



Main Investigation Report

at

Hanns Way, Eastleigh, Hampshire SO50 5NZ

for

Doswell Projects

Reference: 20876/MIR

April 2023

Control Document

Project

Hanns Way, Eastleigh, Hampshire SO50 5NZ

Document Type

Main Investigation Report

Document Reference

20876/MIR

Document Status

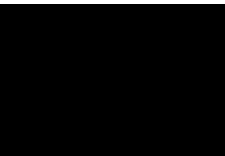
Final

Date

April 2023

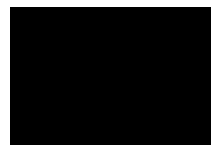
Prepared by

Akshay Radhakrishnan Nair BSc, MSc, FGS



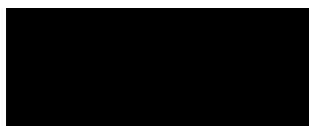
First check by

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



Second check and Update by

C Morrison BSc (Hons), FGS, MEnvSc.



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 Doswell Projects to provide an update to this Main investigation report for the site referred to as Hanns Way, Eastleigh, Hampshire SO50 5NZ to reflect a change in the proposed development scheme. The original report (Ref:19472/MIR) was commissioned by Vivid Housing Limited and full reliance on the original report by Doswell Projects was in the process of being obtained at the time of this update. The scope of the investigation was outlined in the Soils Limited quotation reference Q24753 rev 102, dated 7th June 2021 reported in September 2021. Updates to the report were agreed within the Soils Limited quotation reference Q27650, dated 17th April 2023.

This document comprises the Main Investigation Report and incorporates the results, discussion and conclusions to the original intrusive works in relation to the new proposed scheme.

This Main Investigation Report must be read in conjunction with the Preliminary Investigation Report undertaken on the above site by Soils Limited, Report ref: 20876/PIR, dated April 2023.

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 5930:2015 and BS EN ISO 22476-2&3:2005+A1:2011
- BS 5930:2015 and BS EN ISO 22476-3:2005+A1:2011
- BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design
- BS EN ISO 14688-1:2018 - Geotechnical investigation and testing - Identification and description
- BS EN ISO 14688-2:2018 - Geotechnical investigation and testing - Principles for a classification
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites
- LCRM 2021 Environment Agency
- BS 8004:2015 – Code of practice for foundations
- BS 1377:1990 Parts 1 to 8
- BRE Digest 241 “Low-rise buildings on shrinkable clay soils: Part 2
- BRE Special Digest 1, 2005, ‘Concrete in Aggressive Ground’
- Stroud, M. A. 1974, “The Standard Penetration Test – its application and interpretation”, Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.

- N.E. Simons, B.K. Menzies, “A Short Course in Foundation Engineering”
- NHBC Standards Chapter 4.2, January 2022.
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- Google Earth
- British Geological Survey Website & iGeology App

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.

Contents

Section 1	Introduction.....	I
1.1	Objective of Investigation.....	1
1.2	Location.....	1
1.3	Site Description.....	1
1.4	Proposed Development.....	2
1.5	Anticipated Geology.....	2
1.5.1	River Terrace Deposits.....	2
1.5.2	London Clay Formation.....	2
1.6	Limitations and Disclaimers.....	2
Section 2	Site Works.....	6
2.1	Proposed Project Works.....	6
2.1.1	Actual Project Works.....	6
2.2	Ground Conditions.....	7
2.3	Ground Conditions Encountered in Trial Holes.....	8
2.3.1	Made Ground.....	8
2.3.2	River Terrace Deposits.....	9
2.3.3	London Clay Formation.....	9
2.4	Roots.....	10
2.5	Groundwater.....	10
Section 3	Discussion of Geotechnical In-Situ and Laboratory Testing.....	11
3.1	Dynamic Probe Tests.....	11
3.2	Falling Head Tests.....	11
3.3	Atterberg Limit Tests.....	11
3.4	Particle Size Distribution Tests.....	12
3.5	Sulphate and pH Tests.....	12
Section 4	Foundation Design.....	13
4.1	General.....	13
4.1.1	Made Ground.....	13
4.1.2	River Terrace Deposits.....	14
4.1.3	London Clay Formation.....	14
4.2	Foundation Scheme General.....	15
4.2.1	Guidance on Shrinkable Soils.....	15

4.3	Foundation Scheme.....	16
4.3.1	Shallow Foundations into the granular River Terrace Deposits.....	16
4.3.2	Ground Floor Slab	17
4.3.3	Piled Foundations	18
4.4	Retaining Wall.....	18
4.5	Subsurface Concrete	19
4.6	Excavations	19
4.7	Soakaways	19
Section 5	Determination of Chemical Analysis	20
5.1	Site Characterisation and Revised Conceptual Site Model	20
5.2	Soil Sampling.....	20
5.3	Determination of Chemical Analysis	21
Section 6	Qualitative Risk Assessment.....	22
6.1	Assessment Criteria.....	22
6.2	Representative Contamination Criteria - Soil	22
6.2.1	Asbestos	23
6.3	Tier 1 Quantitative Risk Assessment	23
6.3.1	Soils.....	23
6.3.2	Asbestos	23
6.3.3	Groundwater	24
6.3.4	Soil Gas	24
6.4	Remedial Objective.....	25
6.5	Asbestos	25
6.6	Duty of Care.....	26
6.7	Excavated Material	26
6.8	Re-use of Excavated Material On-site	27
6.9	Imported Material	28
6.10	Discovery Strategy.....	28

List of Figures

Figure 1 – Site Location Map	30
Figure 2 – Aerial Photograph	31
Figure 3 – Trial Hole Plan	32

List of Tables

Table 2.1 Final Depth of Trial Holes	7
Table 2.2 Ground Conditions	8
Table 2.3 Final Depth of Made Ground	9
Table 2.4 Final Depth of River Terrace Deposits	9
Table 2.5 Final Depth of London Clay Formation	10
Table 3.1 Soakage Rates.....	11
Table 4.1 Allowable Bearing Capacities in the granular River Terrace Deposits	17
Table 5.1 Sampling Strategy	20
Table 5.2 Chemical Analysis Specification	21
Table 6.1 Summary of Chemical Analysis of Soils Sample Exceedance.....	22
Table B.1.1 SPT "N" Blow Count Cohesive Classification	
Table B.1.2 SPT "N" Blow Count Granular Classification	
Table B.2.1 Interpretation of DPSH Blow Counts	
Table B.2.2 Interpretation of Atterberg Limit Tests	
Table B.2.3 Interpretation of PSD Tests	
Table C.1.1 CSM Revised Post Testing	

List of Appendices

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

Section I Introduction

I.1 Objective of Investigation

Soils Limited was originally commissioned by Vivid Housing Limited 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. This updated report for the same site was commissioned by Doswell Projects (The Client) to reflect the changes to the proposed development scheme and uses the data collected during the original site investigation and is subject to confirmation of formal reliance.

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: 20876/PIR, April 2023) and/or the Revised Conceptual Site Model presented in Appendix C.1.

I.2 Location

The site was located at Hanns Way, Eastleigh, Hampshire SO50 5NZ and had an approximate O.S Land Ranger Grid Reference of SU 45427 18898. The site location plan is given in Figure 1.

I.3 Site Description

At the time of the investigation the site comprised a car park with no structures onsite. The site was entirely hard capped with tarmac, relatively flat with a slight (<3 degree) dip down to the south. No areas of soft landscaping or vegetation were present onsite. The site drained via surface drainage connected to a soakaway and no interceptor covers were located. The site was surrounded by predominantly commercial premises to the east and south, a footpath and residential properties to the west, and an electric substation to the north. Semi mature trees and vegetation was present within the residential gardens to the west

An aerial photograph showing the site and near environs has been included in Figure 2.

1.4 Proposed Development

The new proposed development scheme is for a three-storey development of residential apartments with associated parking, single storeyed bin and bike store and hard and communal soft landscaping with no private domestic gardens.

In compiling this updated report reliance was placed on drawings 22205-SK110 and SK111 dated 5th April 2023 by OSP Architecture. The recommendations provided within this report are made exclusively in relation to the schemes outlined above and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

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 the bedrock London Clay Formation with overlying superficial deposits of River Terrace Deposits.

1.5.1 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.

1.5.2 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 Reading Formation (Lambeth Group).

1.6 Limitations and Disclaimers

This Main Investigation Report relates to the site located at Hanns Way, Eastleigh, Hampshire SO50 5NZ and was prepared for the sole benefit of Doswell Projects (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 Q27650, dated 17th April 2023 as accepted by the client in the associated signed Job Order Form as well ensuring formal reliance on the original report and the data within, as commissioned by Vivid Housing Limited, has been obtained.

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

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

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

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

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

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

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

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

Unless the site investigation works have been designed and specified in accordance with EC7, this report is a Geotechnical Investigation Report and is not necessarily a Ground Investigation Report as defined by EC7 (Eurocode 7 Part 1, §3.4, Part 2, §6.1) or a Geotechnical Design Report (Eurocode 7 Part 1, §2.8) as defined by Eurocode 7 and as

such may not characterise the ground conditions and additional works may be required to comply with the requirements of EC7.

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

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

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

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

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

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

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

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

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

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

Deleterious materials may be present in any Made Ground that pose a potential risk to site workers, end users and adjacent vulnerable receptors. These could include a range

of contaminants, including asbestos, especially if the material includes large fractions of demolition derived materials.

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

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

Ownership of copyright of all printed material including reports, survey data, drawings, 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. This license is only valid once we have been paid in full for this engagement. In the event of non-payment for our services, we reserve the right to retract the license for all project data, preventing their use and any reliance upon such data by the client or any other third party. We may also contact parties other than the client to notify them of this retraction.

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 original Soils Limited quotation (Q24753 Rev 101, dated 7th June 2021), was to comprise the following items:

- 4No. up to 4m deep windowless sampler boreholes
- 4No. of up to 6m dynamic probes
- 2No monitoring well installations
- 1No. monitoring visit (post works)
- 1No. falling head test
- Geotechnical laboratory testing
- Contamination laboratory testing

2.1.1 Actual Project Works

The actual project site works were undertaken on 28th July 2021, with laboratory analysis and reporting undertaken thereafter, and comprised:

- 3No. windowless sampler boreholes locations (WS1, WS2 & WS4)
- 3No. super heavy dynamic probes (DP1, DP2 & DP4)
- 2No. combined groundwater and ground gas monitoring wells (WS1 & WS4)
- 1No. falling head test
- 1No. post works monitoring visit
- Geotechnical laboratory testing
- Contamination laboratory testing

The actual site investigation works carried out were selected based on the original proposed development scheme. However, whilst the new scheme has been revised, given the relatively small size of the site the actual works carried out were also considered appropriate for the new scheme.

Two windowless sampler boreholes (WS1 & WS4) were backfilled with gravel and bentonite following the installation of monitoring wells.

The remaining trial holes were backfilled with gravel on completion.

All trial hole locations have been presented in Figure 3.

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

2.2 Ground Conditions

On 28th July 2021, three windowless sampler boreholes (WS1 – WS2 & WS4) were drilled to depths of 4.00m below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the client. A fourth location was proposed (WS3), however, was terminated at a depth of 0.40m bgl on contact with a concrete obstruction.

Three super heavy dynamic probes (DP1 – DP2 & DP4) were driven prior and adjacent to their corresponding windowless sampler borehole to depths of 6.00m bgl.

Two standpipes were installed within windowless sample borehole locations WS1 and WS4 to allow for continued monitoring of both groundwater and ground gases, where present.

Falling head testing was undertaken within WS4 to give an indication of soakage potential.

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)
WS1 ^w	4.00	DPI	6.00
WS2	4.00	DP2	6.00
WS3	0.40 ^l		
WS4 ^w	4.00	DP4	6.00

Note: w - well installation ^l Terminated on concrete obstruction

The approximate trial hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the 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 (MG)
River Terrace Deposits (RTD)
London Clay Formation (LCF)

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	Anthropocene	0.00	1.30 – 1.60	1.50	Tarmac over dark grey and brown slightly sandy GRAVEL subbase underlain by reworked brickearth comprising orangish brown slightly sandy CLAY.
RTD	Pleistocene	1.30 – 1.60	4.00 ¹	2.50	Light yellow and orangish brown sandy to very sandy GRAVEL.
LCF	Eocene	4.00 ¹	>6.00 ¹	Not proven ²	No soil recovery for specific description.

Note: ¹ Depth inferred from dynamic probe. ² Base of strata not encountered

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

Soils described as Made Ground were encountered in all four trial holes from ground level to depths of between 1.30m and 1.60m bgl, where fully penetrated. A concrete obstruction was encountered in WS3 which restricted construction of the trial hole.

The Made Ground comprised and capping of tarmac over subbase composed of dark grey and brown slightly sandy GRAVEL. Gravel comprised predominantly of limestone with subordinate inclusions of tarmac and concrete. Possible asbestos material was observed in WS4. The subbase was underlain by a reworked brickearth material comprising orangish brown slightly sandy CLAY with rare fine

gravel sized brick fragments and pockets of orangish brown sand.

The depths of Made Ground have been included in Table 2.3.

Table 2.3 Final Depth of Made Ground

Trial Hole	Depth (m bgl)
WS1	1.30
WS2	1.50
WS3	>0.40 ¹
WS4	1.60

Note: ¹ Final depth of trial hole.

2.3.2 River Terrace Deposits

Soils described as River Terrace Deposits were encountered underlying the Made Ground and persisted to the full exploratory depth of 4.00m bgl within the windowless sampler boreholes. A reduction in blow counts was recorded in all three corresponding dynamic probes from a depth of 4.00m bgl indicating the presence of a “looser” horizon within the granular unit or a transition zone into the expected underlying more cohesive soils of the London Clay Formation. A transition into the London Clay Formation is expected as this is in line with the historical BGS boreholes available from the development of the Swan Centre in proximity to the site.

The River Terrace Deposits comprised light yellow and orangish brown sandy to very sandy clayey GRAVEL. Gravel was angular to subrounded clasts of flint. Sand was predominantly medium to coarse.

The depth of River Terrace Deposits has been included in Table 2.4.

Table 2.4 Final Depth of River Terrace Deposits

Trial Hole	Depth (m bgl)
WS1/DPI	4.00 ^{1,2}
WS2/DP2	4.00 ^{1,2}
WS3/DP3	4.00 ^{1,2}

Note: ¹ Final depth of trial hole. ² Inferred from dynamic probe

2.3.3 London Clay Formation

Soils anticipated to comprise the London Clay Formation were inferred within the dynamic probes underling the River Terrace Deposits from 4.00m bgl and persisting to full probe depth of 6.00m bgl. The inference was made where a reduction in blow counts indicated the presence of a transitional horizon into the expected more cohesive soils of the London Clay Formation at a depth comparable to the historical BGS borehole information published for the Swan Centre development in proximity to the site.

No soil samples were recovered from the London Clay Formation to give a specific description for the stratum.

The depth of London Clay Formation has been included in Table 2.5.

Table 2.5 Final Depth of London Clay Formation

Trial Hole	Depth (m bgl)
DPI	>6.00 ^{1,2}
DP2	>6.00 ^{1,2}
DP3	>6.00 ^{1,2}

Note: ¹ Final depth of trial hole. ² Inferred from dynamic probe

2.4 Roots

No roots/rootlets were observed within any of the trial holes.

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

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

No groundwater was recorded during construction of the windowless sampler boreholes onsite. 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 reducing from their annual maximum (highest) elevation, which typically occurs around March.

A single post-works precautionary monitoring visit was requested and undertaken on 12th August 2021. Both installations, WS1 and WS4, were recorded as dry to their full installation depth of 4.00m bgl.

Groundwater equilibrium conditions may only be conclusively established, if a series of observations are made over a longer period via the groundwater monitoring wells, which did not form part of the original brief.

Section 3 Discussion of Geotechnical In-Situ and Laboratory Testing

3.1 Dynamic Probe Tests

Dynamic probing (DPSH) was undertaken at three locations (DP1 – DP2 & DP4) adjacent and prior to the drilling of their corresponding windowless sampler borehole to depths of 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.

The SPT “N60” values presented have been corrected in accordance with BS EN 22476 Part 3, to account for the rigs 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 rig was 82.11.

The River Terrace Deposits recorded equivalent SPT “N60” values between 19 and 50+ classifying the granular soils with a relative density of medium dense to dense, locally very dense. The granular River Terrace Deposits comprised a medium dense unit to depths of between 2.20m and 3.10m bgl over a dense locally very dense unit which extended to the inferred boundary with the underlying clay.

The underlying inferred predominantly cohesive London Clay Formation recorded equivalent SPT “N60” values between 4 and 11, variable with depth, classifying the cohesive soils as low to medium strength with inferred undrained cohesive strengths of 20kPa to 55kPa.

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

3.2 Falling Head Tests

One falling head soakage test was undertaken within the granular River Terrace Deposits in WS4. Estimated soakage rate was calculated and outlined in Table 3.1. It must be emphasised that the rates given must not be used for design calculations and full in-situ testing must be undertaken to BRE 365 Soakaway Design Standards.

Table 3.1 Soakage Rates

Trial Hole	Test No.	Soakage Rate (Ltr/sec)
WS4	I	2×10^{-2}

3.3 Atterberg Limit Tests

Atterberg Limit tests were performed on two samples obtained from the predominantly cohesive brickearth soils of Made Ground. The results were classified in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

The predominantly cohesive soils of Made Ground were classified as low to medium volume change potential in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

A full interpretation of the Atterberg Limit tests is 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 seven samples from the granular River Terrace Deposits.

The PSD tests classified one of the seven samples from the granular beds of the River Terrace Deposits as having a volume change potential in accordance BRE Digest 240. None of the samples tested had a 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.

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 brickearth type soils of Made Ground and one from the River Terrace Deposits 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 20mg/l with pH values of 7.7 and 8.5.

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

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.'*

Soils described as Made Ground were encountered in all four trial holes from ground level to depths of between 1.30m and 1.60m bgl, where fully penetrated. A concrete obstruction was encountered in WS3 which restricted construction of the trial hole.

The Made Ground comprised and capping of tarmac over subbase composed of dark grey and brown slightly sandy GRAVEL. Gravel comprised predominantly of limestone with subordinate inclusions of tarmac and concrete. Possible asbestos material was observed in WS4. The subbase was underlain by a reworked brickearth material comprising orangish brown slightly sandy CLAY with rare fine gravel sized brick fragments and pockets of orangish brown sand.

The results from Atterberg Limit testing on samples obtained from the reworked brickearth material classified the cohesive soils with a low to medium volume change potential in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

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 River Terrace Deposits

Soils described as River Terrace Deposits were encountered underlying the Made Ground and persisted to the full exploratory depth of 4.00m bgl within the windowless sampler boreholes. A reduction in blow counts was recorded in all three corresponding dynamic probes from a depth of 4.00m bgl indicating the presence of a “looser” horizon within the granular unit or a transition zone into the expected underlying more cohesive soils of the London Clay Formation. A transition into the London Clay Formation is expected as this is in line with the historical BGS boreholes available from the development of the Swan Centre in proximity to the site.

The River Terrace Deposits comprised light yellow and orangish brown sandy to very sandy clayey GRAVEL. Gravel was angular to subrounded clasts of flint. Sand was predominantly medium to coarse.

The results from DPSH testing inferred that the granular soils of the River Terrace Deposits were of medium dense to very dense relative density, comprising a medium dense unit to a depth of between 2.20m and 3.10m bgl over a dense locally very dense unit extending to the inferred boundary with the underlying clay.

The results from PSD testing classified one of the seven samples as having a volume change potential in accordance with BRE Digest 240, recording a fines fraction greater than 15%. None of the seven samples tested had a volume change potential in accordance with NHBC Standards Chapter 4.2.

Soils of the River Terrace Deposits are predominantly granular soils and as such are expected to display moderate bearing and settlement characteristics. The granular soils of the River Terrace Deposits were considered a potential bearing stratum for the proposed development.

4.1.3 London Clay Formation

Soils anticipated to comprise the London Clay Formation were inferred within the dynamic probes underlying the River Terrace Deposits from 4.00m bgl and persisting to full probe depth of 6.00m bgl. The inference was made where a reduction in blow counts indicated the presence of a transitional horizon into the expected more cohesive soils of the London Clay Formation at a depth comparable to the historical BGS borehole information published for the Swan Centre development in proximity to the site. No soil samples were recovered from the London Clay Formation to give a specific description for the stratum.

The results from DPSH testing inferred that the cohesive soils of the London Clay Formation were of low to medium strength, with inferred undrained cohesions between 20kPa to 55kPa, variable with depth.

The soils of the London Clay Formation are typically heavily overconsolidated predominantly cohesive soils and anticipated to display moderate bearing and

settlement characteristics. The soils of the London Clay Formation would be considered as suitable bearing stratum for the proposed development adopting piled foundations given the inferred depth to its upper horizon.

4.2 Foundation Scheme General

At the time of reporting, the new proposed development scheme is for a three-storey development of residential apartments with associated parking, single storeyed bin and bike store and hard and communal soft landscaping with no domestic gardens.

In compiling this report reliance was placed on drawings within Hanns Way, Eastleigh report prepared by OSP Architecture, dated 5th April 2023. The recommendations provided within this report are made exclusively in relation to the schemes outlined above and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Development plans provided by the client are presented in Appendix D.

4.2.1 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.

The results from Atterberg Limits Tests showed that the cohesive reworked brickearth soils of Made Ground had low to medium volume change potential in accordance with both BRE Digest 240 and NHBC Standards Chapter 4.2.

Medium volume change potential must therefore be adopted where foundations pass through the cohesive Made Ground.

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”

4.3 Foundation Scheme

Foundations **must not** be constructed within any Made Ground/Topsoil due to the likely variability and potential for large load induced settlements both total and differential.

No roots/rootlets were observed within any of the exploratory trial holes. If roots are encountered during the construction phase foundations **must not be placed within any live root penetrated** or desiccated **cohesive soils or those with a volume change potential**. Should the foundation excavations reveal such materials, the excavations **must** be extended to greater depth in order to bypass these unsuitable soils. Excavations must be checked by a suitable person prior to concrete being poured.

Considering the type of development, a shallow foundation solution into the granular River Terrace Deposits was considered the suitable. Where the design loads for the multi-storey development are not achievable by the use of shallow foundations, piled foundations into the London Clay Formation at depth may be considered, which would require further intrusive investigation and analysis.

4.3.1 Shallow Foundations into the granular River Terrace Deposits

Based on a 5.00 by 0.75m strip foundation, using commercial software Table 4.1 shows the calculated bearing values and anticipated settlement characteristics. Given the thickness of Made Ground across the site, bearing capacities were calculated from 1.50m bgl. Foundations may need to be locally deepened to fully

penetrate the cohesive brickearth Made Ground and achieve a minimum 0.10m embedment into the granular River Terrace Deposits.

Consideration must be given towards foundation depth and width to avoid the pressure bulb overstressing the weaker soils of the London Clay Formation at a characteristic depth of 4.00m bgl across the site.

Table 4.1 Allowable Bearing Capacities in the granular River Terrace Deposits

Depth (m bgl)	Size (m)	Bearing Capacity (kPa)	Anticipated Settlement (mm)
1.50	5.00 x 0.75	200	20
2.00		200	20

The use of reinforced trench fill foundations would reduce the possibility of differential settlement affecting the foundations.

For the allowable bearing value given above, settlements should not exceed the presented values, provided that excavation bases are carefully bottomed out and blinded or concreted as soon after excavation as possible and kept dry. Foundations must not be constructed over former structures and other hard spots. The foundations design must be suitable for the conditions present at the site.

The anticipated settlement includes both elastic settlement and long-term drained settlement (in the case of cohesive soils).

Anticipated settlements may be taken as proportional to the bearing capacity adopted (for the same configuration of foundation), therefore if the bearing value is halved the anticipated settlement will halve.

It has been assumed that the foundations to the existing structures have been grubbed out. Foundations must not be cast over such hard points without this being considered in the foundation design. Where foundations have been grubbed out the new foundation must be taken through the backfill material into the natural ground.

The intrusive investigation encountered a concrete obstruction in the area of WS3, suggesting the footings/floor slabs of the former structure at the site are likely to still be insitu.

4.3.2 Ground Floor Slab

NHBC Standards 2021 states ground floors should be constructed as suspended floors where:

- *“the foundation depth dictated by the NHBC Standards 2021, 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 thickness of Made Ground encountered across the site, suspended floor slabs are required for the development.

4.3.3 Piled Foundations

If adopted the piled foundations must be taken through any Made Ground and River Terrace 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.

Supplementary investigation via cable percussive boreholes or similar techniques will be required to determine soil parameters are greater depth to aid the design of piled foundations.

4.4 Retaining Wall

If the foundation is to include lateral load from retained soil, then the distribution of loads on the foundation will be trapezoidal and the maximum pressure will be at the toe of the foundation. The foundation has to resist both overturning and sliding forces. The overturning forces are derived from the loads imposed both by the soils retained, by any line loads from structures to the rear of the wall and by groundwater.

To calculate the lateral loads from the soils their coefficient of active earth pressure must be calculated from effective stress testing.

For the allowable bearing value given above, settlements should not exceed the presented values, provided that excavation bases are carefully bottomed out and blinded or concreted as soon after excavation as possible and kept dry. Foundations must not be constructed over former structures and other hard spots. The foundations design must be suitable for the conditions present at the site.

The anticipated settlement includes both elastic settlement and long-term drained settlement (in the case of cohesive soils).

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 7.7 and 8.5. The classification given was determined using the mobile groundwater case, in the 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 and deep excavations at the site are likely to be unstable and will require support. 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 Soakaways

A falling head test was carried out in WS4 to give an *indicative* soakage rate of 2×10^{-2} ltr/s. The soils of the granular River Terrace Deposits would likely function effectively for the adoption of soakaways however full in-situ testing to BRE 365 Soakaway Design would be required to establish a design value.

Consultation with the Environment Agency must be sought regarding any use which may have an impact on groundwater resources.

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: 20876/PIR dated April 2023) identified a low to moderate/low risk of ground contamination from Made Ground present at the site following demolition of former buildings and redevelopment of the site as a carpark.

The Main Investigation Report identified Made Ground to depths between 1.30m and 1.60m bgl and comprised a capping of tarmac over a granular subbase composed of limestone scalplings with subordinate inclusions of tarmac and concrete with possible asbestos material observed in WS4, over a reworked brickearth material comprising orangish brown slightly sandy CLAY with rare fine gravel sized brick fragments and pockets of orangish brown sand.

No olfactory observations of possible contamination were recorded.

Superficial deposits of River Terrace Deposits comprising sandy to very sandy clayey flint GRAVEL was encountered underlying the Made Ground and predominantly cohesive London Clay Formation was inferred from a depth of 4.00m bgl. No groundwater was recorded within the trial holes during intrusive works or within the monitoring wells, installed to a depth of 4.00m bgl in WS1 and WS4, during post works monitoring undertaken on 12th August 2021.

5.2 Soil Sampling

A non-targeted sampling strategy is appropriate when there is:

- No adequate information available regarding the likely locations of contamination
- No sensitive areas where there is a need for a high degree of confidence

A targeted sampling strategy is appropriate when there is:

- Adequate information available regarding the likely locations of contamination
- Sensitive areas where there is a need for a high degree of confidence

The CSM identified a potential source of Made Ground across the site and a non-targeted sampling pattern was adopted in this case to achieve general coverage of the site. Table 5.1 outlines the sampling undertaken.

Table 5.1 Sampling Strategy

Sample	Stratum	Proposed Use Design Option I
WS1:0.20	Made Ground	Soft Landscaping
WS1:0.60	Made Ground	

Sample	Stratum	Proposed Use Design Option I
WS2:0.20	Made Ground	Beneath the building
WS2:0.50	Made Ground	
WS3:0.40	Made Ground	
WS4:0.20	Made Ground	
WS4:0.40	Asbestos bulk analysis	
WS4:1.00	Made Ground	

5.3 Determination of Chemical Analysis

The driver for determination of the analysis suite was the information obtained from the Preliminary Investigation Report and Main Investigation Report intrusive investigation. Table 5.2 outlines the specification for each sample tested.

Table 5.2 Chemical Analysis Specification

Substance	Locations: Depths (m bgl)							
	WS1:0.20 ^S	WS1:0.60 ^S	WS2:0.20 ^S	WS2:0.50 ^S	WS3:0.40 ^S	WS4:0.20	WS:0.40 ^A	WS4:1.00
Asbestos Screen	✓	✓	✓	✓	✓	✓		✓
Asbestos Quantification			✓	✓				✓
Asbestos Bulk Analysis							✓	
Total Phenols	✓	✓	✓	✓	✓	✓		✓
Organic Matter	✓	✓	✓	✓	✓	✓		✓
pH	✓	✓	✓	✓	✓	✓		✓
Metals	✓	✓	✓	✓	✓	✓		✓
Metalloids	✓	✓	✓	✓	✓	✓		✓
Organics	✓	✓	✓	✓	✓	✓		✓
WAC			✓					

Notes: **Metals:** Cd, Cr, Pb, Hg, Ni, Se, Cu, Zn, Bo, V. **Metalloids:** As. **organics:** USEPA 16 speciated PAH, EPD Texas Banded. **WAC:** Waste Acceptance Criteria BS EN 12457/2 **Asbestos screening** was undertaken in accordance with HSG 248. ^S = Soil sample. ^A = Asbestos board

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 is for a three-storey development of residential apartments with associated parking, single storeyed bin and bike store and hard and communal soft landscaping with no private domestic gardens. In compiling this updated report reliance was placed on drawings 22205-SK110 and SK 111 dated 5th April 2023 produced by OSP Architecture.

The recommendations provided within this report are made exclusively in relation to the schemes outlined above and must not be applied to any other scheme without further consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Based on the proposed development, the results of the chemical analysis have been compared against generic guidance values for a '**residential without 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 0.7% and 3.4%. 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 without home grown produce' land-use scenario
No exceedances	
Asbestos locations where material found (no threshold just presence)	
WS2:0.20 – Chrysotile present as fibre bundles	0.001%
WS2:0.50 – Chrysotile present as fibre bundles	<0.001%

WS4:0.40 – Asbestos board fragment determined to comprise chrysotile cement

WS4:1.00 – Chrysotile present as fibre bundles 0.002%

In summary, none of the samples tested recorded chemical concentrations in excess of their relevant screening value for a potentially over conservative residential without plant uptake land-use scenario, as public open space residential may be considered more appropriate now the final development context has been confirmed.

However, four of the eight samples analysed for asbestos, from two of the four trial hole locations, recorded positive asbestos.

6.2.1 Asbestos

Asbestos Containing Soil (ACS) was detected within two samples of Made Ground from WS2 at 0.20m and 0.50m bgl and one sample of Made Ground in WS4 at 1.00m bgl, and Asbestos Containing Material (ACM) was identified in WS4 at 0.40m bgl and determined to comprise chrysotile cement. The detected ACS was described as chrysotile present as fibre bundles and quantification of the impacted samples indicated that asbestos was encountered at quantities in the range of <0.001% and 0.002%.

Specialist advice should be retained to ensure compliance with appropriate legislation and guidance (H&S at Work Act, CAR 2012, etc.) during the development.

6.3 Tier I Quantitative Risk Assessment

Quantitative 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 C.2.

6.3.1 Soils

None of the samples tested showed concentrations in excess of the very conservative screening value for a for a residential without home grown produce land-use scenario.

6.3.2 Asbestos

Asbestos materials were recorded in four of the eight samples of Made Ground analysed for asbestos, from two of the four trial hole locations. The asbestos in soil was determined to comprise chrysotile at quantities in the range of <0.001% and 0.002%. Bulk analysis of the asbestos board fragment determined it as chrysotile cement.

The Tier 1 Quantitative risk assessment therefore established that there was **a risk to the human health receptors** of construction workers or future end-users from Asbestos.

6.3.3 Groundwater

The Preliminary Investigation Report (Soils Limited report reference 20876/PIR, dated April 2023) recorded the site to be underlain by a Secondary A Aquifer associated with superficial River Terrace Deposits and identified a very low to negligible contamination risk to shallow groundwater receptor.

The intrusive site investigation encountered Made Ground to depths of between 1.30m and 1.60m bgl where the stratum was fully penetrated. A notable thickness of cohesive brickearth formed the lower part of the Made Ground across the site and is considered a likely aquiclude between any potential contaminants identified within the overlying anthropogenic sourced materials and potential shallow groundwater receptor within the River Terrace Deposits. Notwithstanding, given that the site drains to a soakaway, possibly without an associated interceptor according to site observations, localised contamination could occur around the existing soakaway and associated infrastructure given the present site use as a car park.

London Clay Formation was inferred from a depth of 4.00m bgl, where the dynamic probes reflected a transition into a different lithology, is classed as unproductive strata, and would act as an aquiclude to deeper groundwater receptors.

No source protection zones, or abstraction points were recorded within 1000m radius from the site.

Given the above and seeming lack of any groundwater resource underlying the site, the risk to the groundwater receptor is considered very low to negligible and there is no merit in any remedial action to be undertaken.

6.3.4 Soil Gas

The Preliminary Investigation Report identified a very low to low risk of soil gas generation associated with the possible presence of Made Ground underlying the site following demolition of former structures and redevelopment of the site as a car park.

The intrusive investigation identified Made Ground persisting to depths of between 1.30m and 1.60m bgl, where fully penetrated. No obvious putrescible materials were recorded within the Made Ground.

Monitoring of the ground gas concentrations of the wells installed within WS1 and WS4 was requested on one occasion as a precautionary exercise and undertaken on 12th August 2021.

The ground gas monitoring recorded the concentrations of oxygen, methane (total and LEL), carbon dioxide, carbon monoxide, flow rates, atmospheric pressure and differential pressure.

The precautionary ground gas monitoring visit recorded the following ranges of ground gases across the two monitoring points:

- Carbon dioxide between < 0.1% v/v (instrument detection limit) and 0.4% v/v.
- Oxygen concentrations between 18.2% v/v and 20.3%
- Methane was not recorded above the instrument detection limit of < 0.1%v/v
- Hydrogen sulphate and carbon monoxide were not recorded above the instrument detection limit of < 1ppm.

Gas flow rate was not recorded above the instrument detection limit of < 0.1l/hr and the monitoring visit was undertaken during an atmospheric pressure of 1018mb over a level pressure trend period.

Based on the above reported precautionary gas values, it was established there appears to be no significant risk from ground gases at the site.

6.4 Remedial Objective

Soil chemical analysis did not record any tested chemical determinants in excess of their relevant screening values. However, asbestos was recorded in four of the eight samples analysed, from two of the four trial hole locations. Therefore, there remains a risk to Human Health receptors via the inhalation exposure pathway. Competent advice should be retained so as to advise, identify and mitigate the identified risks to vulnerable receptors during and following construction activities in line with CAR 2012 and other relevant guidance and legislation.

As the site formally had a building situated onsite constructed circa 1933 and recorded to have had various alterations over the years, it is likely its demolition and subsequent infilling on site has resulted of the presence of asbestos material within the Made Ground.

The remedial objective for the site is to ensure site clean-up removes any unacceptable risk to the identified receptors. In essence the remedial objective should sever any source-pathway-receptor pollutant linkages that have been established. Once this has been achieved, by whatever means, there can theoretically be no risk.

6.5 Asbestos

Asbestos-containing soils (ACSs) were identified at the site, asbestos materials were recorded in four of the eight samples analysed for asbestos, from two of the four trial hole locations. The asbestos type was chrysotile. In collaboration with a licensed competent asbestos advisor or contractor, consultation must made with the local authority to determine and agree an appropriate remediation strategy and ensure compliance with appropriate legislation and guidance. Asbestos quantification

undertaken on the samples recorded quantities in the range of <0.001% and 0.002% as Chrysotile.

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, with particular consideration to the risk from asbestos.

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).

WAC testing was undertaken on one sample representative of Made Ground on the site which indicated the sample would likely be suitable for inert waste disposal (excluding ACM) subject to agreement and confirmation from the landfill operator.

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 given the low levels of contamination noted in this investigation 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 and other appropriate 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. Analysis may also be required to confirm fitness for purpose by reference to appropriate standards and specifications i.e. for Topsoil.

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.

List of Figures

Figure 1 – Site Location Map	30
Figure 2 – Aerial Photograph	31
Figure 3 – Trial Hole Plan	32

List of Appendices

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

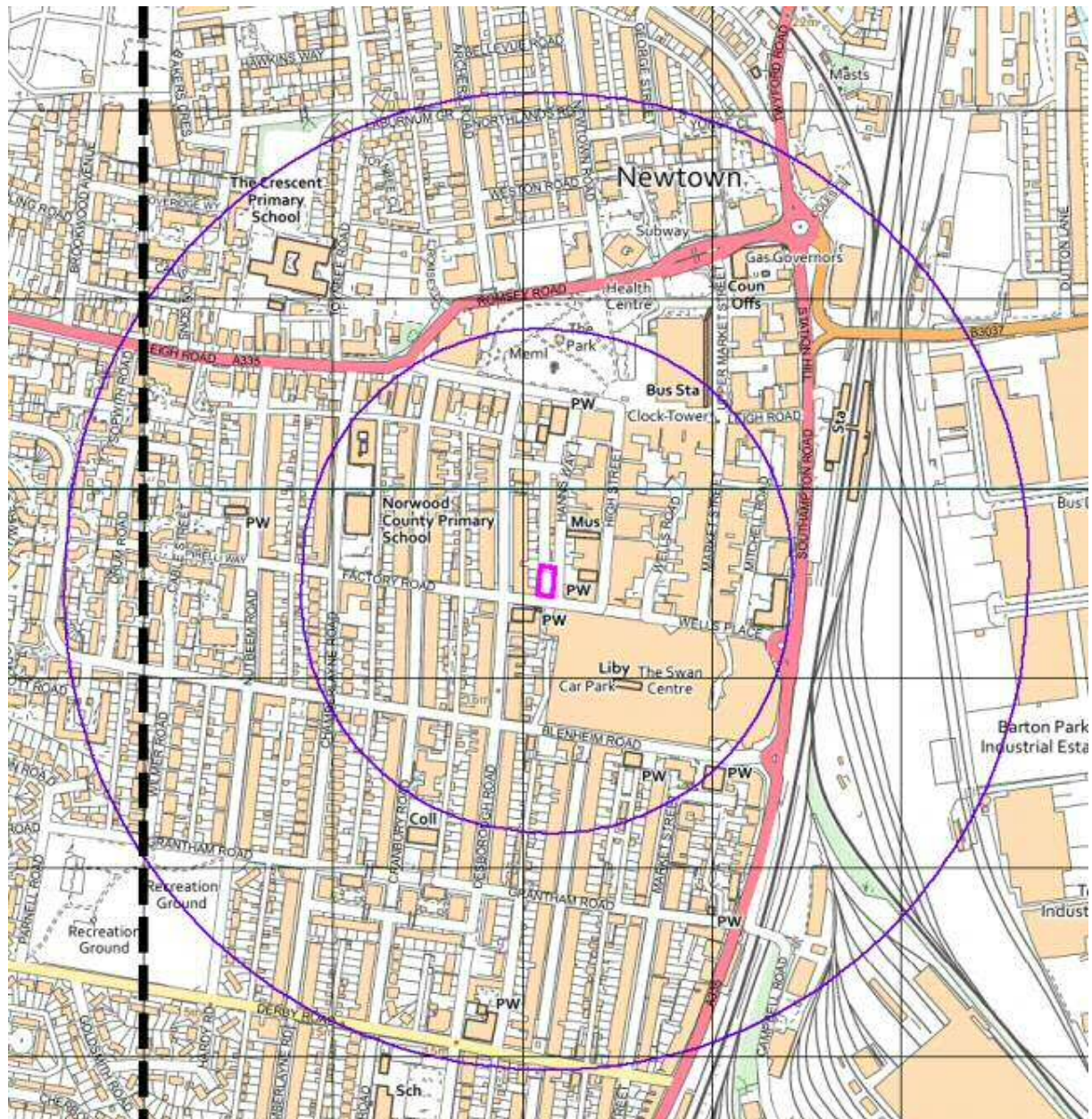


Figure I – Site Location Map



Job Number
20876

Project
Hanns Way, Eastleigh, Hampshire SO50 5NZ

Client
Doswell Projects

Date
April 2023



Figure 2 – Aerial Photograph

Project

Hanns Way, Eastleigh, Hampshire
SO50 5NZ

Client

Doswell Projects

Date

April 2023

Job Number

20876





Figure 3 – Trial Hole Plan

Project
Hanns Way, Eastleigh, Hampshire
SO50 5NZ

Client
Doswell Projects

Date
April 2023

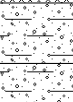
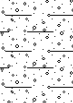
Job Number
20876



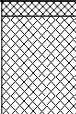
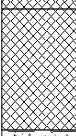
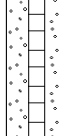
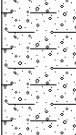
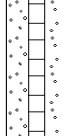
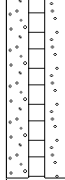
Appendix A Field Work

Appendix A.1 Engineers Logs

	Contract Name: Hanns Way				Client: Doswell Projects				Hole ID: WS1					
	Contract Number: 19472		Start and End Date: 28/07/21		Logged By: GB		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM2		Print Date: 17/04/2023		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	D+J			0.10		TARMAC. MADE GROUND.						1		
0.60	D+J			(0.40)		Fine to coarse angular to sub angular dark grey brown slightly sandy limestone scalplings GRAVEL. Occasional fine to coarse tarmac fragments. Rare fine to coarse concrete fragments. Sand is fine to coarse. MADE GROUND.								
1.00	D+J			0.50		Soft dark light orange brown slightly sandy CLAY. Rare fine brick fragments. Occasional intermittent pockets of light orange brown sand. Rare fine to coarse angular to sub angular flint gravel. MADE GROUND.						2		
1.50	D+J			(0.80)										
2.00	D			1.30		Fine to coarse light grey brown angular to sub angular to sub rounded slightly sandy clayey flint GRAVEL. Sand is fine to coarse.						3		
2.50	D			(0.60)										
3.00	D			1.90		Fine to coarse light grey brown angular to sub angular to sub rounded slightly clayey sandy flint GRAVEL. Sand is fine to coarse.						4		
3.50	D			(2.10)										
4.00	D			4.00		End of Borehole at 4.00m						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
					0.00	1.00	PLAIN	33						
					1.00	4.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

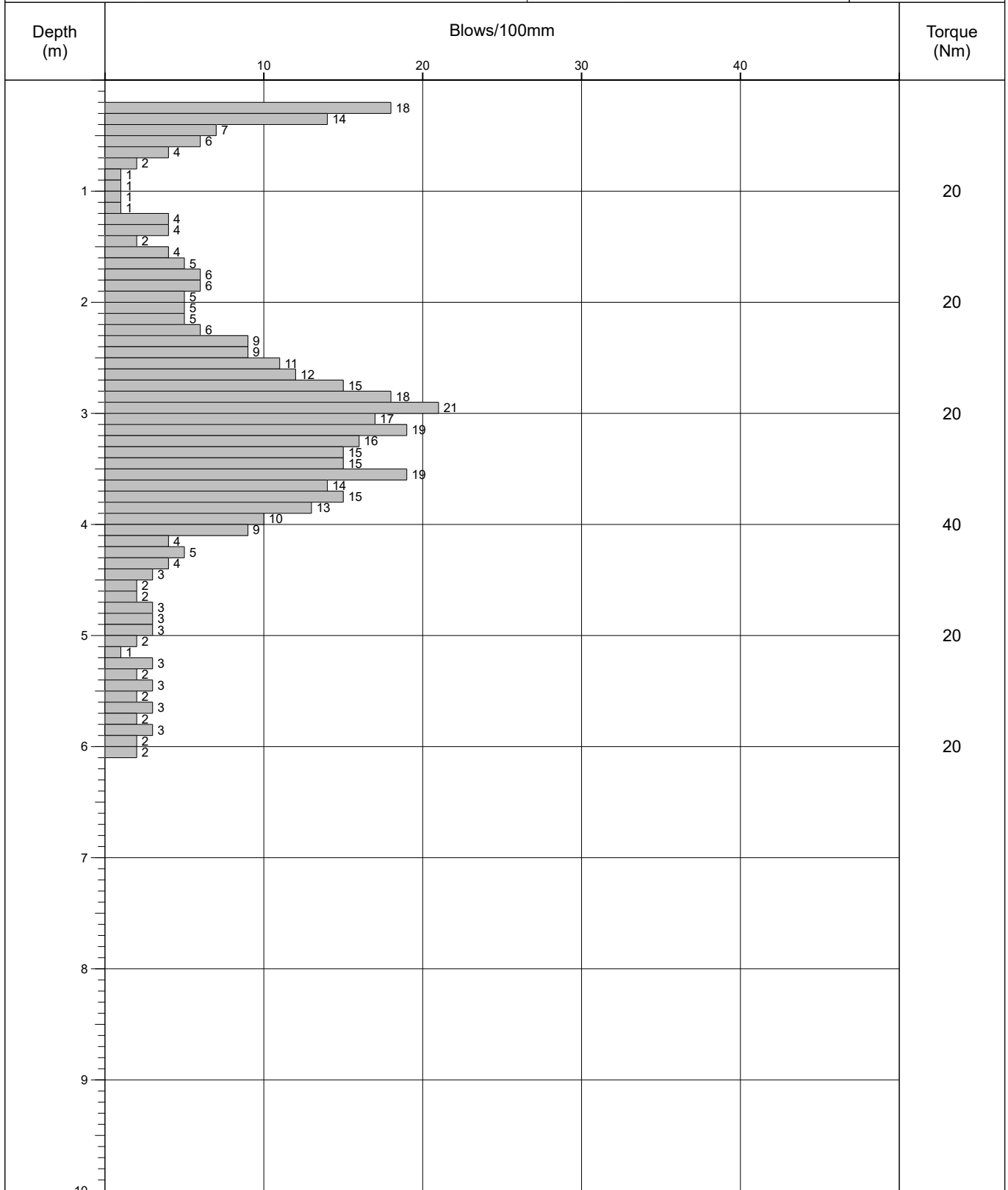
	Contract Name: Hanns Way				Client: Doswell Projects				Hole ID: WS2					
	Contract Number: 19472		Start and End Date: 28/07/21		Logged By: GB		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM2		Print Date: 17/04/2023		Scale: 1:50			
Weather:				Termination:								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	D+J			0.10		TARMAC. MADE GROUND. Fine to coarse angular to sub angular dark grey brown slightly sandy limestone scalplings GRAVEL. Occasional fine to coarse tarmac fragments. Rare fine to coarse concrete fragments. Rare fine granite gravel. Sand is fine to coarse. MADE GROUND. Soft dark grey brown slightly sandy slightly gravelly CLAY. Rare rootlets. Occasional fine to coarse, brick, concrete, ash fragments. Rare fine tarmac fragments. Rare intermittent pockets of light orange brown fine to coarse sand. MADE GROUND. Soft dark light orange brown slightly sandy CLAY. Rare fine brick fragments. Occasional intermittent pockets of light orange brown sand. Rare fine to coarse angular to sub angular flint gravel. MADE GROUND.						1		
0.30														
0.50	D+J			(0.30)										
0.60														
0.90	D+J			(0.90)		Fine to coarse light grey brown angular to sub angular to sub rounded slightly sandy clayey flint GRAVEL. Sand is fine to coarse. Fine to coarse light grey brown angular to sub angular to sub rounded slightly clayey sandy flint GRAVEL. Sand is fine to coarse.						2		
1.40	D+J			1.50										
1.80	D			(0.40)										
1.90														
2.30	D			(2.10)								3		
2.80	D													
3.30	D													
3.80	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)						
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
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

			Contract Name: Hanns Way				Client: Doswell Projects				Hole ID: WS3					
			Contract Number: 19472		Start and End Date: 28/07/21		Logged By: JC		Checked By:		Status:		Hole Type: WS			
			Easting:		Northing:		Ground Level:		Plant Used: PREM2		Print Date: 17/04/2023		Scale: 1:50			
Weather:				Termination: Concrete obstruction						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	D+J			0.10		TARMAC										
0.40	D+J			(0.30) 0.40		SAND & GRAVEL with cobbles comprising brick, concrete and flint. Concrete obstruction encountered at 0.40m bgl. MADE GROUND										
						End of Borehole at 0.40m										
													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)								
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		
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.																

	Contract Name: Hanns Way				Client: Doswell Projects				Hole ID: WS4					
	Contract Number: 19472		Start and End Date: 28/07/21		Logged By: GB		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: PREM2		Print Date: 17/04/2023		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	D+J			0.10		TARMAC SANDY GRAVEL. Gravel is fine to cobble red brick and concrete. 1 PIECE OF SUSPECTED ASBESTOS						1		
0.50	D+J			(0.70)										
1.00	D+J			0.80		Soft light dark orange brown gravelly CLAY. Rare occasional fine brick fragments. Occasional fine to coarse angular to sub angular to sub rounded flint gravel. Rare intermittent pockets of light dark orange brown fine to coarse sand. MADE GROUND								
1.20	D+J			(0.80)								2		
1.50	D			1.60		Fine to coarse light grey brown angular to sub angular to sub rounded slightly sandy clayey flint GRAVEL. Sand is fine to coarse.								
2.00	D			(1.00)										
2.50	D			2.60								3		
3.00	D			(1.40)		Fine to coarse light grey brown angular to sub angular to sub rounded slightly clayey sandy flint GRAVEL. Sand is fine to coarse. Occasional rare dark orange brown staining.								
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)						
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	33						
					1.00	4.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														



Project Name:	Hanns Way	Project No.	19472	Co-ords:		Hole Type	DP
Location:	Eastleigh, Hampshire SO50 5NZ	Level:	m AOD	Scale	1:50	Logged By	
Client:	Doswell Projects	Dates:	28/07/2021				



Remarks	Fall Height	760mm	Cone Base Diameter	50.5mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type	DPSH	Energy Ratio (Er)	82.11%

**Soils Limited**

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

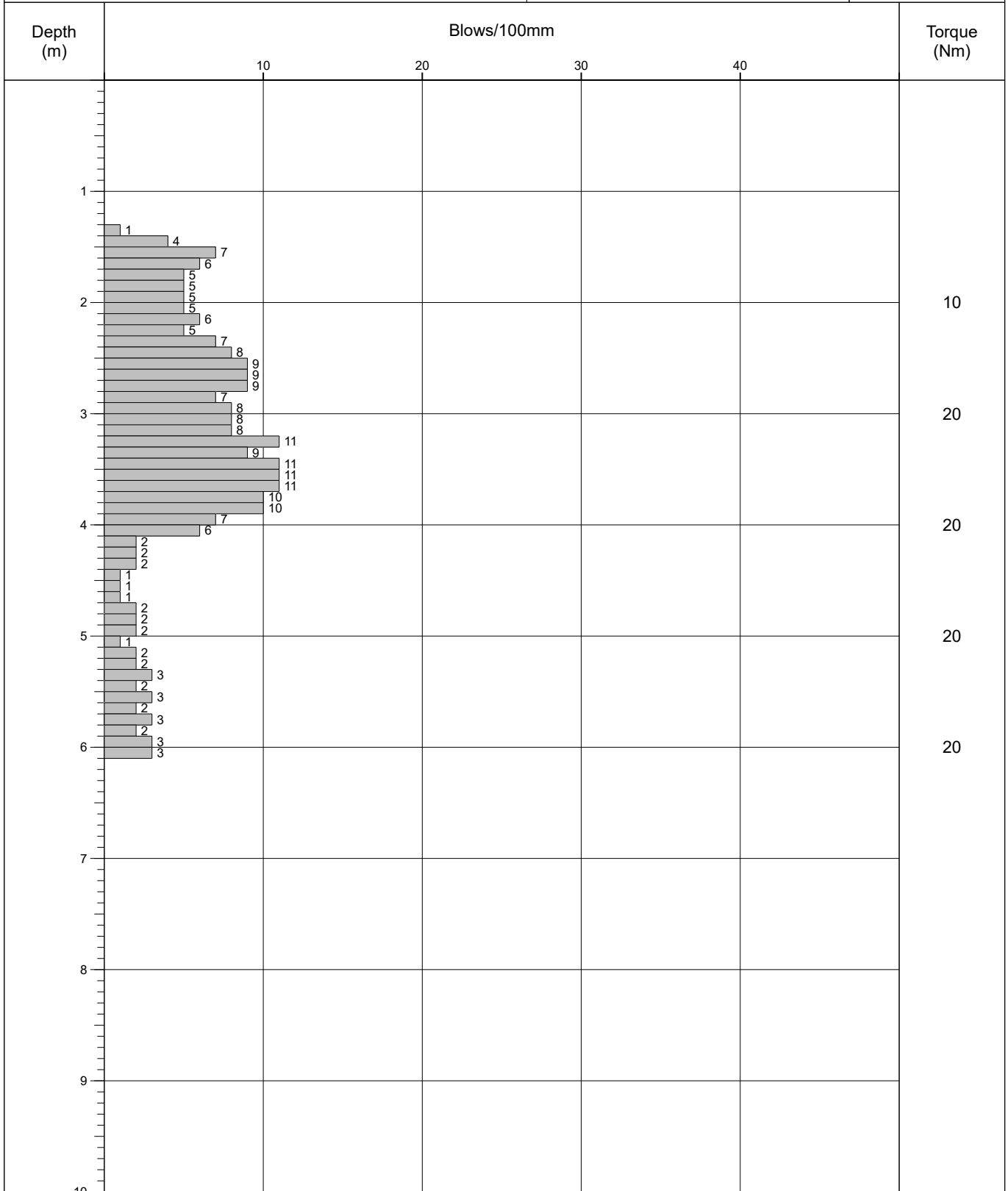
Probe Log

Probe No.

DP4

Sheet 1 of 1

Project Name:	Hanns Way	Project No.	19472	Co-ords:		Hole Type	DP
Location:	Eastleigh, Hampshire SO50 5NZ	Level:	m AOD			Scale	1:50
Client:	Doswell Projects	Dates:	28/07/2021			Logged By	



Remarks	Fall Height	760mm	Cone Base Diameter	50.5mm
	Hammer Weight	63.5kg	Final Depth	6m
	Probe Type	DPSH	Energy Ratio (Er)	82.11%



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)

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
DPI	RTD 1.30 – 3.10 GRAVEL	19 – 23	Medium dense
	RTD 3.10 – 4.00 GRAVEL	31 – 39	Dense
	LCF ¹ 4.00 – 6.00 Clay	8 – 11	Medium ($C_u = 40 - 55\text{kPa}$)
DP2	RTD 1.50 – 2.20 GRAVEL	19 – 23	Medium dense
	RTD 2.20 – 4.00 GRAVEL	35 - >50	Dense to very dense
	LCF ¹ 4.00 – 6.00 Clay	8 – 11	Medium ($C_u = 40 - 55\text{kPa}$)
DP4	RTD 1.60 – 2.20 GRAVEL	19	Medium dense
	RTD 2.20 – 4.00 GRAVEL	31 – 43	Dense
	LCF ¹ 4.00 – 6.00 Clay	4 – 8	Low ($C_u = 20 - 40\text{kPa}$)

Note: ¹ Ground conditions inferred past the base of windowless sampler boreholes. Er = 82.11%

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	NHBC
MG	13 - 18	18 - 22	71 - 89	13 - 20	CL - CI	Low to medium	Low to medium

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	Volume Change Potential		Passing 63µm Sieve (%)
			BRE	NHBC	
WS1	1.50	Clayey sandy GRAVEL	Yes	No	18
WS1	2.50	Clayey sandy GRAVEL	No	No	7
WS1	4.00	Clayey sandy GRAVEL	No	No	7
WS2	1.80	Very sandy clayey GRAVEL	No	No	7
WS2	2.80	Very sandy clayey GRAVEL	No	No	10
WS4	2.00	Clayey sandy GRAVEL	No	No	10
WS4	3.00	Clayey sandy GRAVEL	No	No	5

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



Tim Rudkin
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
t: 01622 850410

DETS Report No: 21-09695

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

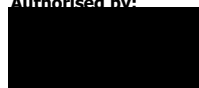
Sample Receipt Date: 04/08/2021

Sample Scheduled Date: 04/08/2021

Report Issue Number: 1

Reporting Date: 10/08/2021

Authorised by:



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.



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



Soil Analysis Certificate						
DETS Report No: 21-09695	Date Sampled	28/07/21	28/07/21			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Hanns Way	TP / BH No	WS1	WS2			
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied			
Order No: 19472	Depth (m)	1.00	2.30			
Reporting Date: 10/08/2021	DETS Sample No	558148	558149			

Determinand	Unit	RL	Accreditation	(n)		
pH	pH Units	N/a	MCERTS	7.7	8.5	
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	< 200	< 200	
Total Sulphate as SO ₄	%	< 0.02	MCERTS	< 0.02	< 0.02	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	20	< 10	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	< 0.01	
Total Sulphur	%	< 0.02	NONE	< 0.02	< 0.02	
Ammonium as NH ₄	mg/kg	< 0.5	MCERTS	1.9	1.6	
Ammonium as NH ₄	mg/l	< 0.05	MCERTS	0.19	0.16	
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	11	7	
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	5.7	3.7	
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	< 3	MCERTS	6	< 3	
Water Soluble Nitrate (2:1) as NO ₃	mg/l	< 1.5	MCERTS	3	< 1.5	
W/S Magnesium	mg/l	< 0.1	NONE	0.7	0.3	

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)

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



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



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-09695	
Soils Ltd	
Site Reference: Hanns Way	
Project / Job Ref: 19472	
Order No: 19472	
Reporting Date: 10/08/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
558148	WS1	None Supplied	1.00	12.8	Brown sandy clay
558149	WS2	None Supplied	2.30	6.1	Light brown sandy gravel with stones

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

Insufficient Sample ^{1/s}

Unsuitable Sample ^{u/s}



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



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-09695

Soils Ltd

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

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



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 55235

Client Ref: **19472**

Report Date: **23-08-2021**

Client PO: **19472**

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

Contract Title: **Hanns Way**
For the attention of: **Tim Rudkin**

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

Date Completed: **23-08-2021**

Test Description	Qty
Moisture Content of Soil BS1377 : Part 2 : Clause 3.2 : 1990 - * UKAS	2
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	2
PSD Wet & Dry Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	7
Samples Received - @ Non Accredited Test	9
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:

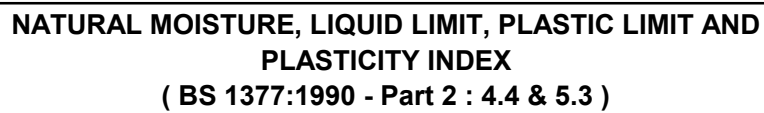
Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

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

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



Operators	Checked	23/08/2021	Richard John (Advanced Testing Manager)
Clayton Jenkins	Approved	23/08/2021	Paul Evans (Quality/Technical Manager)





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

Contract Number 55235

Borehole/Pit No. WS1

Site Name Hanns Way

Sample No.

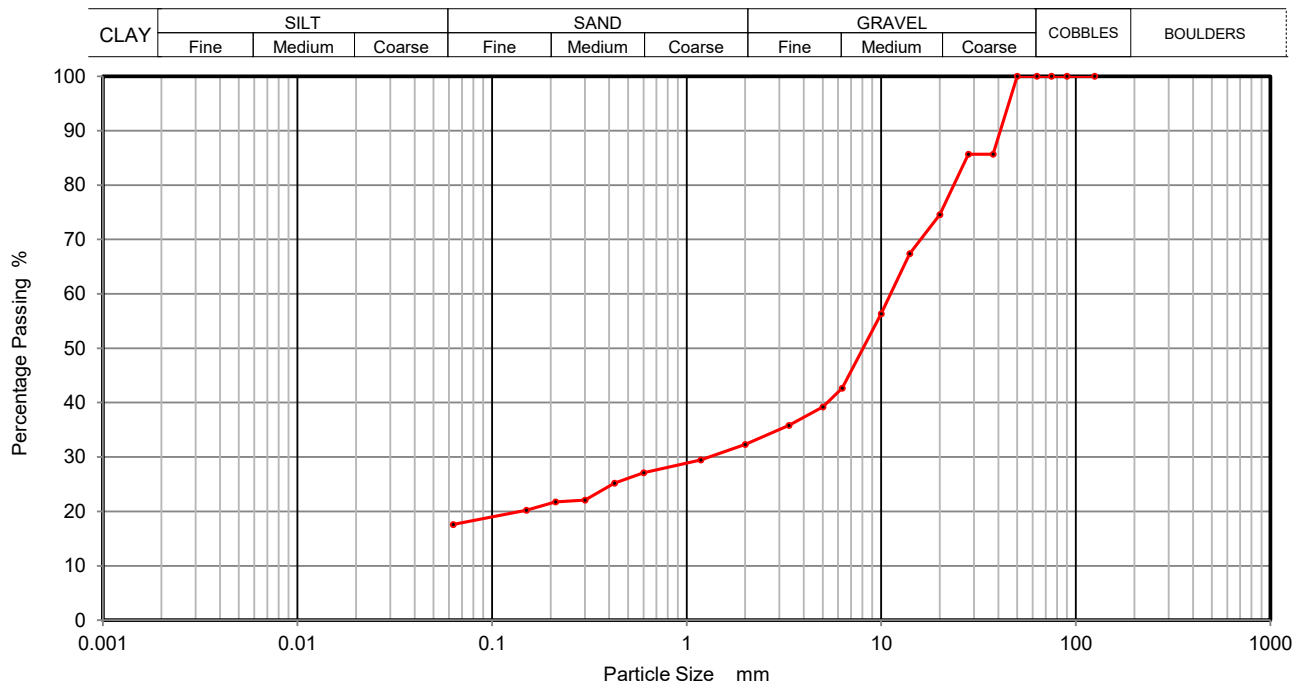
Soil Description Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL

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	86		
28	86		
20	75		
14	67		
10	56		
6.3	43		
5	39		
3.35	36		
2	32		
1.18	29		
0.6	27		
0.425	25		
0.3	22		
0.212	22		
0.15	20		
0.063	18		

Sample Proportions	% dry mass
Cobbles	0
Gravel	68
Sand	14
Silt and Clay	18

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/08/2021	Richard John
David	Approved	23/08/2021	Paul Evans



2788



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

Contract Number 55235

Borehole/Pit No. WS1

Site Name Hanns Way

Sample No.

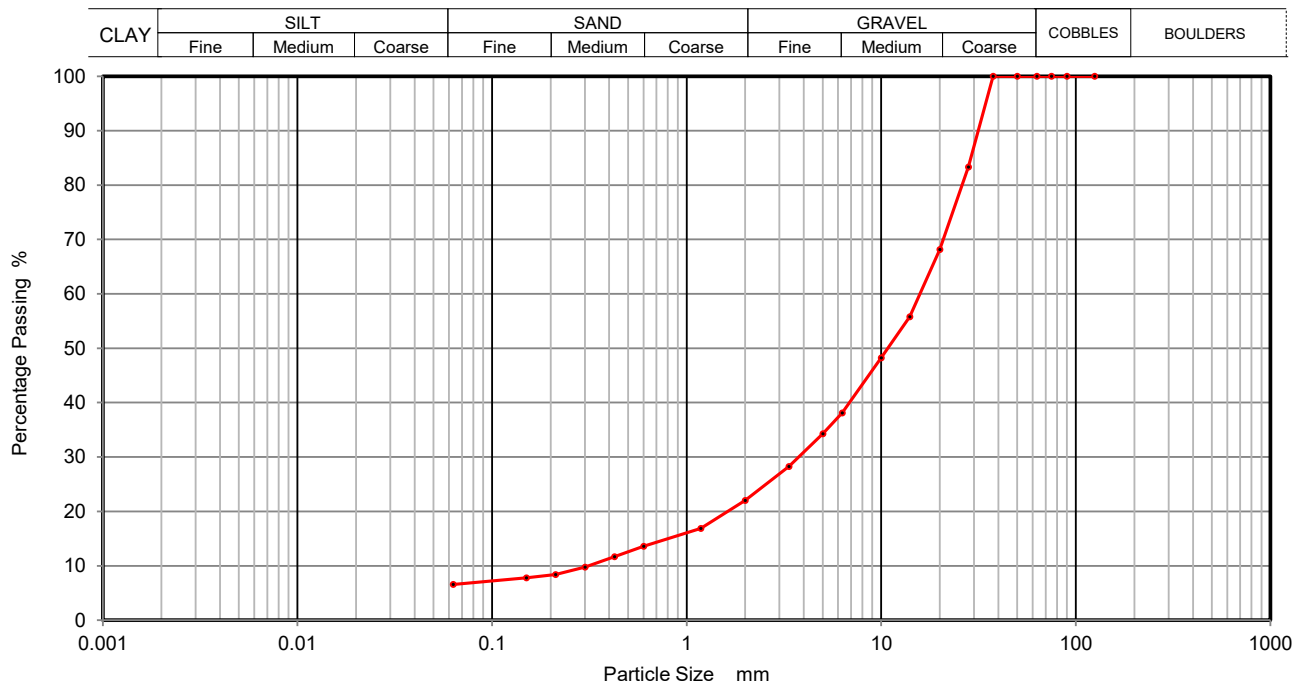
Soil Description Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top 2.50

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	83		
20	68		
14	56		
10	48		
6.3	38		
5	34		
3.35	28		
2	22		
1.18	17		
0.6	14		
0.425	12		
0.3	10		
0.212	8		
0.15	8		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	78
Sand	15
Silt and Clay	7

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/08/2021	Richard John
David	Approved	23/08/2021	Paul Evans

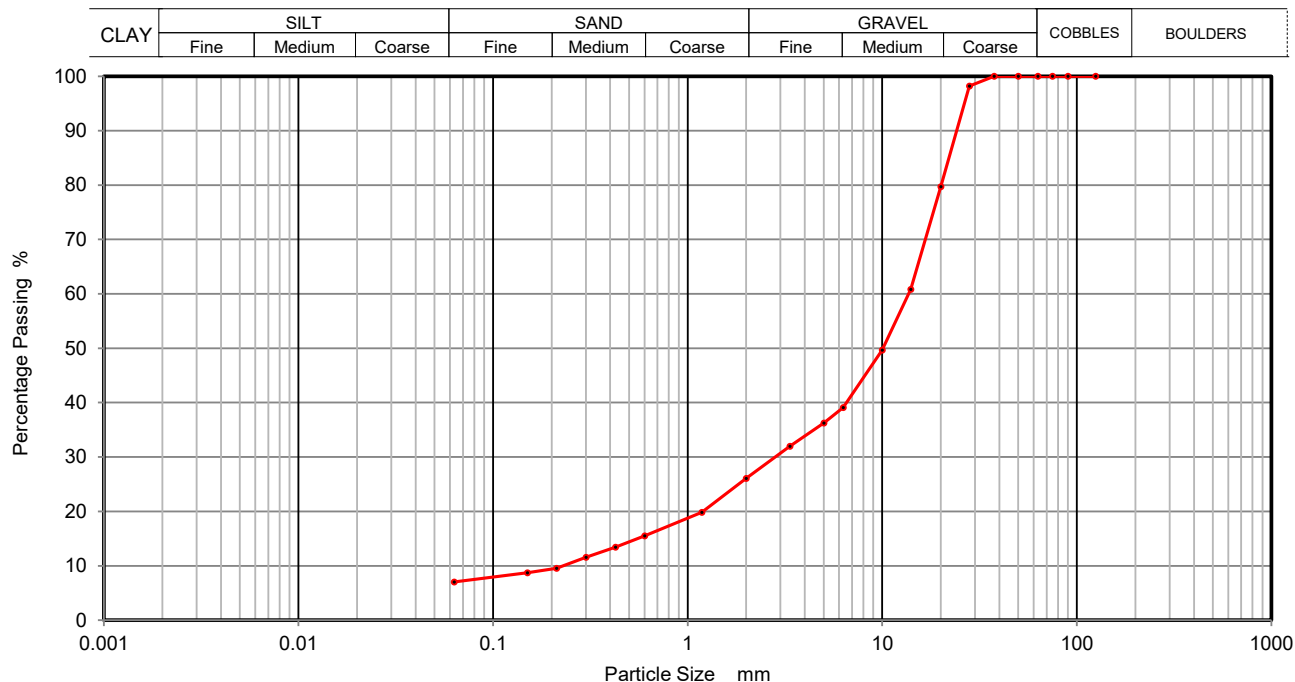


2788



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

Contract Number	55235	
	Borehole/Pit No.	
WS1		
Site Name	Hanns Way	
Sample No.		
Soil Description	Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL	
Depth Top		4.00
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	98		
20	80		
14	61		
10	50		
6.3	39		
5	36		
3.35	32		
2	26		
1.18	20		
0.6	16		
0.425	13		
0.3	12		
0.212	10		
0.15	9		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	74
Sand	19
Silt and Clay	7

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/08/2021	Richard John
David	Approved	23/08/2021	Paul Evans





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

Contract Number 55235

Borehole/Pit No. WS2

Site Name Hanns Way

Sample No.

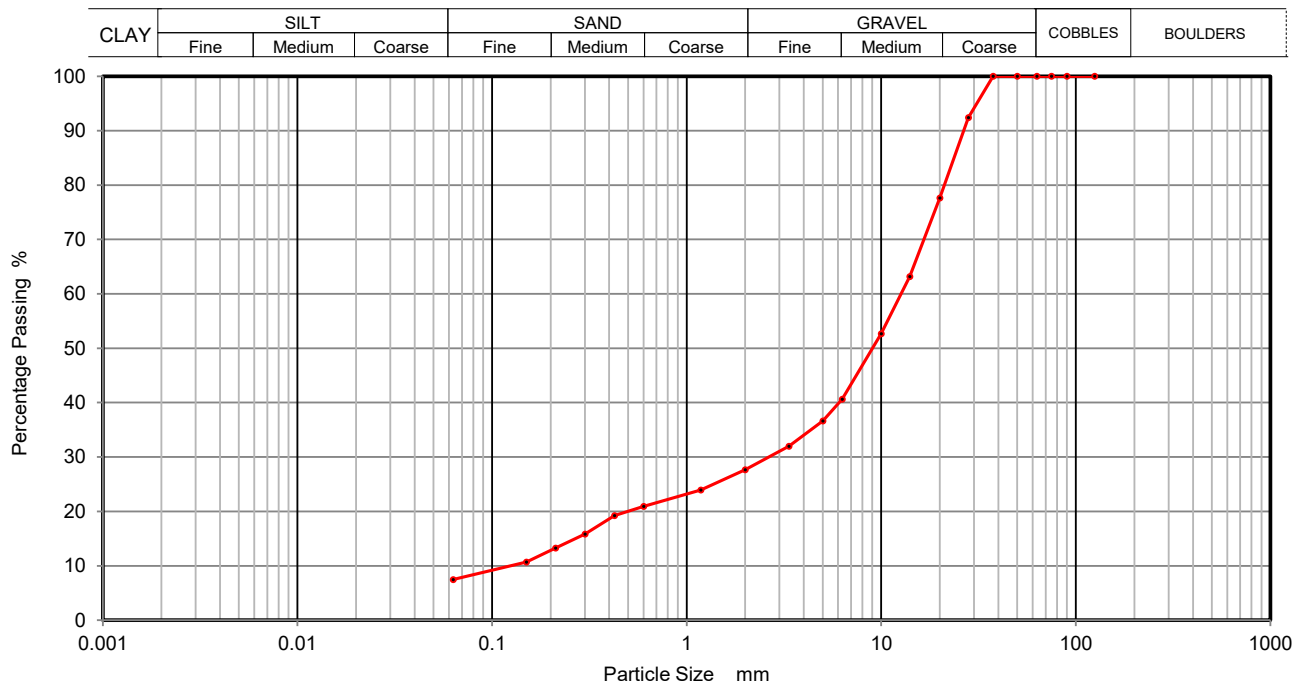
Soil Description Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top 1.80

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	92		
20	78		
14	63		
10	53		
6.3	41		
5	37		
3.35	32		
2	28		
1.18	24		
0.6	21		
0.425	19		
0.3	16		
0.212	13		
0.15	11		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	72
Sand	21
Silt and Clay	7

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/08/2021	Richard John
David	Approved	23/08/2021	Paul Evans



2788



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

Contract Number 55235

Borehole/Pit No. WS2

Site Name Hanns Way

Sample No.

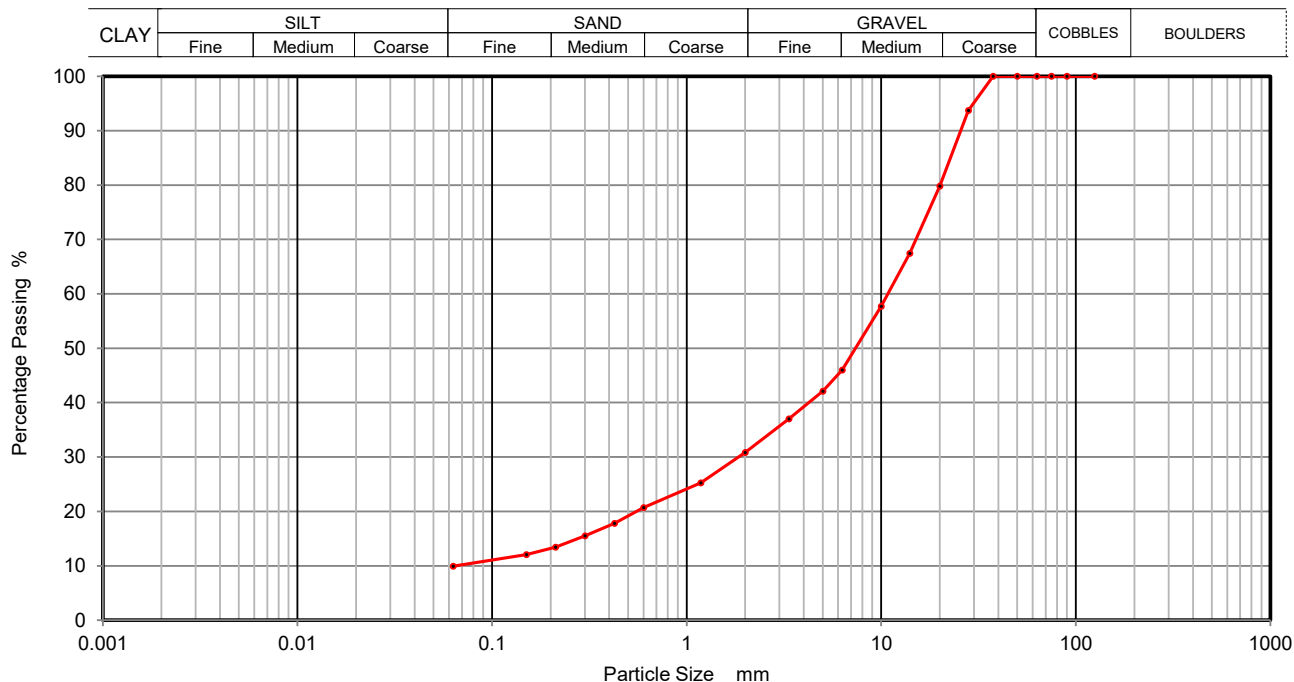
Soil Description White/ brown silty/ clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top 2.80

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	94		
20	80		
14	67		
10	58		
6.3	46		
5	42		
3.35	37		
2	31		
1.18	25		
0.6	21		
0.425	18		
0.3	16		
0.212	13		
0.15	12		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	69
Sand	21
Silt and Clay	10

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/08/2021	Richard John
David	Approved	23/08/2021	Paul Evans



2788



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

Contract Number 55235

Borehole/Pit No. WS4

Site Name Hanns Way

Sample No.

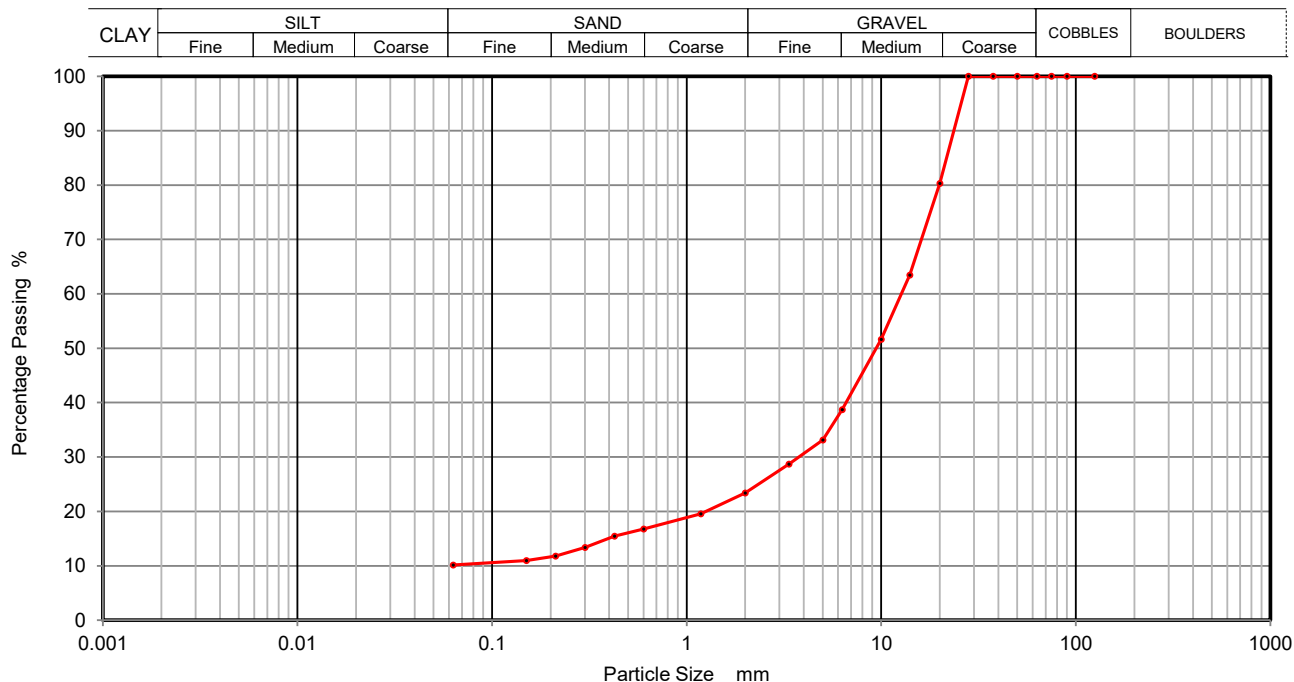
Soil Description Brown silty/ clayey fine to coarse sandy fine to coarse GRAVEL

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	80		
14	63		
10	52		
6.3	39		
5	33		
3.35	29		
2	23		
1.18	20		
0.6	17		
0.425	15		
0.3	13		
0.212	12		
0.15	11		
0.063	10		

Sample Proportions	% dry mass
Cobbles	0
Gravel	77
Sand	13
Silt and Clay	10

Remarks
Preparation and testing in accordance with BS1377 unless noted below

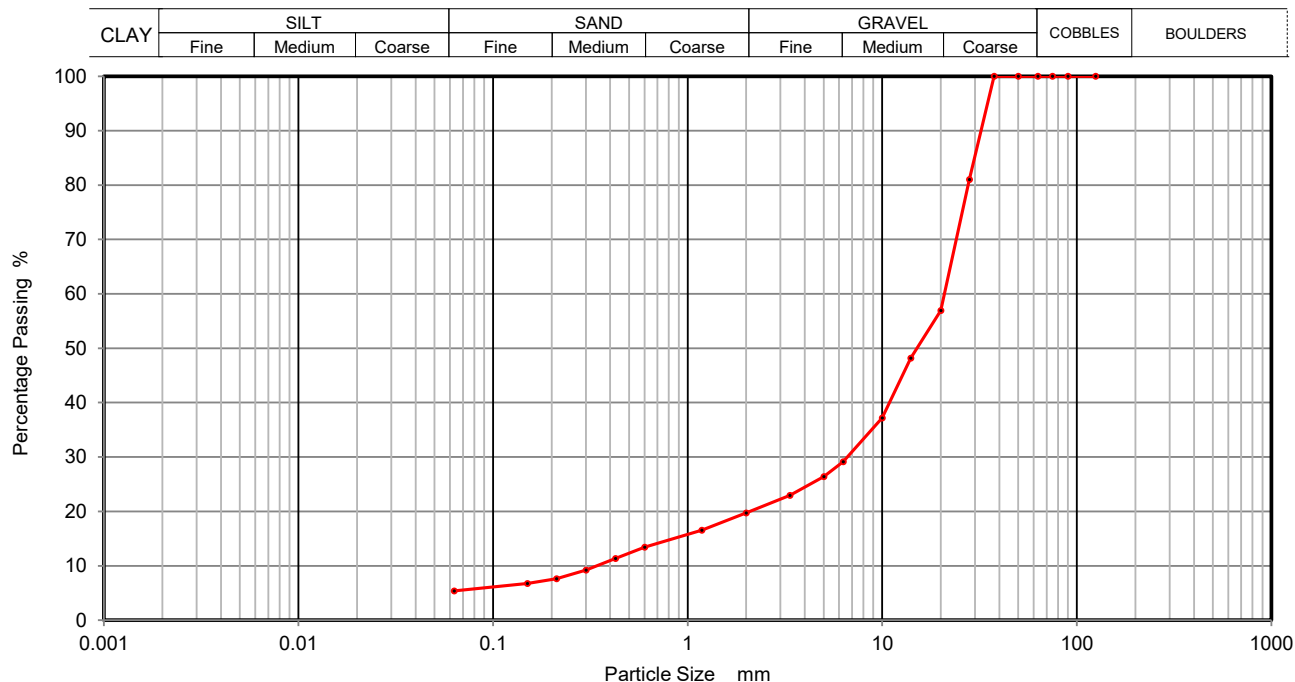
Operator	Checked	22/08/2021	Richard John
David	Approved	23/08/2021	Paul Evans





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

Contract Number	55235	
	Borehole/Pit No.	
WS4		
Site Name	Hanns Way	
Sample No.		
Soil Description	Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL	
Depth Top		3.00
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	81		
20	57		
14	48		
10	37		
6.3	29		
5	26		
3.35	23		
2	20		
1.18	17		
0.6	13		
0.425	11		
0.3	9		
0.212	8		
0.15	7		
0.063	5		

Sample Proportions	% dry mass
Cobbles	0
Gravel	80
Sand	15
Silt and Clay	5

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	22/08/2021	Richard John	
David	Approved	23/08/2021	Paul Evans	



2788

Appendix C Chemical Laboratory Testing

Appendix C.1 Conceptual Site Model

Table C.I.I CSM Revised Post Testing

Source	Identified Contaminant	Exposure Pathway	Receptor	Initial Assessment from Desk Study and Main Investigation Report Information			Comments	Proposed Investigation
				Severity	Probability	Risk		
Made Ground	Asbestos	Inhalation of dust	Site Workers/Site Maintenance	Medium	Likely	Moderate	Made Ground at the site was determined to be impacted with asbestos. None of the other determinants analysed recorded concentrations above the adopted generic screening values, risk low to negligible. Localised contamination could occur around the existing soakaway and associated infrastructure.	Consultation with suitably qualified and competent asbestos advisors recommended prior to site works to ensure compliance with CAR 2012 etc, H&S duty of care and waste requirements. A Discovery Strategy should also be emplaced.
			End-Users	-	-	-		
			Off-site Users	Medium	Low	Moderate/low		

Appendix C.2 Chemical Laboratory Results



Tim Rudkin
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
t: 01622 850410

DETS Report No: 21-09696

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

Sample Receipt Date: 04/08/2021

Sample Scheduled Date: 04/08/2021

Report Issue Number: 1

Reporting Date: 11/08/2021



Technical Manager

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

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

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



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



Soil Analysis Certificate						
DETS Report No: 21-09696	Date Sampled	28/07/21	28/07/21	28/07/21	28/07/21	28/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hanns Way	TP / BH No	WS1	WS1	WS2	WS2	WS3
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19472	Depth (m)	0.20	0.60	0.20	0.50	0.40
Reporting Date: 11/08/2021	DETS Sample No	558150	558151	558152	558153	558154

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Detected	Detected	Not Detected
Sample Matrix ^(S)	Material Type	N/a	NONE			Chrysotile present as fibre bundles	Chrysotile present as fibre bundles	
Asbestos Type ^(S)	PLM Result	N/a	ISO17025			Chrysotile	Chrysotile	
pH	pH Units	N/a	MCERTS	8.3	7.6	9.4	9.1	10.2
Organic Matter (SOM)	%	< 0.1	NONE	0.7	0.7	1.5	0.9	1.5
Arsenic (As)	mg/kg	< 2	MCERTS	13	3	9	7	5
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	NONE	0.3	< 0.2	0.2	< 0.2	0.4
Chromium (Cr)	mg/kg	< 2	MCERTS	17	21	16	15	10
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	44	14	25	16	10
Lead (Pb)	mg/kg	< 3	MCERTS	34	10	33	32	28
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	21	13	12	11	5
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 1	MCERTS	17	26	18	20	16
Zinc (Zn)	mg/kg	< 3	MCERTS	80	35	59	48	73
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)



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



Soil Analysis Certificate						
DETS Report No: 21-09696	Date Sampled	28/07/21	28/07/21	28/07/21		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Hanns Way	TP / BH No	WS4	WS4	WS4		
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 19472	Depth (m)	0.20	0.40	1.00		
Reporting Date: 11/08/2021	DETS Sample No	558155	558156	558157		

Determinand	Unit	RL	Accreditation				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected		Detected	
Sample Matrix ^(S)	Material Type	N/a	NONE			Chrysotile present as fibre bundles	
Asbestos Type ^(S)	PLM Result	N/a	ISO17025			Chrysotile	
pH	pH Units	N/a	MCERTS	8.9		7.9	
Organic Matter (SOM)	%	< 0.1	NONE	3.4		0.4	
Arsenic (As)	mg/kg	< 2	MCERTS	21		5	
W/S Boron	mg/kg	< 1	NONE	< 1		1.2	
Cadmium (Cd)	mg/kg	< 0.2	NONE	0.7		< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	12		22	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2		< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	28		12	
Lead (Pb)	mg/kg	< 3	MCERTS	50		14	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1		< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	15		17	
Selenium (Se)	mg/kg	< 2	MCERTS	< 3		< 3	
Vanadium (V)	mg/kg	< 1	MCERTS	17		32	
Zinc (Zn)	mg/kg	< 3	MCERTS	109		41	
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)



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



Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-09696	Date Sampled	28/07/21	28/07/21	28/07/21	28/07/21	28/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hanns Way	TP / BH No	WS1	WS1	WS2	WS2	WS3
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19472	Depth (m)	0.20	0.60	0.20	0.50	0.40
Reporting Date: 11/08/2021	DETS Sample No	558150	558151	558152	558153	558154

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	0.15	< 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	0.30	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.31	0.11	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.15	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.22	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.27	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.13	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.19	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.13	< 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	0.12	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	2	< 1.6	< 1.6



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



Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-09696	Date Sampled	28/07/21	28/07/21			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Hanns Way	TP / BH No	WS4	WS4			
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied			
Order No: 19472	Depth (m)	0.20	1.00			
Reporting Date: 11/08/2021	DETS Sample No	558155	558157			

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	0.45	< 0.1		
Pyrene	mg/kg	< 0.1	MCERTS	0.48	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	0.35	< 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		



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



Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09696	Date Sampled	28/07/21	28/07/21	28/07/21	28/07/21	28/07/21
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hanns Way	TP / BH No	WS1	WS1	WS2	WS2	WS3
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 19472	Depth (m)	0.20	0.60	0.20	0.50	0.40
Reporting Date: 11/08/2021	DETS Sample No	558150	558151	558152	558153	558154

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	2	< 1	2	< 1	< 1
EPH Texas (>C16 - C21)	mg/kg	< 1	MCERTS	11	< 1	7	< 1	13
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	219	< 6	108	34	601
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	232	< 6	117	34	614



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



Soil Analysis Certificate - EPH Texas Banded						
DETS Report No: 21-09696	Date Sampled	28/07/21	28/07/21			
Soils Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Hanns Way	TP / BH No	WS4	WS4			
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied			
Order No: 19472	Depth (m)	0.20	1.00			
Reporting Date: 11/08/2021	DETS Sample No	558155	558157			

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	744	< 1	
EPH Texas (>C21 - C40)	mg/kg	< 6	MCERTS	729	< 6	
EPH Texas (C6 - C40)	mg/kg	< 6	NONE	1473	< 6	



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



Bulk Analysis Certificate						
DETS Report No: 21-09696	Date Sampled	28/07/21				
Soils Ltd	Time Sampled	None Supplied				
Site Reference: Hanns Way	TP / BH No	WS4				
Project / Job Ref: 19472	Additional Refs	None Supplied				
Order No: 19472	Depth (m)	0.40				
Reporting Date: 11/08/2021	DETS Sample No	558156				

Determinand	Unit	RL	Accreditation				
Asbestos Type ^(S)	PLM Result	N/a	ISO17025	Chrysotile			
Sample Matrix ^(S)	Material Type	N/a	NONE	Cement			

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification) that is in accordance with the Health and Safety Executive HSG 248 Appendix 2.

This report refers to samples as received, and Dets Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

RL: Reporting Limit

Subcontracted analysis ^(S)



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



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 21-09696	
Soils Ltd	
Site Reference: Hanns Way	
Project / Job Ref: 19472	
Order No: 19472	
Reporting Date: 11/08/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
558150	WS1	None Supplied	0.20	3.6	Grey sandy clay with stones
558151	WS1	None Supplied	0.60	16.6	Brown sandy clay
558152	WS2	None Supplied	0.20	5.9	Brown sandy clay with stones
558153	WS2	None Supplied	0.50	9.9	Brown sandy clay
558154	WS3	None Supplied	0.40	5.6	Brown gravelly sand with brick
558155	WS4	None Supplied	0.20	3.4	Brown gravelly sand with stones
558157	WS4	None Supplied	1.00	12.2	Brown sandy clay with gravel

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

Insufficient Sample ^{I/S}

Unsuitable Sample ^{U/S}



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



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-09696

Soils Ltd

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

Reporting Date: 11/08/2021

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



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



Water Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-09696

Soils Ltd

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

Reporting Date: 11/08/2021

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

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	20.0	%
Loss on Ignition	Soil	BS EN 12457	35.0	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	23.0	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	11.6	%
pH	Soil	BS EN 12457	0.28	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	18.7	%
Barium	Leachate	BS EN 12457	11.6	%
Cadmium	Leachate	BS EN 12457	20.3	%
Chromium	Leachate	BS EN 12457	18.3	%
Copper	Leachate	BS EN 12457	24.3	%
Mercury	Leachate	BS EN 12457	23.7	%
Molybdenum	Leachate	BS EN 12457	14.7	%
Nickel	Leachate	BS EN 12457	16.1	%
Lead	Leachate	BS EN 12457	15.7	%
Antimony	Leachate	BS EN 12457	17.9	%
Selenium	Leachate	BS EN 12457	22.0	%
Zinc	Leachate	BS EN 12457	17.4	%
Chloride	Leachate	BS EN 12457	15.3	%
Fluoride	Leachate	BS EN 12457	16.4	%
Sulphate	Leachate	BS EN 12457	20.6	%
TDS	Leachate	BS EN 12457	12.0	%
Phenol Index	Leachate	BS EN 12457	14.0	%
DOC	Leachate	BS EN 12457	10.0	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	35.0	%
pH	Soil	BS 3882: 2015	0.14	Units
Carbonate	Soil	BS 3882: 2015	16.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	14.9	%
Copper	Soil	BS 3882: 2015	16.0	%
Nickel	Soil	BS 3882: 2015	17.7	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%



Tim Rudkin
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
t: 01622 850410

DETS Report No: 21-10171

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

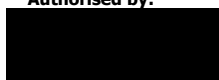
Sample Receipt Date: 18/08/2021

Sample Scheduled Date: 18/08/2021

Report Issue Number: 1

Reporting Date: 24/08/2021

Authorised by:



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.



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



Soil Analysis Certificate						
DETS Report No: 21-10171	Date Sampled	28/07/21	28/07/21	28/07/21		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Hanns Way	TP / BH No	WS2	WS2	WS4		
Project / Job Ref: 19472	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 19472	Depth (m)	0.20	0.50	1.00		
Reporting Date: 24/08/2021	DETS Sample No	560149	560150	560151		

Determinand	Unit	RL	Accreditation			
Asbestos Quantification ^(S)	%	< 0.001	ISO17025	0.001	< 0.001	0.002

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



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

Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 21-10171

Soils Ltd

Site Reference: Hanns Way

Project / Job Ref: 19472

Order No: 19472

Reporting Date: 24/08/2021

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.3 General Assessment Criteria

HUMAN HEALTH RISK ASSESSMENT

Introduction

The statutory definition of contaminated land was initially defined in the Environmental Protection Act 1990, ref. 1.1, which was introduced by the Environment Act 1995, ref. 1.2, and retained in the Environment Act 2021, ref 1.3, as;

‘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 land has developed as a direct result of the introduction of these Acts. The technical guidance supporting the original legislation was summarised in a number of key documents collectively known as the Contaminated Land Reports (CLRs). These have since been replaced or superseded by Land Contamination Risk Management (LCRM) 2021, ref 1.4 produced and administrated by the Environment Agency online through the .GOV.uk website <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm> .

However, the basic definitions, methodology and guidance remain essentially the same utilizing the UK Contaminated Land Exposure Assessment Models (CLEA) as within the original CLR and planning guidance it replaces or supersedes.

In establishing whether a site fulfils the statutory definition of ‘contaminated land’ it remains 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 identified 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 therefore be defined as the confirmation of a link between a contaminant ‘source’ and a vulnerable at risk ‘receptor’ by means of a ‘pathway’ and that the risk is potentially significant. If there is no complete linkage, risk defaults to low to negligible and can never be potentially significant.

Assessment Methodology

A four-stage assessment process is followed for identifying potential pollutant linkages on a site. These stages are summarised 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 in the context of existing and future proposals.

Stages 1 and 2 develop an initial '*conceptual model*' based upon information collated from desk-based available and existing site information and a walkover of the site as recommended in BS10175 and LCRM. The formation of any conceptual model is an iterative process and as such it should be updated and refined throughout each phase of the project to reflect any additional information obtained and unknowns being resolved and identify the potential contaminants of concern at the site, i.e. those with the potential to cause significant harm to identified receptors.

The extent of the desk studies and enquiries to be conducted should be in general accordance with BS10175 and other UK guidance to produce an initial conceptual model highlighting the known potential risks, remaining unknowns and contaminants of concern. The information from these enquiries is presented in a desk study or preliminary report with recommendations, if necessary, for further work based upon the conceptual model findings and any identified or unresolved unknowns.

If potential pollutant linkages or potentially significant unknowns are identified within the initial conceptual model, further site investigation and report will be recommended and usually required under planning. Such investigation should be based on and driven by the findings of the initial conceptual model and planned in general accordance with BS10175, LCRM and other current UK guidance where relevant. The number of exploratory holes and samples collected for analysis should be consistent with the size, extent and nature of the site, the identified contaminants of concern and the level of initial risk identified in the initial conceptual model. This will enable a contamination risk assessment to be conducted in accordance with current UK requirements, at which point the conceptual model can be updated and any relevant pollutant linkages can be further quantified and any remaining unknowns resolved. As previously this is an iterative process that may highlight or require additional investigation to resolve to the satisfaction of the regulator.

A two-stage investigation process may therefore be more appropriate where time constraints are less of an issue with the first intrusive investigation being conducted as an initial or screening assessment to confirm or validate the presence of potential sources on site identified in the initial conceptual model and to investigate if additional unknown sources not previously identified are present. This helps to define the scope, extent and requirements of a second more refined and targeted investigation to delineate wherever possible the extent of the identified contamination, contaminants of concern and/or remaining unknowns.

All site works should be undertaken in general accordance with the British Standards BS 10175, ref. 5, for environmental only investigations and BS 5930:2015, ref. 1.6, in the case of combined Geoenvironmental and/or Geotechnical investigations.

The results of analysis are compared initially against generic guidance values which are dependent on the proposed end-use of the development and which must ultimately be based on traceable, scientifically valid and justified exposure and chemical data using the UKCLEA methodology.

The end-use and therefore potential exposure pathways may be defined as one of the following under current UK guidance;

- Residential with homegrown produce i.e. typical low rise and low-density housing with gardens where vegetables and fruits may be grown for home consumption.
- Residential without homegrown produce i.e. low-density housing where no gardens are present where vegetables and fruits could be grown for home consumption.
- Allotments – i.e. areas where vegetables and fruits are grown for home consumption but are not specifically associated with a residential property.
- Public open space residential – i.e. grassed areas adjacent and/or directly related to high density housing and other common or communal open areas on which underlying soils could be exposed but on which vegetables and fruits are not grown for consumption.
- Public open space – i.e. areas such as parks, playing fields and other recreational areas to which public access is possible but otherwise to which there is no direct residential linkage.
- Commercial – i.e. industrial premises where there is limited exposure to soil and residents are not present on site.

Standard Land-use Scenarios

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

Residential with homegrown produce

Generic scenario assumes a 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 assumed to be a young female child (zero to six years old)
 - 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.
-

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 homegrown vegetables will not occur and the pathways of direct ingestion and produce inputs are suitably moderated.

Allotments

Areas of open space commonly made available to local users but remote from residential properties, but on which tenants may grow fruit and vegetables 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 only occasional accompanied visits.

Although some allotment holders may choose to keep animals on allotments, potential exposure to animal products is not currently considered within the CLEA model.

-
- Critical receptor is a young female child (zero to six years old)
 - 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 but at reduced exposure levels reflecting non-residential status.
-

Commercial

This generic scenario assumes a typical commercial or light industrial property 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 over working lifetime
 - Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours but exposure reduced to reflect non-residential nature and general lack of open spaces.
-

Public Open Space within Residential Area

This generic scenario refers to any grassed area up to 0.05 ha that is associated with residential properties but is not for their exclusive use and on which no fruit or vegetables are grown for home consumption.

-
- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil which can be interacted with directly
 - Predominantly used by children for play and/or access
 - Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
-

-
- older children chosen as the critical receptor on basis that they will use site most frequently (age class 4-9 years)
-
- ingestion rate assumed to be 75 mg.day⁻¹
-

Public Open Space Park

This generic scenario refers to any public park or grassed space 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% assumed 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 of soils).
-

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC) generated using the CLEA model based on the exposure and land use scenario assumptions noted above.

GAC's are deliberately conservative values adopted to ensure that they are applicable to the majority of possible contaminated sites and below which there is considered a low to negligible risk to identified human health receptors, i.e. there can be no harm. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC's derived by a competent third party or the Environment Agency / DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC's 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 or the contaminant is susceptible to wide variation depending on factors such as form and bioavailability, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific or remediation values for relevant soil contaminants based on site and contaminant specific conditions.

In 2014, the publication of Category 4 Screening Levels (C4SL), refs 1.8 and 1.9, 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 1.7 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. 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 For Use Levels (S4ULs) published by LQM, ref. 1.10, 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, assessment criteria may be generated using the Contaminated Land Exposure Assessment (CLEA) Software Version 1.07, ref. 1.11, Toxicological and physico-chemical/fate and transport data used to generate the criteria 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 originally from the relevant CLR 9 TOX report, or updated toxicological data published by the Environment Agency (2009), where available. Where no TOX report is available reference has been made to appropriately determined health criteria values, derived from the above-noted hierarchy, as this is considered to represent appropriate peer reviewed data sources. Similarly, fate and transport data should also be determined by reference to appropriate sources and the CLEA model assumptions.

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. 1.12. Individual concentrations are then compared to the selected guideline values to identify and isolate concentrations of contaminants that are in excess of the selected screening low or no risk criteria.

Where the risk estimation identifies significant concentrations of one or more contaminants, further risk evaluation needs to be undertaken often as a site specific DQRA in line with current guidance to determine and confirm if the identified exceedances are significant in the context of the proposed development or activity.

References

- 1.1 The Environmental Protection Act, Part IIA, Section 78, DoE 1990.
- 1.2 Environment Act 1995, Section 57, DoE 1995.
- 1.3 Environment Act 2021 OEP 2021.
- 1.4 Land Contamination Risk Management Gov.UK (EA) 2021
- 1.5 BS 10175: 2011+A2:2017 '*Investigation of potentially contaminated sites. Code of practice*', British Standards Institute, 2017
- 1.6 BS 5930: 2015+A1:2020 '*Code of practice for ground investigations*', British Standards Institute, 2015
- 1.7 Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', Environment Agency, 2008
- 1.8 DEFRA SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination, published March 2014.
- 1.9 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.
- 1.10 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.
- 1.11 CLEA '*Software Version 1.071*' (downloaded from the CL:AIRE website , <https://www.claire.co.uk/home/news/44-risk-assessment/178-soil-guideline-values>)
- 1.12 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.

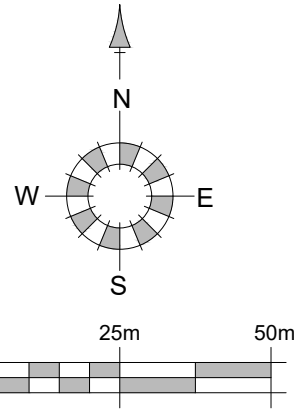
Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)									Name	Authority	Date	
			With			Without			Allotments			Commercial			Residential			Park						
			SOM	1.0	2.5	6	1	2.5							6	1	2.5	6	1	2.5				6
Type	Contaminants	Species	Year																					
Metals	Antimony		2010					550						7500							EIC/AGS/CL:AIRE	EIC/AGS/CL:AIRE	2010	
	Arsenic		2014			37		40			49		640		79		168			S4UL	LQM/CIEH	2015		
			2015			37		40			40		640		79		170							
	Barium		2010					1300					22000							EIC/AGS/CL:AIRE	EIC/AGS/CL:AIRE	2010		
	Beryllium		2015			1.7		1.7			35		12		2.2		63			S4UL	LQM/CIEH	2015		
	Boron		2015			290		11000			45		240000		21000		46000			S4UL	LQM/CIEH	2015		
	Cadmium		2015			11		85			1.9		190		120		532			S4UL	LQM/CIEH	2015		
	Chromium	III	2014			26		149			4.9		410		220		880			C4SL	DEFRA	2014		
			2015			910		910		18000		8600		1500		33000			S4UL	LQM/CIEH	2015			
			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					210		310			84		6000		760		1400			C4SL	DEFRA	2014		
	Mercury	Elemental	2012			1.0		1.0			26		26							SGV	DEFRA	2012		
			2015			1.2		1.2		21		58		16		30			S4UL	LQM/CIEH	2015			
		Inorganic	2012			170		170			80		36000							SGV	DEFRA	2012		
			2015			40		56		19		1100		120		240			S4UL	LQM/CIEH	2015			
		Methyl	2012			11		11			8		410							SGV	DEFRA	2012		
			2015			11		15			6		320		40		68			S4UL	LQM/CIEH	2015		
	Molybdenum		2010					670					17000							EIC/AGS/CL:AIRE	EIC/AGS/CL:AIRE	2010		
	Nickel		2012			130		130			230		1800							SGV	DEFRA	2012		
			2015			130		180			53		980		230		800			S4UL	LQM/CIEH	2015		
	Selenium		2012			350		350			120		13000							SGV	DEFRA	2012		
			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		
BTEX & MTBE	Benzene		2012			0.33		0.33			0.07		95						SGV	DEFRA	2012			
			2014			0.87		3.3			0.18		98		140		230			C4SL	DEFRA	2014		
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015
	Toluene		2012			610		610			120		4400						SGV	DEFRA	2012			
			2015	130	290	660	880	1900	3900	22	51	120	65000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Ethylbenzene		2012			350		350			90		2800						SGV	DEFRA	2012			
			2015	47	110	260	83	190	440	16	39	91	4700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015
	Xylenes	o-xylene	2012			250		250			160		2600							SGV	DEFRA	2012		
			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	2012			240		240			180		3500							SGV	DEFRA	2012		
			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	2012			230		230			160		3200							SGV	DEFRA	2012		
			2015	56	130	310	79	180	310	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	130000	180000	S4UL	LQM/CIEH	2015
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	220000	320000	S4UL	LQM/CIEH	2015
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	18000	21000	S4UL	LQM/CIEH	2015
	Aliphatic >C10 - C12		2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	24000	S4UL	LQM/CIEH	2015
	Aliphatic >C12 - C16		2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	25000	26000	S4UL	LQM/CIEH	2015
	Aliphatic >C16 - C35		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C35 - C44		2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9300	S4UL	LQM/CIEH	2015

Land Use			Residential With or Without Plant Uptake									Public Open Space (POS)										Name	Authority	Date			
			With						Allotments			Commercial			Residential						Park						
			home-grown produce			Without home-grown produce																					
Type	Contaminants	Species	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						
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015			
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015			
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015			
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015			
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015			
	Aliphatic + Aromatic >C44 - C70			1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015			
Polycyclic Aromatic Hydrocarbons (PAH' s) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015			
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015			
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	540000	540000	740000	740000	740000	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			
	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015			
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015			
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015			
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015			
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015			
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	S4UL	LQM/CIEH	2015			
	Coal Tar(Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015			
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015			
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015			
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015			
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015			
	Tetrachloroethene		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015			
			2021	0.31	0.7	1.6	0.32	0.71	1.6	2	4.8	11	24	55	130	3200	3300	3400	1400	1900	2500	C4SL	CLAIRE	2021			
	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 (TCE)		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			
			2021	0.0093	0.02	0.043	0.0097	0.02	0.045	0.032	0.072	0.16	0.73	1.5	3.4	76	78	79	41	54	69	C4SL	CLAIRE	2021			
	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			
Explosives	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			
			2021	0.0064	0.01	0.017	0.015	0.019	0.029	0.0017	0.0031	0.0058	1.1	1.4	2.2	7.8	7.8	7.8	18	19	19	C4SL	CLAIRE	2021			
	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015			
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)		2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015			
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)		2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000	23000	24000	S4UL	LQM/CIEH	2015			
Pesticides	Aldrin		2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015			
	Dieldrin		2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41																

Land Use			Residential With or Without Plant Uptake									Allotments			Commercial			Public Open Space (POS)									Name	Authority	Date
			With			Without			Residential									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																										
Phenols & Chlorophenols	1,3-Dichlorobenzene		2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015					
	1,4-Dichlorobenzene		2015	61	150	350	61	150	350	15	37	88	4400	10000	25000	17000	17000	1700	36000	36000	36000	S4UL	LQM/CIEH	2015					
	1,2,3,-Trichlorobenzene		2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770	1100	1600	S4UL	LQM/CIEH	2015					
	1,2,4,-Trichlorobenzene		2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700	2600	4000	S4UL	LQM/CIEH	2015					
	1,3,5,-Trichlorobenzene		2015	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380	580	860	S4UL	LQM/CIEH	2015					
	1,2,3,4,-Tetrachlorobenzene		2015	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	1500	1600	1600	S4UL	LQM/CIEH	2015					
	1,2,3,5,- Tetrachlobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49	120	240	78	79	79	110	120	130	S4UL	LQM/CIEH	2015					
	1,2,4, 5,- Tetrachlobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42	72	96	13	13	13	25	26	26	S4UL	LQM/CIEH	2015					
	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		2012	420			420			280			3200						SGV			DEFRA			2012				
			2015	120	200	380	440	690	1200	23	42	83	440	690	1300	440	690	1300	440	690	1300	S4UL	LQM/CIEH	2015					
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015					
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015					
Others	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015					
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015					
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012	8			8			8			240						SGV			DEFRA			2012				

NOTE	
Priority	Guideline (mg kg ⁻¹)
1	Site Specific Assessment Criteria (SSAC) (Soils Limited)
2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014 and 2021)
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 should have priority unless site specific, Client or regulatory requirements dictate otherwise – which must be justified	
Table reviewed January 2022	

Appendix D Information Provided by the Client

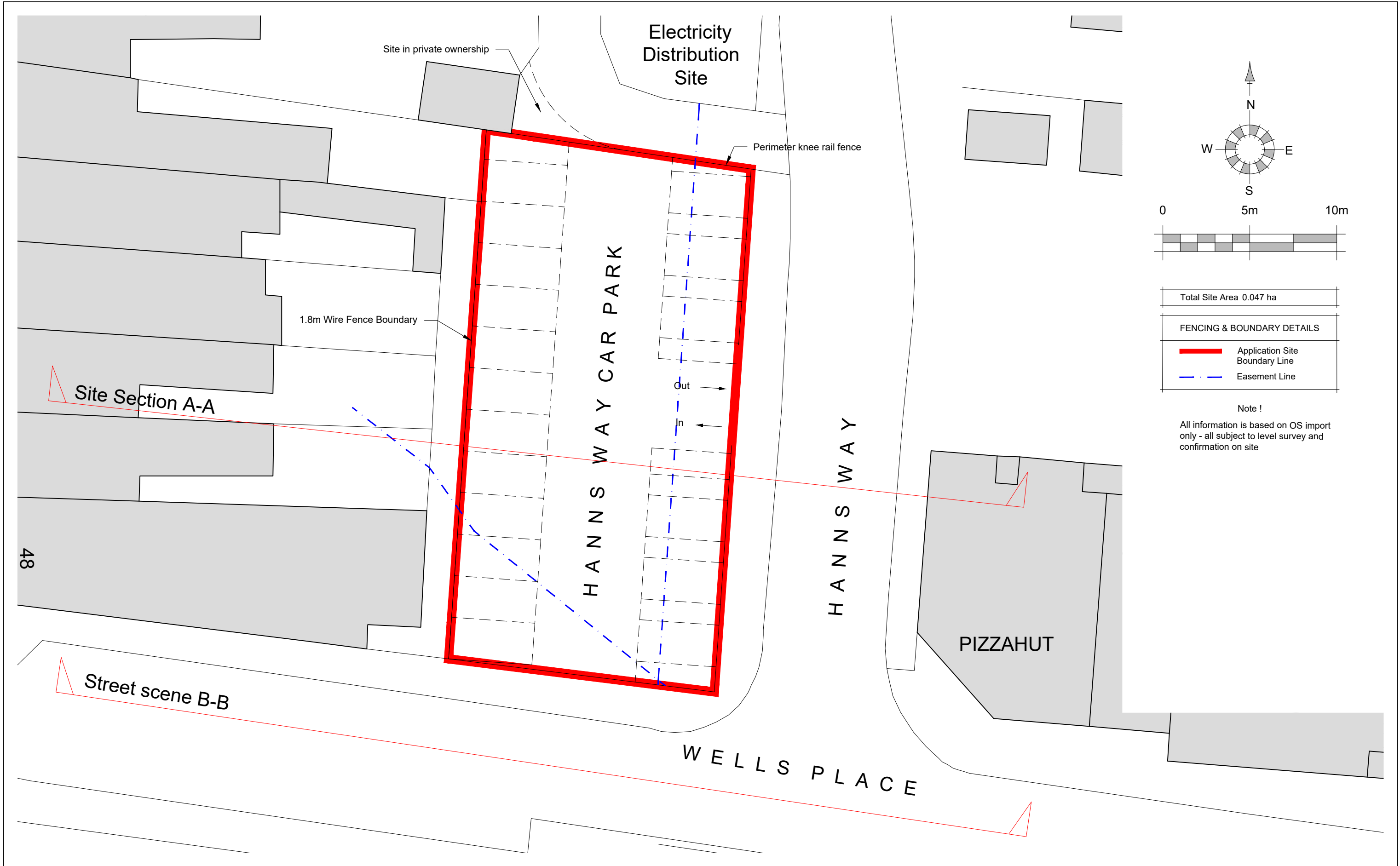


Ordnance Survey, (c) Crown Copyright 2023. All rights reserved. Licence number 100022432

Work in Progress

CLIENT:	Doswell Projects	PROJECT:	Hanns Way Eastleigh
SCALE:	1:1250 (A4 ORIGINAL)	DRAWING:	Site Location Plan
DRAWN:	NL	S101	—
DATE:	27/03/23	22205	

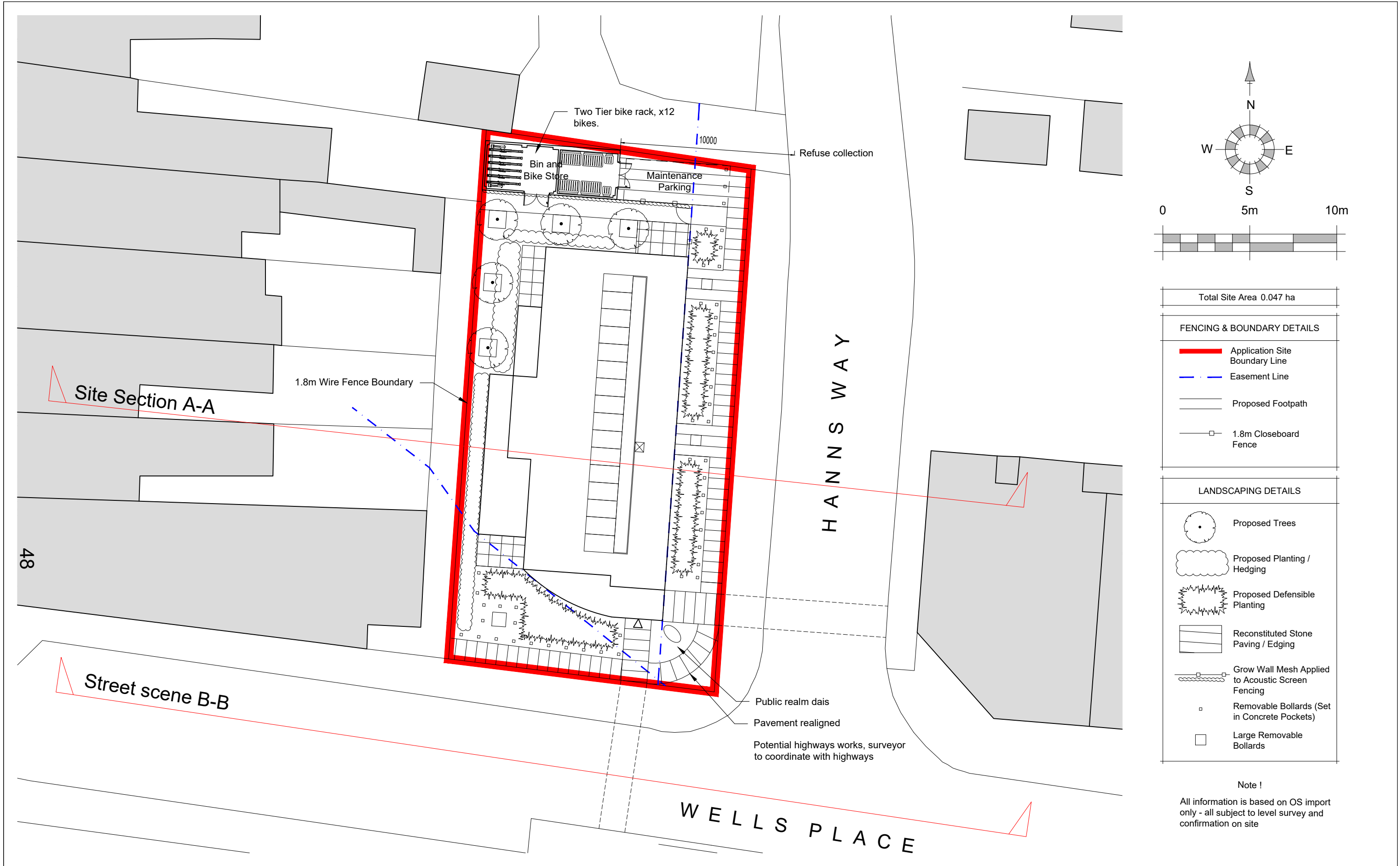




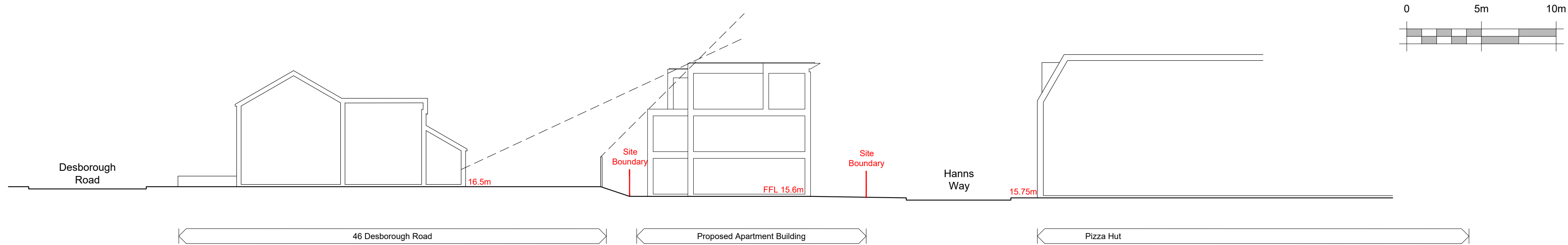
Total Site Area 0.047 ha	
FENCING & BOUNDARY DETAILS	
	Application Site Boundary Line
	Easement Line

Note !
All information is based on OS import only - all subject to level survey and confirmation on site

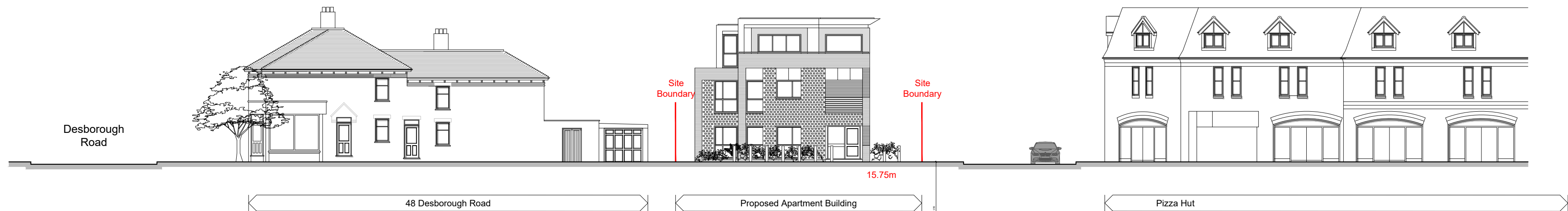
REV.	DATE	REVISIONS:	BY	STATUS:	CLIENT:	Doswell Projects Ltd.	PROJECT:	Hanns Way, Eastleigh	 architecture planning masterplanning Broadmede House, Farnham Business Park, Weydon Lane, Farnham, Surrey GU9 8QT. info@osparchitecture.com www.osparchitecture.com Tel: 01252 267878	
Preliminary This drawing may be scaled or cross referenced to the scale bar for planning application purposes only. Do not scale for any other purpose, use figured dimensions only. Subject to site survey and all necessary consents. All dimensions to be checked by user and any discrepancies, errors or omissions to be reported to the Architect before work commences. This drawing is to be read in conjunction with all other relevant materials. OS Licence No. 100007327					SCALE:	1:200 (A3 ORIGINAL)	DRAWING:	Existing Site Layout		
					DRAWN:	MM	22205	S102		—
					DATE:	29/03/23				
					© COPYRIGHT EXISTS ON THE DESIGNS AND INFORMATION SHOWN ON THIS DRAWING					



REV. A	DATE 11/04/22	REVISIONS: Minor Updates.	BY XX	STATUS: Preliminary	CLIENT: Doswell Projects Ltd.	PROJECT: Hanns Way, Eastleigh	 architecture planning masterplanning Broadmede House, Farnham Business Park, Weydon Lane, Farnham, Surrey GU9 8QT. info@osparchitecture.com www.osparchitecture.com Tel: 01252 267878
© COPYRIGHT EXISTS ON THE DESIGNS AND INFORMATION SHOWN ON THIS DRAWING					SCALE: 1:200 (A3 ORIGINAL)	DRAWING: Proposed Site Layout	
					DRAWN: MM DATE: 29/03/23	22205 OS Licence No. 100007327	



Datum 10.000
Site Section A - A



Datum 10.000
Streetscene B - B

Note !
All information is based on OS import only - all subject to level survey and confirmation on site

REV.	DATE	REVISIONS:	BY	REV.	DATE	REVISIONS:	BY	STATUS:	CLIENT:	PROJECT:	DRAWING:	
									Doswell Projects Ltd.	Hanns Way, Eastleigh	Existing Site Section and Street scene	
									SCALE:	1:200 (A2 ORIGINAL)	P103	—
									DRAWN:	MM	22205	
									DATE:	30/03/23		

Work in Progress

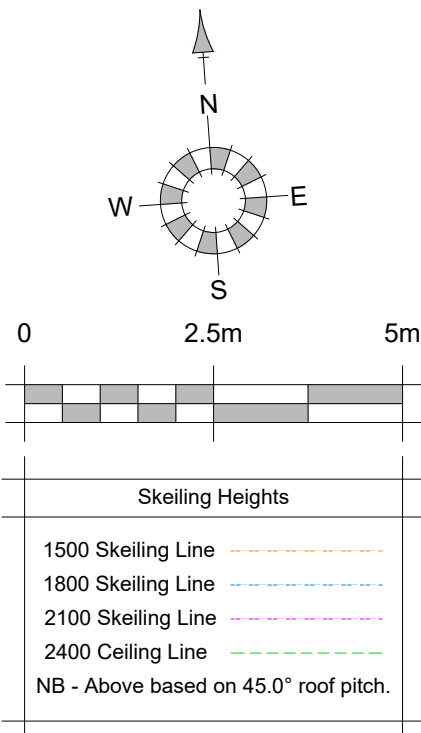
© COPYRIGHT EXISTS ON THE DESIGNS AND INFORMATION SHOWN ON THIS DRAWING

This drawing may be scaled or cross referenced to the scale bar for planning application purposes only. Do not scale for any other purpose, use figured dimensions only. Subject to site survey and all necessary consents. All dimensions to be checked by user and any discrepancies, errors or omissions to be reported to the Architect before work commences. This drawing is to be read in conjunction with all other relevant materials.

OS Licence No. 100007327

architecture planning masterplanning

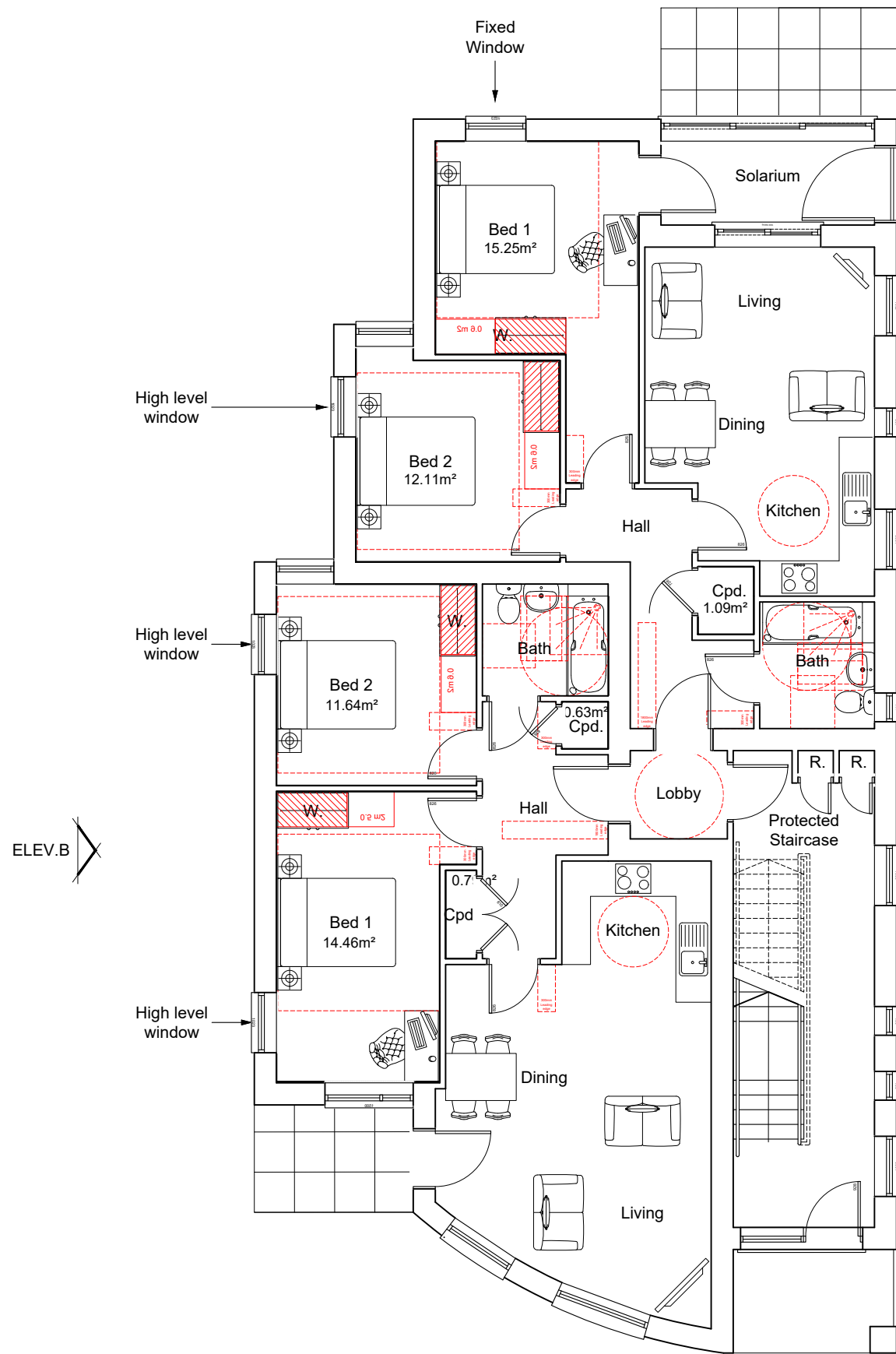
Broadmede House, Farnham Business Park, Weydon Lane, Farnham, Surrey GU9 8QT.
info@osparchitecture.com www.osparchitecture.com
Tel: 01252 267878



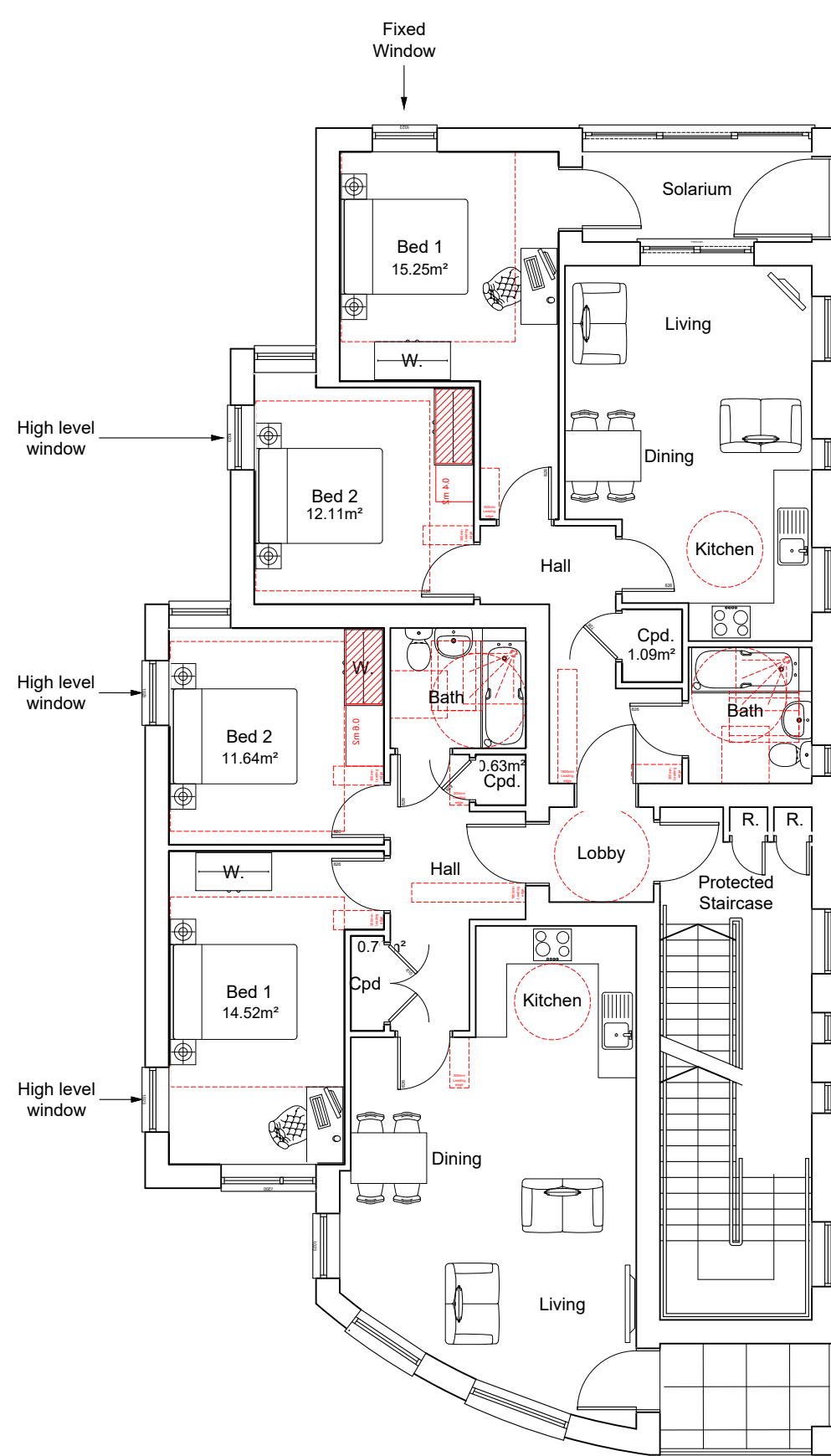
Nationally Described Space Standards (2 Bed 3 person 1 storey)	
Gross Internal Area (requirement 61m²)	62.8m²
Built-in storage (requirement 2.0m³)	2.29m³
Bed 1 - Double/ twin (req. 11.5m², 2.75m wide)	15.25m², 3.4m
Bed 2 - Single (req. 7.5m², 2.15m wide)	12.11m², 3.4m

Nationally Described Space Standards (2 Bed 3 person 1 storey)	
Gross Internal Area (requirement 61m²)	62.8m²
Built-in storage (requirement 2.0m³)	2.29m³
Bed 1 - Double/ twin (req. 11.5m², 2.75m wide)	15.25m², 3.4m
Bed 2 - Single (req. 7.5m², 2.15m wide)	12.11m², 3.4m

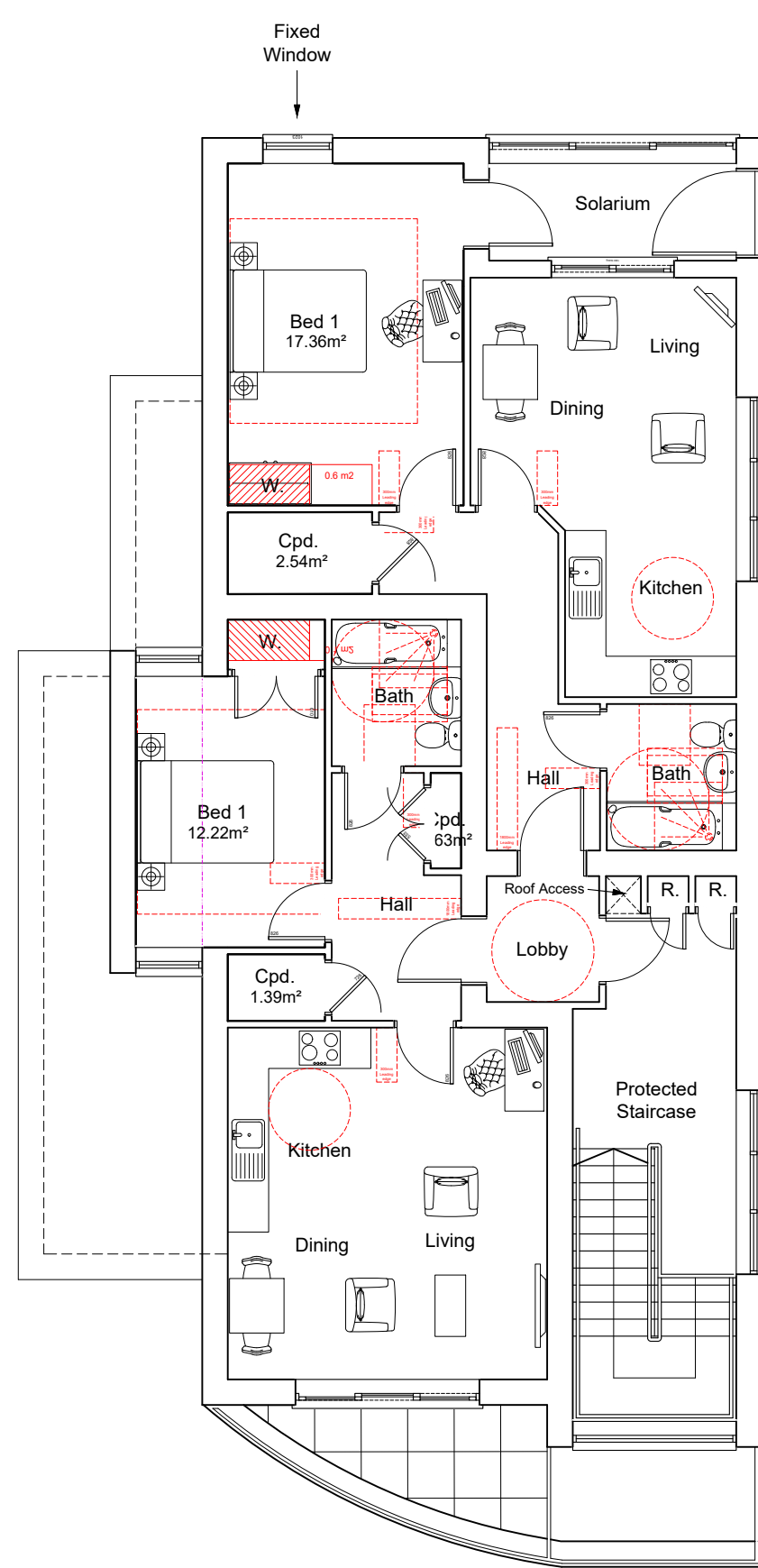
Nationally Described Space Standards (1 Bed 2 person 1 storey)	
Gross Internal Area (requirement 50m²)	54.2m²
Built-in storage (requirement 1.5m³)	3.14m³
Bed 1 - Double/ twin (req. 11.5m², 2.75m wide)	17.36m², 3.46m



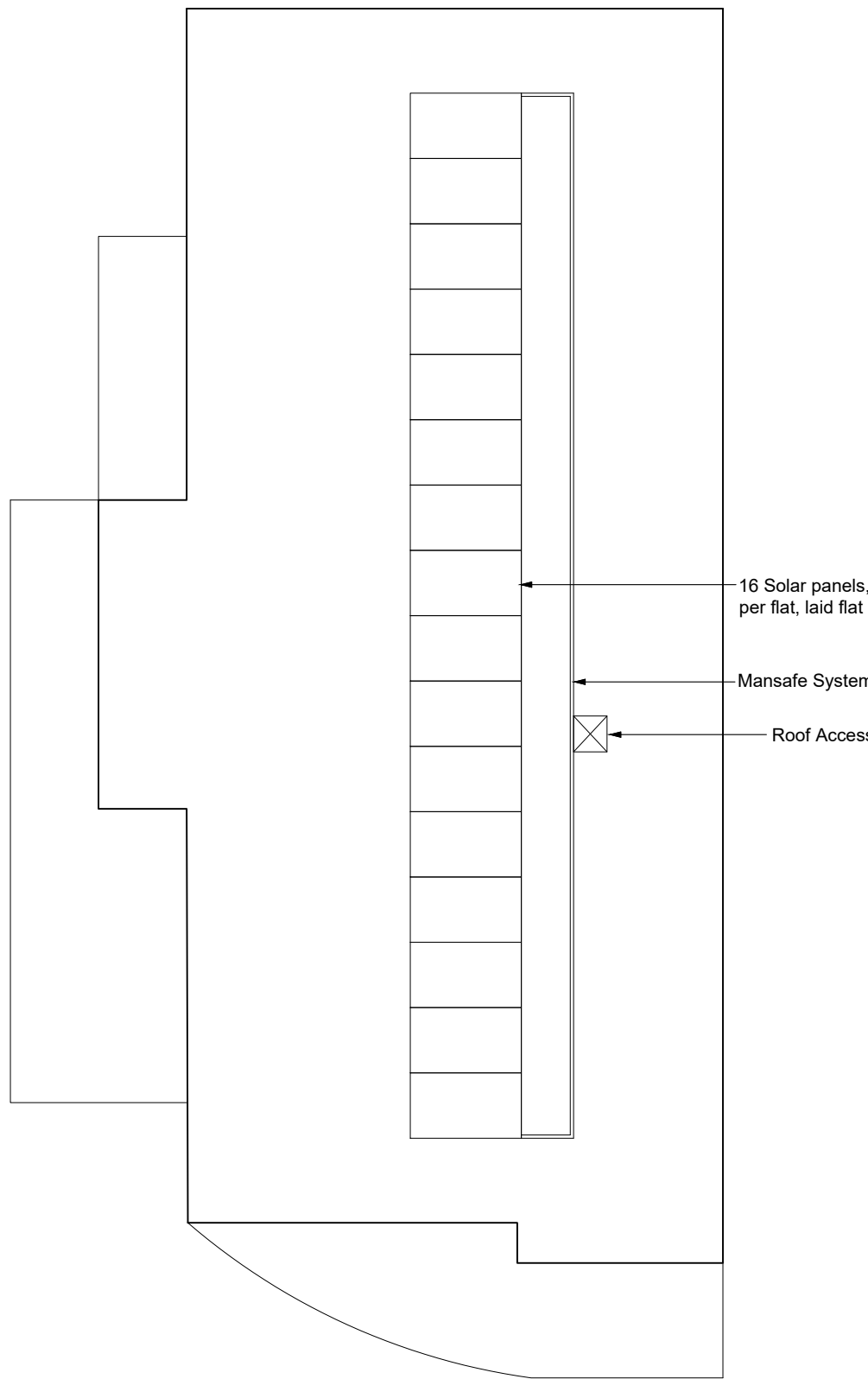
Ground Floor Plan



First Floor Plan



Second Floor Plan



Roof Plan

Nationally Described Space Standards (2 Bed 4 person 1 storey)	
Gross Internal Area (requirement 70m²)	70.1m²
Built-in storage (requirement 2.0m³)	2.52m³
Bed 1 - Double/ twin (req. 11.5m², 2.75m wide)	14.46m², 2.77m
Bed 2 - Double/ twin (req. 11.5m², 2.55m wide)	11.64m², 3.4m

Nationally Described Space Standards (2 Bed 4 person 1 storey)	
Gross Internal Area (requirement 70m²)	70.1m²
Built-in storage (requirement 2.0m³)	2.52m³
Bed 1 - Double/ twin (req. 11.5m², 2.75m wide)	14.46m², 2.77m
Bed 2 - Double/ twin (req. 11.5m², 2.55m wide)	11.64m², 3.4m

Nationally Described Space Standards (1 Bed 2 person 1 storey)	
Gross Internal Area (requirement 50m²)	50.1m²
Built-in storage (requirement 1.5m³)	2.12m³
Bed 1 - Double/ twin (req. 11.5m², 2.75m wide)	12.22m², 2.77m

REV.	DATE	REVISIONS:	BY	REV.	DATE	REVISIONS:	BY	REV.	DATE	REVISIONS:	BY	STATUS:

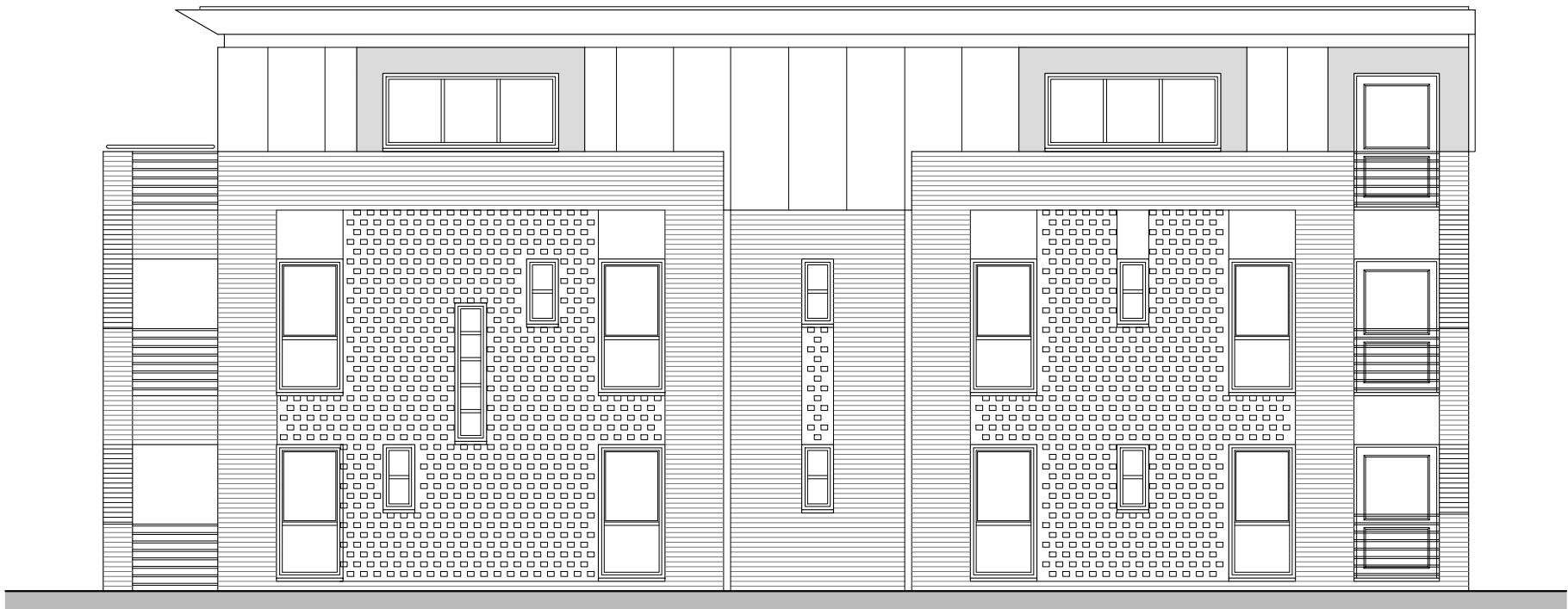
Work in Progress

CLIENT:	Doswell Projects Ltd.	PROJECT:	Hanns Way Eastleigh
SCALE:	1:100 (A1 ORIGINAL)	DRAWING:	Proposed Floor Plans
DRAWN:	NL	22205	SK110
DATE:	05/04/23		—

OSP
architecture planning masterplanning
Broadmeade House, Farnham Business Park,
Weydon Lane, Farnham, Surrey GU9 8QT.
info@osparchitecture.com www.osparchitecture.com
Tel: 01252 267878



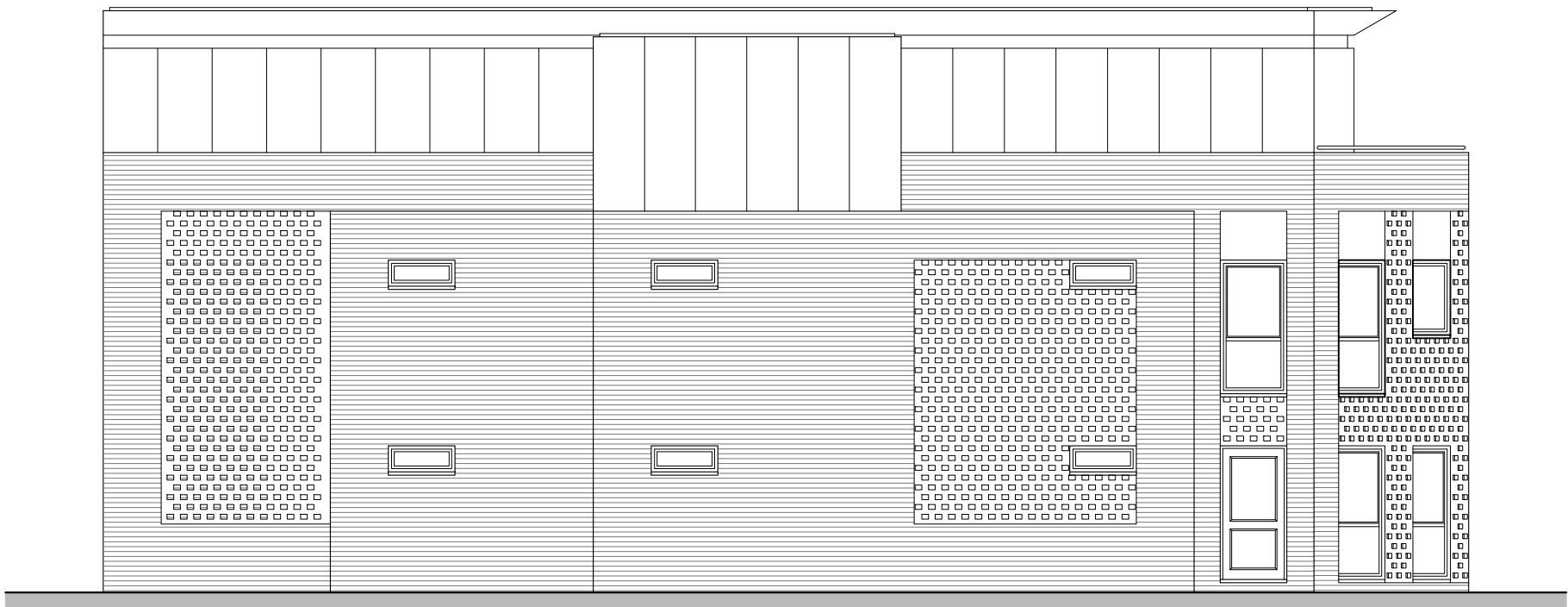
Front Elevation



Side Elevation B



Rear Elevation



Side Elevation A

REV.	DATE	REVISIONS:	BY	REV.	DATE	REVISIONS:	BY	REV.	DATE	REVISIONS:	BY	STATUS:

Work in Progress

CLIENT:	Doswell Projects Ltd.	PROJECT:	Hanns Way Eastleigh
SCALE:	1:100 (A1 ORIGINAL)	DRAWING:	Proposed Elevations
DRAWN: DATE:	NL 05/04/23	22205	SK111 —



architecture planning masterplanning

Broadmede House, Farnham Business Park,
Weydon Lane, Farnham, Surrey GU9 8QT.
info@osparchitecture.com www.osparchitecture.com
Tel: 01252 267878

Soils Limited
Geotechnical & Environmental Consultants

Newton House
Cross Road, Tadworth
Surrey KT20 5SR

T 01737 814221
W soilslimited.co.uk