WDE consulting
Grounded solutions

62a Western Road
Tring
Hertfordshire
HP23 4BB
01442 825570
wdeconsulting.co.uk

7th June 2024
21298c01

Great Dunmow Town Council
c/o R. Emmerson
Foakes House
47 Stortford Road
Great Dunmow
Essex
CM6 1DG

Dear Roy,

GEO-SITE ASSESSMENT LETTER REPORT – JUNE 2024
DOCTOR'S POND, GREAT DUNMOW

Overview

WDE Consulting (WDE) is pleased to present Great Dunmow Town Council (the *client*) with the results from the Geo-Site Assessment completed at Doctor's Pond, Great Dunmow (Figure 1 and Figure 2) in May 2024. It is understood the pond acts as a catchment for run-off from local roads and open areas and may be causing an unacceptable risk to the ecological receptors including fish. The pond is going to be de-silted and WDE has been asked to investigate the silt within the pond and advise further actions for disposal.

The works described in this report are subject to WDE's Standard Terms of Business. This report was finalised in June 2024 and should be read in light of any subsequent changes in legislation, statutory requirements, statutory guidance, non-statutory guidance, relevant research, and industry practices. Graphs, and laboratory testing are presented in the attached appendices.

WDE Consulting has duly taken account of the recommendations contained within the relevant guidance documents[1,2,3] and legislation during the preparation of this report.

Scope of Work

A summary of the scope of work undertaken is presented in Table 1 along with the dates of their completion.

Table 1 – Scope of Work Undertaken

Item	Description	Start Date	Completion Date
1	Pond Sampling	13/05/2024	13/05/2024
2	Analytical Laboratory analysis	17/05/2024	30/05/2024
3	Geotechnical Laboratory analysis	17/05/2024	06/06/2024
4	Geo-Site Assessment Report	03/06/2024	07/06/2024

[1] Environment Agency. 2020. Land Contamination Risk Management (LCRM)

[2] British Standards 2011. Investigation of Potentially Contaminated Sites-Codes of Practice. BS10175:2011

[3] British Standards. 2015. Code of Practice for Site Investigations. BS5930

Background Information

Information Sources

Information that was used in determining the site history and environmental setting were taken from publicly available data sources.

Site Location and Description

The site is located at Doctor's Pond, Great Dunmow, Essex at postcode CM6 1AY and National Grid Reference TL 62710 22194 (Figure 1) and is situated in a mixed commercial and residential setting.

The site consists of an oval shaped pond measuring ~90x35m with North Street adjacent to the pond on the eastern site boundary. The southern boundary has housing facing the pond and a public park is located to the west of the site. The pond itself is also currently open for fishing and to the general public.

No areas of concern were identified during the site walkover.

Geology, Hydrogeology and Hydrology

Published geological information indicates that the bedrock geology consists of the London Clay Formation with superficial deposits of Head (clay, silt and sand and gravel). The bedrock deposits have not been deemed unproductive and the site lies within an outer source protection zone 2.

Environmental Setting

The site does not lie within any Environmental Designations. There are no licensed or historical landfills or SSSI's within 250m radius from the site.

Phase 2 Intrusive Investigation

Field Methods

The sampling locations are detailed on Figure 2 and comprise the following:

- 6no. locations (S1-S6) across the pond were sampled at ~0.70m depth using a telescopic sampling device.

All of the fieldwork was completed under the supervision of a WDE site engineer. Representative soil samples were taken for accredited laboratory testing. Soil samples were transported to a UKAS accredited laboratory under chain of custody conditions.

No constraints were encountered during the investigation.

Field Results

Encountered Geology

The typical material which formed the bed of the pond comprised of dark brown organic silty clay (sludge/slurry) with occasional fine to medium rounded gravels.

Soil Chemical Assessment

The soil chemical data is presented in Appendix C, the key findings of which include:

- Non-hazardous loose asbestos fibres (chrysotile) were identified in S5 although (<0.001%).
- There have been no exceedances of public open space GACs.
- The pond materials have a likely waste classification of *hazardous* due to benzo(a)pyrene and TPH concentration, and a WAC limit of *hazardous waste landfill*

Therefore, the materials will likely need to be disposed of to a hazardous waste landfill. This should be confirmed by the receiving landfill prior to exportation.

Geotechnical Assessment

A copy of the test results is presented in appendix D and is summarised in Table 2.

Table 2 – Summary of Geotechnical Test Results

Location Ref	Description	Depth (m bgl)	MC %	PI%	PSD %
S1	Organic silty clay (slurry)	0.70	351 - 371	86	
S2					94% fines, 6% sand and gravel
S3	Clayey sand		62		14% fine, 13% gravel, 73% sand
S4	Silty clay (slurry)		284	81	

The silty clay slurry had a high moisture content and plasticity index and is likely to reduce in volume by 3x when dry given the high initial moisture content.

However, this is an estimate, and the actual shrinkage rate may differ based on the specific characteristics of the soil which is not homogenous and the drying process.

Please do not hesitate to contact us should you require any additional information.

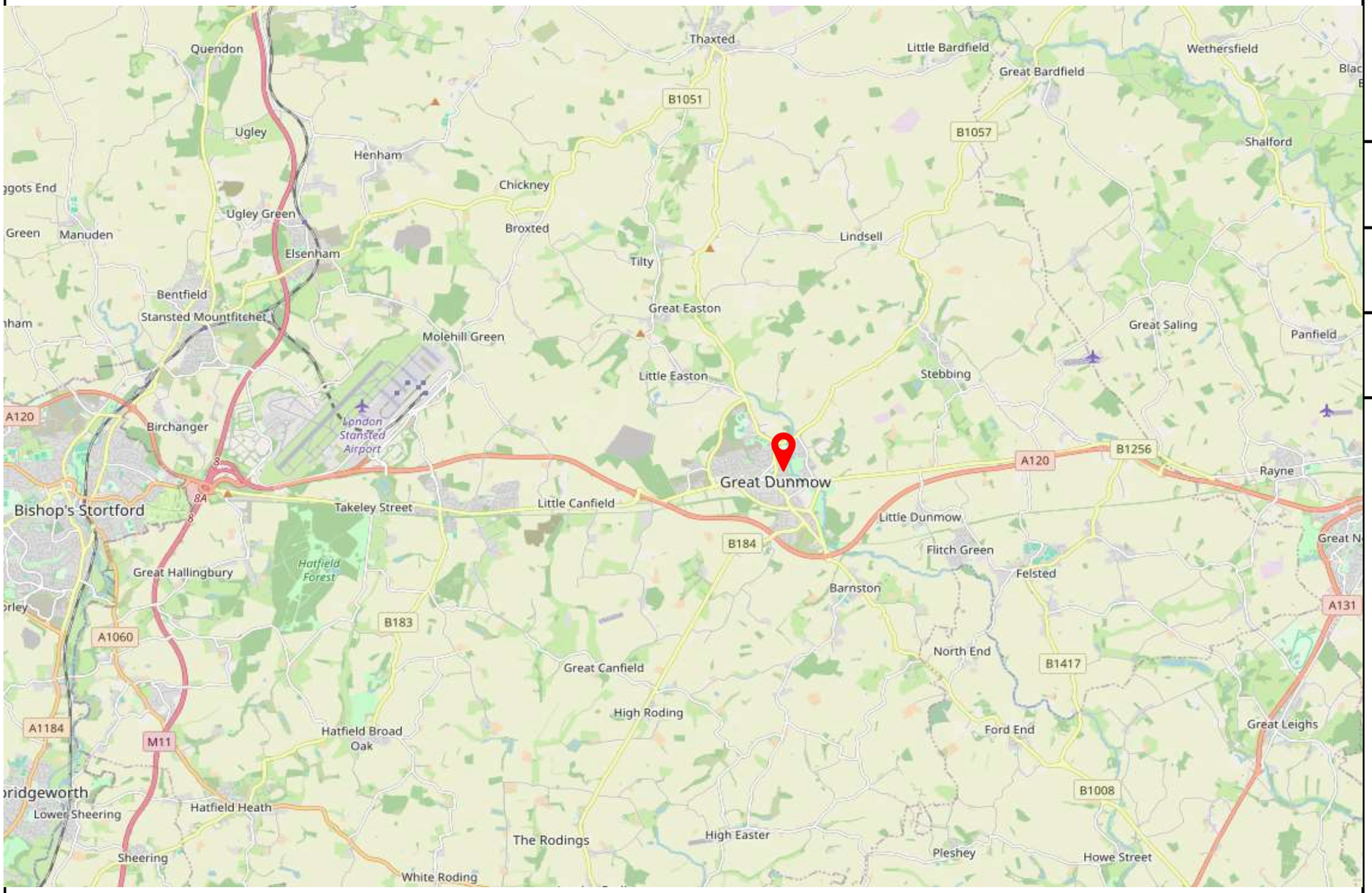
Yours sincerely
WDE CONSULTING LIMITED

Jason Fitzgerald
Principal Consultant

Simon Ware
Managing Director

Attached:
Figures
Appendix A: Photographs
Appendix B: Chemical Test Results
Appendix C: Geotechnical Test Results

FIGURES



WDE consulting

62A Western Road
Tring
HERTS
HP23 4BB
T: 01442 825570

Client

Great Dunmow Town Council

Project

Doctors Pond, Great Dunmow

Title

Figure 1: Site Location Plan

Job number: 21298

06/06/2024

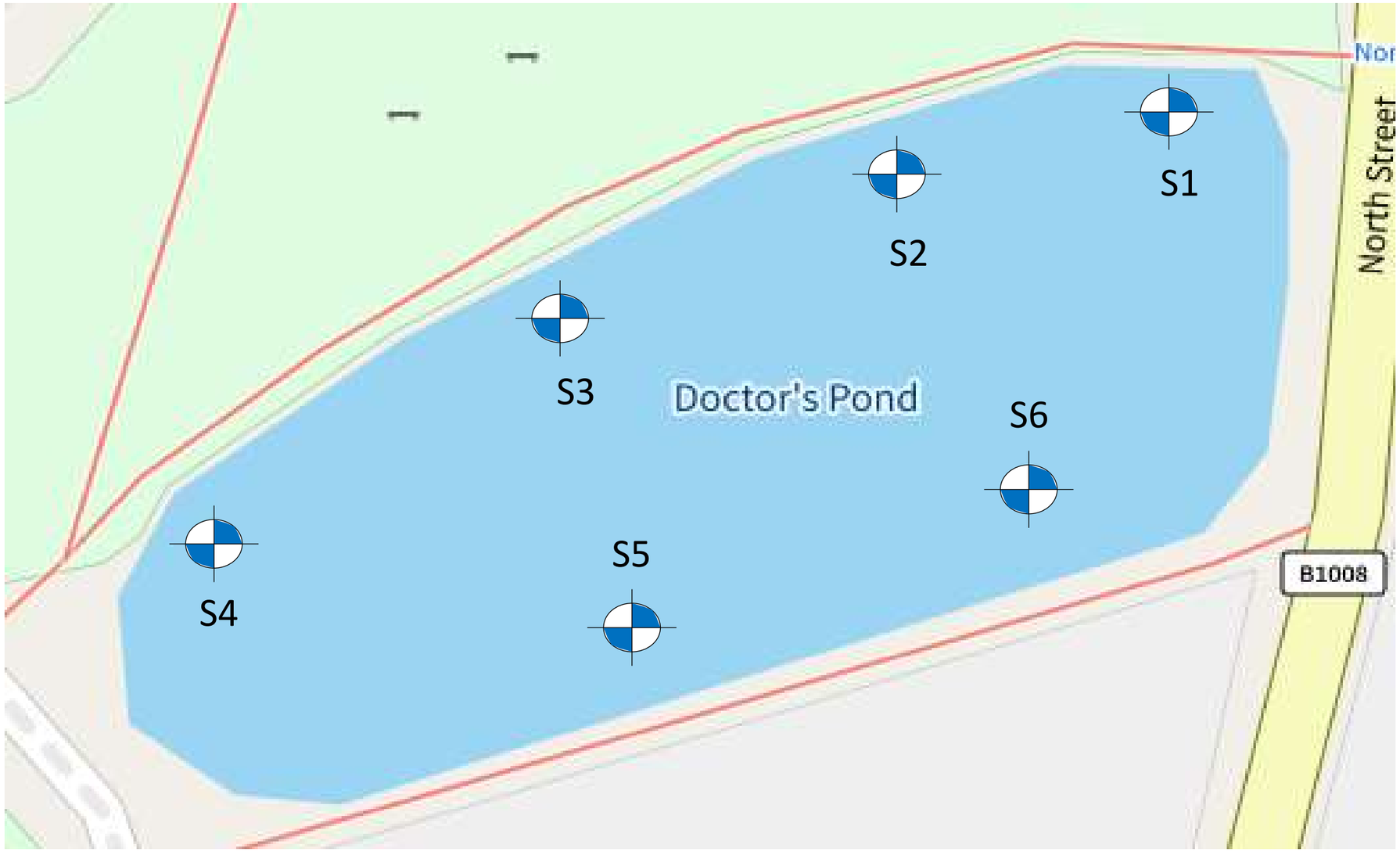


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Figure 2: Intrusive Locations

APPENDIX A: SITE PHOTOS

Photo 1: Location of site

Photo 2: Location S6, near reed beds.

Photo 3: Location S5

APPENDIX B: CHEMICAL TEST RESULTS

WDE Consulting Ltd
62a Western Road
Tring
Hertfordshire
HP23 4BB

t: 01442 825570

e: Results@wdeconsulting.o.uk
rsaint@wdeconsulting.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-020132

Project / Site name:	Doctor's Pond, Gread Dunmow	**Samples received on:**	17/05/2024
Your job number:	21298	**Samples instructed on/ Analysis started on:**	17/05/2024
Your order number:	24-203	**Analysis completed by:**	28/05/2024
Report Issue Number:	1	**Report issued on:**	29/05/2024
Samples Analysed:	5 soil samples		

Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-020132
Project / Site name: Doctor's Pond, Gread Dunmow
Your Order No: 24-203

Lab Sample Number				201778	201779	201780	201781	201782
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.70	0.70	0.70	0.70
Date Sampled				13/05/2024	13/05/2024	13/05/2024	13/05/2024	13/05/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	76	77	70	30	53
Total mass of sample received	kg	0.1	NONE	0.8	0.8	0.8	0.8	0.8

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Detected
Asbestos Analyst ID	N/A	N/A	N/A	KSZ	KSZ	KSZ	KSZ	KSZ
Actinolite detected	Type	N/A	ISO 17025	-	-	-	-	Not-detected
Amosite detected	Type	N/A	ISO 17025	-	-	-	-	Not-detected
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	-	Not-detected
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	-	Detected
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	-	Not-detected
Tremolite detected	Type	N/A	ISO 17025	-	-	-	-	Not-detected

Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	-	< 0.001

Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	-	Loose Fibres

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8.7	7.5	7.5	6.9	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO_4	%	0.005	MCERTS	0.273	0.353	0.233	0.086	0.305
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	720	1100	610	280	1300
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	359	534	306	139	661
Sulphide	mg/kg	1	MCERTS	72	87	89	41	81
Organic Matter	%	0.1	MCERTS	-	-	-	-	17
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	5.7	7.3	5.1	2.4	-
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	-	-	-	9.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 24-020132
Project / Site name: Doctor's Pond, Gread Dunmow
Your Order No: 24-203

Lab Sample Number				201778	201779	201780	201781	201782
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.70	0.70	0.70	0.70
Date Sampled				13/05/2024	13/05/2024	13/05/2024	13/05/2024	13/05/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.07	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.41	< 0.05	0.54	0.45	0.44
Acenaphthene	mg/kg	0.05	MCERTS	0.12	0.22	0.21	0.15	0.12
Fluorene	mg/kg	0.05	MCERTS	0.17	0.25	0.31	0.19	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.3	2.3	2.7	2.2	1.5
Anthracene	mg/kg	0.05	MCERTS	0.66	< 0.05	1.1	0.86	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	6.3	9.9	13	8	7.4
Pyrene	mg/kg	0.05	MCERTS	5.7	9.1	12	7	6.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3	5.7	6.9	4.3	3.8
Chrysene	mg/kg	0.05	MCERTS	4.1	6	7.3	4.3	4.6
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	5	8.3	11	5	6.7
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	2.4	4.1	3.3	2.6	2.8
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.3	7.1	8.4	4.8	5.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.7	4	4.7	2.4	3.7
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1	0.84	1.1	0.88	0.78
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.1	4.6	5.3	2.7	4.3
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	40.3	62.3	77.3	46	47.9
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	16	15	12	16
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.56	0.65	0.51	0.39	0.65
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.2	1.4	0.6	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.7	0.8	0.6	< 0.2	0.7
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	27	19	12	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	66	70	52	26	73
Lead (aqua regia extractable)	mg/kg	1	MCERTS	96	120	92	49	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	18	13	8.6	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	1.8	< 1.0	1.4
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	27	34	23	16	30
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	240	280	220	120	260

Analytical Report Number: 24-020132
Project / Site name: Doctor's Pond, Gread Dunmow
Your Order No: 24-203

Lab Sample Number				201778	201779	201780	201781	201782
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.70	0.70	0.70	0.70
Date Sampled				13/05/2024	13/05/2024	13/05/2024	13/05/2024	13/05/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL	mg/kg	1	MCERTS	6.4	3.5	2.5	< 1.0	1.6
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL	mg/kg	2	MCERTS	25	14	14	< 2.0	18
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL	mg/kg	8	MCERTS	83	62	48	< 8.0	79
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL	mg/kg	8	MCERTS	500	380	360	36	570
TPHCWG - Aliphatic >C35 - C44 EH_CU_1D_AL	mg/kg	8.4	NONE	250	200	190	< 8.4	320
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL	mg/kg	10	NONE	620	460	430	36	660
TPHCWG - Aliphatic >C5 - C44 EH_CU+HS_1D_AL	mg/kg	10	NONE	870	660	620	36	980
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	1.1
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	6.7	3.4	3.5	< 2.0	5.8
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	47	40	49	20	55
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	330	240	260	100	380
TPHCWG - Aromatic >EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	210	170	200	47	330
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	380	290	320	120	440
TPHCWG - Aromatic >EC5 - EC44 EH_CU+HS_1D_AR	mg/kg	10	NONE	590	450	520	170	760
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-020132
Project / Site name: Doctor's Pond, Gread Dunmow
Your Order No: 24-203

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
201782	S5	0.70	198	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

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

Analytical Report Number : 24-020132
Project / Site name: Doctor's Pond, Gread Dunmow

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
201778	S1	None Supplied	0.7	Brown silt / sediment *b
201779	S2	None Supplied	0.7	Brown silt / sediment *b
201780	S3	None Supplied	0.7	Brown silt / sediment *b
201781	S4	None Supplied	0.7	Brown clay and sand with gravel
201782	S5	None Supplied	0.7	Grey silt / sediment with vegetation *b

Analytical Report Number : 24-020132
Project / Site name: Doctor's Pond, Gread Dunmow

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references	HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft)	A006B	D	ISO 17025
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	In-house method	L010	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Organic matter in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L023B	D	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L023B	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS

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Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

*b - Unaccredited sample matrix.

WDE consulting

Chemtest WDE Standard QRA Suite

	No. of Samples	Unit	Target Concentration	Source	Min	Max	No. That Exceed	ACM Lab	S1	S2	S3	S4	S5
Sample Ref									None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Type									0.70	0.70	0.70	0.70	0.70
Depth									13/05/2024	13/05/2024	13/05/2024	13/05/2024	13/05/2024
Date													
			Public open space (park)										
Moisture Content	5	%	-						76	77	70	30	53
Asbestos	5	N/A	DL	WDE					Not-detected	Not-detected	Not-detected	Not-detected	Detected
Asbestos Quantification	1	%	0.01	HSE	0.001	0.001	0						0.001
pH	5	pH Units	-	-	6.9	8.7	0		8.7	7.5	7.5	6.9	7.3
Total Cyanide	5	mg/kg	50	DIV	0	BDL	0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate Total	5	%	-	-	0.086	0.353	-		0.273	0.353	0.233	0.086	0.305
Sulphate as SO_4	5	g/l	-	-	0.28	1.3	-		0.72	1.1	0.61	0.28	1.3
Sulphide	5	mg/kg	-	-	41	89	-		72	87	89	41	81
Total Organic Carbon (TOC)	5	%	-	-	2.4	9.6	-		5.7	7.3	5.1	2.4	9.6
Total Phenols (monohydric)	5	mg/kg	760	LQM	0	BDL	0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Naphthalene	5	mg/kg	1200	LQM	0.07	0.07	0		< 0.05	< 0.05	< 0.05	0.07	< 0.05
Acenaphthylene	5	mg/kg	29000	LQM	0.41	0.54	0		0.41	< 0.05	0.54	0.45	0.44
Acenaphthene	5	mg/kg	29000	LQM	0.12	0.22	0		0.12	0.22	0.21	0.15	0.12
Fluorene	5	mg/kg	20000	LQM	0.17	0.31	0		0.17	0.25	0.31	0.19	< 0.05
Phenanthrene	5	mg/kg	6200	LQM	1.3	2.7	0		1.3	2.3	2.7	2.2	1.5
Anthracene	5	mg/kg	150000	LQM	0.66	1.1	0		0.66	< 0.05	1.1	0.86	< 0.05
Fluoranthene	5	mg/kg	6300	LQM	6.3	13	0		6.3	9.9	13	8	7.4
Pyrene	5	mg/kg	15000	LQM	5.7	12	0		5.7	9.1	12	7	6.4
Benzo(a)anthracene	5	mg/kg	49	LQM	3	6.9	0		3	5.7	6.9	4.3	3.8
Chrysene	5	mg/kg	93	LQM	4.1	7.3	0		4.1	6	7.3	4.3	4.6
Benzo(b)fluoranthene	5	mg/kg	13	LQM	5	11	0		5	8.3	11	5	6.7
Benzo(k)fluoranthene	5	mg/kg	370	LQM	2.4	4.1	0		2.4	4.1	3.3	2.6	2.8
Benzo(a)pyrene	5	mg/kg	11	LQM	4.3	8.4	0		4.3	7.1	8.4	4.8	5.3
Indeno(1,2,3-cd)pyrene	5	mg/kg	150	LQM	2.4	4.7	0		2.7	4	4.7	2.4	3.7
Dibenz(a,h)anthracene	5	mg/kg	1.1	LQM	0.78	1.1	0		1	0.84	1.1	0.88	0.78
Benzo(ghi)perylene	5	mg/kg	1400	LQM	2.7	5.3	0		3.1	4.6	5.3	2.7	4.3
Total EPA-16 PAHs	5	mg/kg		-	40.3	77.3	0		40.3	62.3	77.3	46	47.9
Arsenic (dissolved)	5	mg/kg	170	LQM	12	16	0		13	16	15	12	16
Beryllium	5	mg/kg	63	LQM	0.39	0.65	0		0.56	0.65	0.51	0.39	0.65
Boron (dissolved)	5	mg/kg	46000	LQM	0.2	1.4	0		1.2	0.2	1.4	0.6	0.8
Cadmium (dissolved)	5	mg/kg	532	LQM	0.6	0.8	0		0.7	0.8	0.6	< 0.2	0.7
Chromium (dissolved)	5	mg/kg	33000	LQM	12	27	0		24	27	19	12	27
Copper (dissolved)	5	mg/kg	44000	LQM	26	73	0		66	70	52	26	73
Lead (dissolved)	5	mg/kg	1400	C4SL	49	120	0		96	120	92	49	120
Mercury (dissolved)	5	mg/kg	240	LQM	0.4	0.5	0		0.4	< 0.3	< 0.3	< 0.3	0.5
Nickel (dissolved)	5	mg/kg	3400	LQM	8.6	18	0		15	18	13	8.6	17
Selenium (dissolved)	5	mg/kg	1800	LQM	1.4	1.8	0		< 1.0	< 1.0	1.8	< 1.0	1.4
Vanadium	5	mg/kg	5000	LQM	16	34	0		27	34	23	16	30
Zinc (dissolved)	5	mg/kg	170000	LQM	120	280	0		240	280	220	120	260
Benzene	5	mg/kg	90	LQM	0	BDL	0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	5	mg/kg	87000	LQM	0	BDL	0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	5	mg/kg	17000	LQM	0	BDL	0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Xylenes (o)	5	mg/kg	17000	LQM	0	BDL	0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Xylenes (m p)	5	mg/kg	17000	LQM	0	BDL	0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	5	mg/kg	7900	CLAIRE	0	BDL	0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	5	mg/kg		-	40.3	77.3	0		40.3	62.3	77.3	46	47.9
TPH-CWG - Aliphatic >C5 - C6	5	mg/kg	95000	LQM	0	BDL	0		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aliphatic >C6 - C8	5	mg/kg	150000	LQM	0	BDL	0		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aliphatic >C8 - C10	5	mg/kg	14000	LQM	0	BDL	0		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPH-CWG - Aliphatic >C10 - C12	5	mg/kg	21000	LQM	1.6	6.4	0		6.4	3.5	2.5	< 1.0	1.6
TPH-CWG - Aliphatic >C12 - C16	5	mg/kg	25000	LQM	14	25	0		25	14	14	< 2.0	18
TPH-CWG - Aliphatic >C16 - C21	5	mg/kg	450000	LQM	48	83	0		83	62	48	< 8.0	79
TPH-CWG - Aliphatic >C21 - C35	5	mg/kg	450000	LQM	36	570	0		500	380	360	36	570
TPH-CWG - Aliphatic >C35 - C44	5	mg/kg	450000	LQM	190	320	0		250	200	190	< 8.4	320
Total Aliphatic Hydrocarbons	5	mg/kg		-	36	980	0		870	660	620	36	980
TPH-CWG - Aromatic >C5 - C7	5	mg/kg	76000	LQM	0	BDL	0		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >C7 - C8	5	mg/kg	87000	LQM	0	BDL	0		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >C8 - C10	5	mg/kg	7200	LQM	0	BDL	0		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
TPH-CWG - Aromatic >C10 - C12	5	mg/kg	9200	LQM	1.1	1.1	0		< 1.0	< 1.0	< 1.0	< 1.0	1.1
TPH-CWG - Aromatic >C12 - C16	5	mg/kg	10000	LQM	3.4	6.7	0		6.7	3.4	3.5	< 2.0	5.8
TPH-CWG - Aromatic >C16 - C21	5	mg/kg	7600	LQM	20	55	0		47	40	49	20	55
TPH-CWG - Aromatic >C21 - C35	5	mg/kg	7800	LQM	100	380	0		330	240	260	100	380
TPH-CWG - Aromatic >C35 - C44	5	mg/kg	7800	LQM	47	330	0		210	170	200	47	330
Total Aromatic Hydrocarbon	5	mg/kg		-	170	760	0		590	450	520	170	760

Below GAC
Exceedence

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Naphthalene				0.000007					0.000007					0.000007	0.000007
Acenaphthylene	0.000054			0.000054											
Acenaphthene	0.000022														
Fluorene															
Phenanthrene	0.00027			0.00027					0.00027						
Anthracene	0.00011													0.00011	0.00011
Fluoranthene	0.0013			0.0013					0.0013						
Pyrene	0.0012			0.0012											
Benzo(a)anthracene															
Chrysene				0.00073			0.00073						0.00073		
Benzo(b)fluoranthene							0.0011							0.0011	0.0011
Benzo(k)fluoranthene				0.00041			0.00041								
Benzo(a)pyrene							0.00084				0.00084		0.00084	0.00084	0.00084
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene							0.00011							0.00011	0.00011
Benzo(ghi)perylene														0.00053	0.00053
Arsenic			0.0016		0.0016									0.0016	0.0016
Boron	0.00014			0.00014											
Cadmium	0.00008	0.00008	0.00008		0.00008	0.00008	0.00008								
Chromium										0.0027			0.0027		
Copper				0.0073										0.0073	0.0073
Lead				0.012					0.012		0.012	0.012		0.012	0.012
Mercury		0.00005				0.00005								0.00005	0.00005
Nickel							0.0017	0.0017	0.0017						
Selenium			0.00018		0.00018										0.00018
Zinc	0.028			0.028											
Benzene	0.0005		0.0005	0.0005			0.0005								
Toluene				0.0005								0.0005			
Ethylbenzene				0.0005	0.0005							0.0005			
p & m-xylene	0.0005			0.0005											
o-xylene	0.0005			0.0005											
MTBE (Methyl Tertiary Butyl Ethe	0.0005														
PRO C6-C10				0.000014			0.000014							0.000014	0.000014
DRO C10-C25				0.11272					0.11272					0.11272	0.11272
Total (or greatest)	0.0332	0.00013	0.0024	0.1666	0.0024	0.00013	0.0017	0.0017	0.1127	0.0027	0.0120	0.0120	0.0027	0.1364	0.1366
Threshold (%)	20.0	0.1	3	25.0	3.0	0.1	0.1	0.1	1.0	1.0	0.5	5.0	0.1	25.00	25.00
Exceeded? (y/n)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Benzo(a)pyrene							8.4						0.00084		
BaP Concentration in TPH													0.000000924		
BaP Exceeded (y/n)													N		
TPH (EC5 - EC35)				0.11			1100				0.11		0.11	0.11	0.11
Threshold (%)				25.0			Y				5.0		0.1	2.50	2.50
Hazardous Properties				N			Y				N		Y	N	N

TPH has to be >1000mg otherwise non-haz

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	Car. Cat 1a	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic				Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	RE1	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H350	H10		H11	H14	H14
Asbestos										0.001					
Threshold (%)										0.1					
Hazardous Properties										N					

UKAS TESTING
4041

WDE Consulting Ltd
62a Western Road
Tring
Hertfordshire
HP23 4BB

t: 01442 825570

e: Results@wdeconsulting.o.uk
rsaint@wdeconsulting.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 24-020133

Project / Site name:	Doctor's Pond, Gread Dunmow	**Samples received on:**	17/05/2024
Your job number:	21298	**Samples instructed on/ Analysis started on:**	17/05/2024
Your order number:	24-203	**Analysis completed by:**	28/05/2024
Report Issue Number:	1	**Report issued on:**	28/05/2024
Samples Analysed:	10:1 WAC sample		

Signed: Izabela Wójcik

Izabela Wójcik
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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i2 Analytical
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	**24-020133**						
					Client:	**WDENV**	
Location	**Doctor's Pond, Gread Dunmow**						
Lab Reference (Sample Number)	201783				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	13/05/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	S6						
Depth (m)	0.70						
Solid Waste Analysis							
TOC (%)	7.5				3%	5%	6%
Loss on Ignition (%)	13				--	--	10%
BTEX (µg/kg)	< 5.0				6000	--	--
Sum of PCBs (mg/kg)	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	950				500	--	--
Total PAH (WAC-17) (mg/kg)	60.6				100	--	--
pH (units)	7.1				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	3.9				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00279			0.0279	0.5	2	25
Barium *	0.0584			0.584	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00055			0.0055	0.5	10	70
Copper *	0.016			0.16	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.000972			0.00972	0.5	10	30
Nickel *	0.0013			0.013	0.4	10	40
Lead *	0.0022			0.022	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.016			0.16	4	50	200
Chloride *	4.4			44	800	15000	25000
Fluoride*	0.092			0.92	10	150	500
Sulphate *	46			460	1000	20000	50000
TDS*	190			1900	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.47			74.7	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.8						
Dry Matter (%)	24						
Moisture (%)	76						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Analytical Report Number : 24-020133
Project / Site name: Doctor's Pond, Gread Dunmow

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
201783	S6	None Supplied	0.7	Grey sludge [a]

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Analytical Report Number : 24-020133
Project / Site name: Doctor's Pond, Gread Dunmow

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in soil	Determination of pH in soil by addition of water followed by electrometric measurement	In-house method	L005B	W	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	NONE
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	NONE
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046B	W	NONE
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	NONE
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	NONE
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	NONE
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	NONE

Analytical Report Number : 24-020133
Project / Site name: Doctor's Pond, Gread Dunmow

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
WAC Leachate 10:1		In-house method	L043B	W	NONE

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

*b - Unaccredited sample matrix.

APPENDIX C: GEOTECHNICAL TEST RESULTS

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
35362	Doctor's Pond, Great Dunmow	Samples received	17/05/2024
		Schedule received	17/05/2024
Project No.	Client	Project started	20/05/2024
21298/PO24-211	WDE Consulting	Testing Started	31/05/2024

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%	%	%	%	
1	1	0.70	-	B	Dark grey organic silty CLAY (pond sludge/slurry)	371	100	144	58	86	
2	2	0.70	-	B	Dark grey slightly sandy silty CLAY with rare medium sub-rounded gravel	351					
3	3	0.70	-	B	Dark grey silty clayey gravelly SAND (gravel is fm and sub-angular to sub-rounded)	62					
4	4	0.70	-	D	Grey slightly sandy silty CLAY (slurry) with rare fine sub-angular gravel	284	99	135	54	81	

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3, 4.4 and 5.0
These results only apply to the items tested

NOTE: The report shall not be reproduced except in full without authority of the laboratory

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

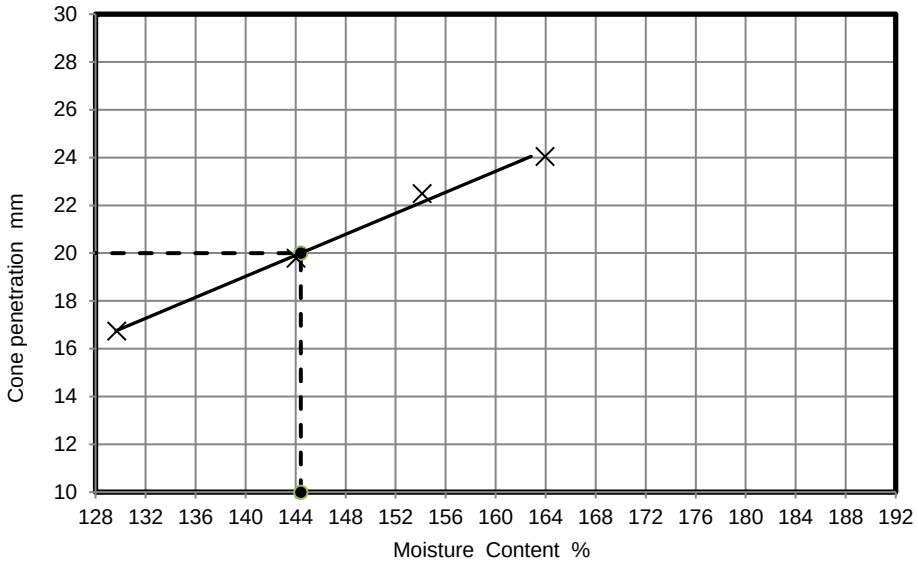
Initials **J.P**

Date: 06/06/2024

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

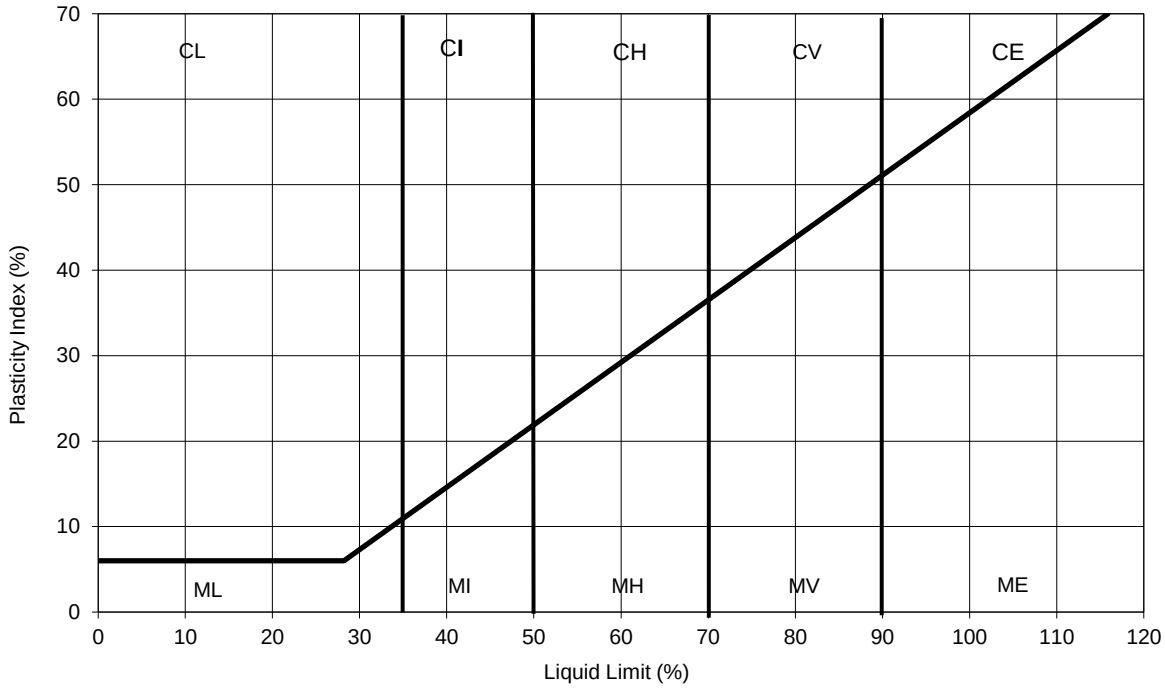
K4 SOILS	**LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX**			Job No.	35362
				Borehole/Pit No.	1
Site Name	Doctor's Pond, Great Dunmow			Sample No.	1
Project No.	21298/PO24-211	Client	WDE Consulting	Depth Top	0.70 m
Soil Description	Dark grey organic silty CLAY (pond sludge/slurry)			Depth Base	- m
				Sample Type	B
				Samples received	17/05/2024
				Schedules received	17/05/2024
				Project Started	20/05/2024
				Date Tested	31/05/2024



NATURAL MOISTURE CONTENT	**371**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**144**	**%**
PLASTIC LIMIT	**58**	**%**
PLASTICITY INDEX	**86**	**%**

Remarks

PLASTICITY INDEX



UKAS TESTING

TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 06/06/2024

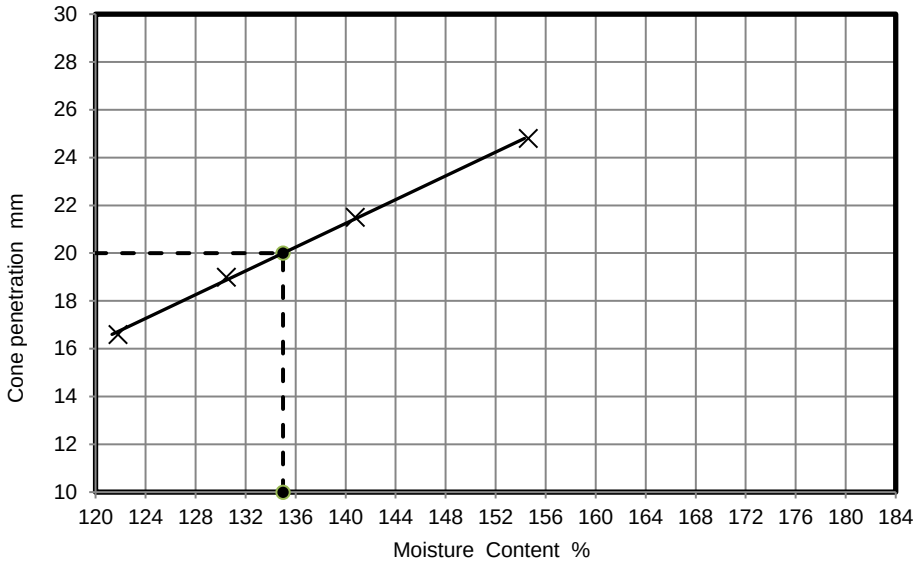
Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

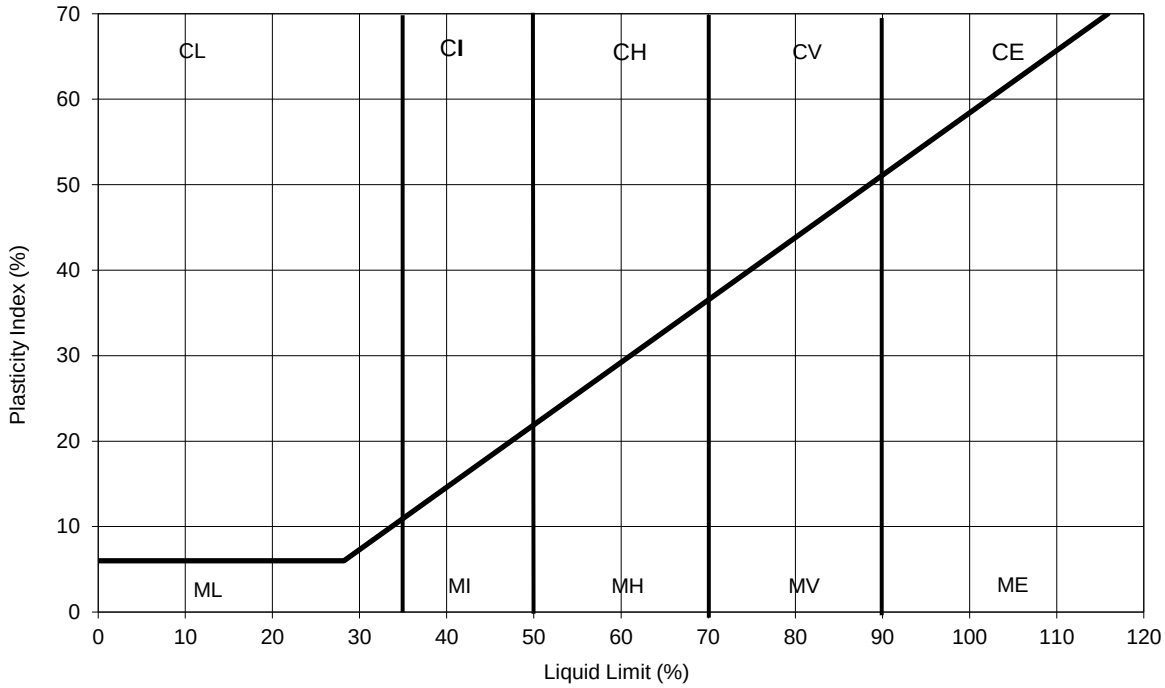
Job No.	35362				
Borehole/Pit No.	4				
Site Name	Doctor's Pond, Great Dunmow			Sample No.	4
Project No.	21298/PO24-211	Client	WDE Consulting	Depth Top	0.70 m
Soil Description	Grey slightly sandy silty CLAY (slurry) with rare fine sub-angular gravel			Depth Base	- m
				Sample Type	D
				Samples received	17/05/2024
				Schedules received	17/05/2024
				Project Started	20/05/2024
				Date Tested	31/05/2024



NATURAL MOISTURE CONTENT	**284**	**%**
% PASSING 425µm SIEVE	**99**	**%**
LIQUID LIMIT	**135**	**%**
PLASTIC LIMIT	**54**	**%**
PLASTICITY INDEX	**81**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.3 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

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Tel: 01923 711 288 Email: James@k4soils.com

UKAS TESTING

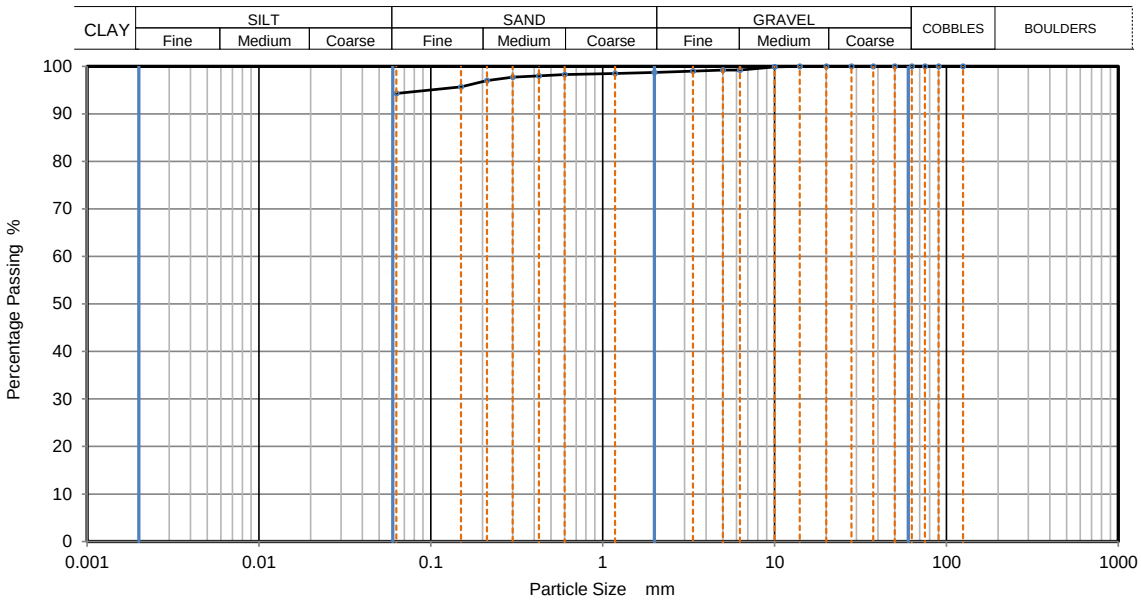
2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

Site Name	Doctor's Pond, Great Dunmow			Job Ref	35362
				Borehole/Pit No.	2
Project No.	21298/PO24-211	Client	WDE Consulting	Sample No.	2
				Depth Top	0.70 m
Soil Description	Dark grey slightly sandy silty CLAY with rare medium sub-rounded gravel			Depth Base	- m
				Sample Type	B
				Samples received	17/05/2024
				Schedules received	17/05/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	20/05/2024
				Date tested	03/06/2024

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	98		
0.3	98		
0.212	97		
0.15	96		
0.063	94		

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	5
Fines <0.063mm	94

Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

Checked and Approved

Initials: **J.P**

Date: 06/06/2024

UKAS TESTING

2519

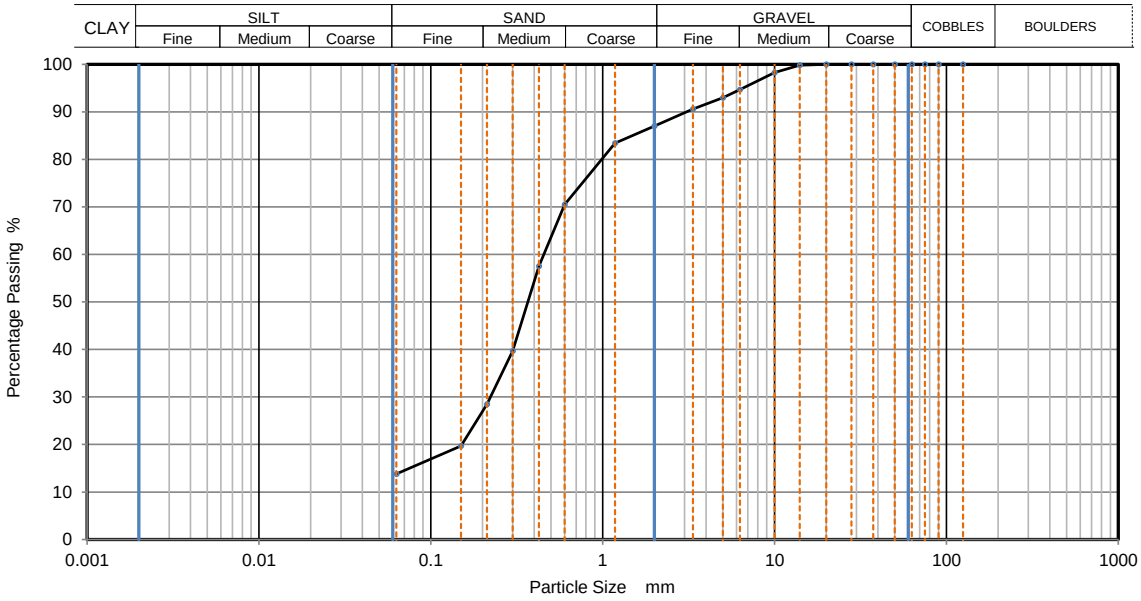
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3

PARTICLE SIZE DISTRIBUTION

Site Name	Doctor's Pond, Great Dunmow			Job Ref	35362
				Borehole/Pit No.	3
Project No.	21298/PO24-211	Client	WDE Consulting	Sample No.	3
				Depth Top	0.70 m
Soil Description	Dark grey silty clayey gravelly SAND (gravel is fm and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	B
				Samples received	17/05/2024
				Schedules received	17/05/2024
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	20/05/2024
				Date tested	03/06/2024

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	95		
5	93		
3.35	91		
2	87		
1.18	83		
0.6	71		
0.425	58		
0.3	40		
0.212	29		
0.15	20		
0.063	14		

Sample Proportions	% dry mass
Very coarse	0
Gravel	13
Sand	73
Fines <0.063mm	14

Grading Analysis		
D100	mm	
D60	mm	0.454
D30	mm	0.222
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory

Unit 8, Olds Close, Watford, Herts, WD18 9RU

Email: james@k4soils.com

Tel: 01923 711288

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Initials: **J.P**

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UKAS TESTING

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R3