rev. -		



Rev

Date

Description

Int

CALAHOMES

Job title

LAND EAST OF WESTERGATE

Drawing title

CONSTRAINTS PLAN

Status

For Information

Scale

1:1000@A0

Date

OCT 20

Drawn

LK

Dwg No.

00163_CALA_CN_01

Rev.

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