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Proposed Residential Development Land off Gray's Lane Hitchin Hertfordshire



Phase II Ground Investigation Report

September 2023

Revision 00

R-GI-26671-01-00

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Proposed Residential Development
Land off Gray's Lane
Hitchin
Hertfordshire

Phase II Ground Investigation Report

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1.0 Executive Summary

- 1.1.1 The following is provided as an overview and should not be relied upon in isolation to the main report.

Summary overview

Existing site	The site is approximately 2.0Ha in area and comprises a roughly rectangular shaped grassed field bounded by hedgerows, mature deciduous trees and a wood to the south.
Proposals	Construction of new residential dwellings with associated access, landscaping and infrastructure.
History	Since the earliest available historical mapping in the late 1800s, the site was an agricultural field, with a building present by the 1900s. Orchards were present across majority of the site until they were cleared by the 1980s. Up to the 1950s, fewer smaller buildings and a larger building was constructed on the northern boundary and by the 1980s, no buildings were mapped and the site was largely woodland with limited areas of open land. A small gravel pit was mapped immediately north to the site. An area mapped as Mount Pleasant appeared to comprise 'potential groundworkings'. By 1900, the gravel pit and potential groundworkings were no longer mapped.
Geology	British Geological Survey (BGS) mapping indicates there to be superficial deposits of Glaciofluvial Deposits overlying bedrock geology of the West Melbury Marly Chalk Formation and the Zig Zag Formation.
Hydrology	The superficial Glaciofluvial Deposits are recorded as a Secondary A Aquifer (undifferentiated) and the bedrock geology of the West Melbury Marly Chalk and Zig Zag Formation are recorded as a Principal Aquifer.
Radon	No radon protection measures are required for new buildings on the site.
UXO	UXO risk is considered low with no further action required.
Fieldwork	The fieldwork comprised 8 windowless sampler boreholes to a maximum depth of 4.0m bgl with 4 groundwater and ground gas monitoring installations. 7 TRL dynamic cone penetration tests were also completed to measure in-situ CBR values.
Ground conditions	Topsoil was encountered in all windowless sampler boreholes over Made Ground or Glaciofluvial Deposits. The Made Ground was encountered in 3 boreholes and comprised a brown Sand with gravels of sandstone, flint and brick to depths between 0.3m and 0.6m bgl. The Glaciofluvial Deposits generally consisted of a variable soft to firm brown gravelly sandy Clay with gravels of sandstone, flint and chalk and an orange brown gravelly clayey Sand with gravels of sandstone flint and chalk to a maximum investigation depth of 4.0m bgl. Within WS07 from 0.9m to 2.0m, an orange brown silty sandy Gravel was recovered to 2.0m depth.
Groundwater	No groundwater was encountered during the intrusive investigation or the subsequent groundwater monitoring to date.
Contamination assessment	Our quantitative risk assessment has determined there to be an overall low risk to identified receptors with no remediation necessary across the site subject to LPA approval. The Topsoil is fit for reuse in the residential gardens.

Summary overview

Ground Gas	Based on the desk study, ground gas sources have been identified and following subsequent land gas monitoring works to date, the site is classified as an NHBC 'Green' site with no gas protection requirements needed.
Foundation assessment	Traditional strip or trench fill foundations are considered suitable for the proposed development with a minimum foundation depth of 0.75m bgl into the natural soils fully penetrating any roots desiccated cohesive soils which have been identified on site (including as a result of grasses). Where plots are close to boundary trees or vegetation foundations will need to be deepened in accordance with NHBC Chapter 4.2 based on Low volume change potential. Heave precautions are considered to be required and foundations should extend a minimum of 0.3m beyond any potentially desiccated soils. A bearing capacity of 110kN/m² is considered achievable.
Floor slab	Suspended floor slabs are recommended due to potential for heave.
Soil Aggressivity	Glaciofluvial Deposits - DS-1, ACEC-1s.
Pavement design	A preliminary design CBR value of 3% can be assumed based on TRL DCP site testing and the results of the modified plasticity indices. CBR values should be confirmed at formation level through insitu testing once the design of the site has been finalised.
Infiltration potential	BRE365 infiltration testing completed by others record that the testing undertaken indicates that the majority of the granular soils of the Glaciofluvial Deposits are likely to be suitable for drainage via conventional soakaways. However, where more cohesive soils and bands have been identified as part of the investigation, soakaways in these soils are considered unlikely to be effective.

Table 1.1

2.0 Introduction

2.1 Client instructions and reliance

- 2.1.1 JPP were appointed by Manor Oak Homes Ltd to carry out a Phase II ground investigation for land south of Gray's Lane, Hitchin, Hertfordshire. Our site investigation was carried out in July 2023 with this report issued in September 2023.
- 2.1.2 This report has been produced for the benefit of Manor Oak Homes Ltd and JPP Geotechnical & Environmental Ltd will not accept liability for the third-party use of the information herein without prior reliance agreed. This report is valid for 6 years from the date of issue however any significant changes to the proposals or followed legislation and guidance within this time could dictate a review of our findings and recommendations.
- 2.1.3 Investigations have been carried out using reasonable care and judgement based on the development proposals and brief. There is a potential for ground conditions to vary from those encountered during our investigations and differ where not exposed by our investigations. Our investigations have been carried out following current and relevant standards and guidance which are listed within our references, although this is not an exhaustive list. Our investigations and assessments may not be fully in accordance with the Eurocodes.

2.2 Site proposals

- 2.2.1 We understand proposals are for the construction of new residential dwellings with associated access, landscaping and infrastructure as per the AT Architecture Ltd Drawing reference: A_1622 PL100, dated March 2018.

2.3 Investigation strategy and objectives

- 2.3.1 The investigations comprised a Phase II contamination and geotechnical risk assessment for the proposed residential housing development. Our investigation also included a preliminary assessment to inform foundation design.

3.0 Site Desk Study Information

3.1 Third party phase 1 report

- 3.1.1 A full Phase I Desk Study has been produced by Geo-Environmental dated November 2020 (reference: GE17424-DSRv1.1-NOV20) to which the reader is referred. The salient points are summarised and discussed where required in this report.

3.2 Site description

- 3.2.1 The site is located on land south of Gray's Lane, Hitchin, Hertfordshire and is centred approximately at National Grid Reference 517434 229118.
- 3.2.2 The site is approximately 4.3Ha in area and comprises a roughly rectangular shaped grassed field bounded by hedgerows and mature deciduous trees to the north, east and west and by a mature to semi-mature woodland to the south.
- 3.2.3 Further surrounding the site is Gray's Lane to the north, Crow Furlong to the east and Pirton Road to the south. Residential dwellings are located largely further east and west with grassed agricultural fields elsewhere.

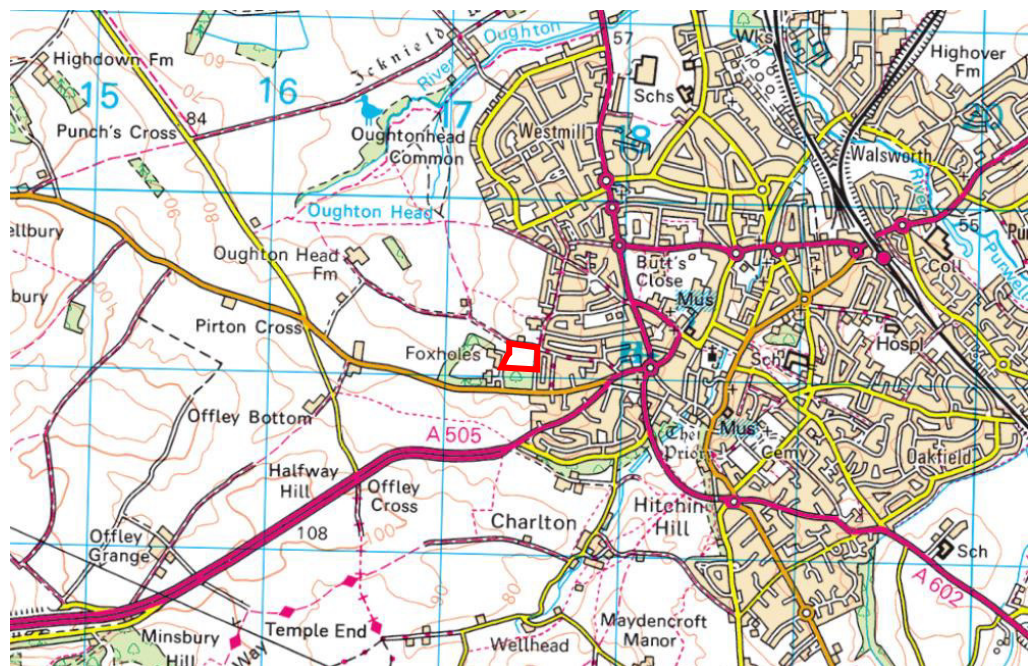


Figure 3.2: Ordnance Survey Mapping showing the site boundary in red

3.3 Geology

- 3.3.1 British Geological Survey (BGS) mapping indicates the site to comprise of superficial Glaciofluvial Deposits (sand and gravel) overlying bedrock geology of the West Melbury Marly Chalk Formation and the Zig Zag Formation (chalk). The Melbourn Rock Member (chalk) is mapped to the west of the site.
- 3.3.2 No Made Ground is mapped on site. However, a small area immediately north is mapped as Made Ground. Historically, this area of land was mapped as Gray's Lane Gravel Pit, an opencast sand and gravel quarry pit, approximately 60m north from site.
- 3.3.3 Additionally, an area of 'potential groundworkings' is historically mapped approximately 125m south east to the site, however, this area is not mapped as Made Ground on BGS mapping. The Geo-environmental report should be referred to for more relevant details.

3.4 Hydrology and hydrogeology

- 3.4.1 The superficial Glaciofluvial Deposits are recorded as a Secondary A Aquifer (undifferentiated) and the bedrock geology of the West Melbury Marly Chalk and Zig Zag Formation are recorded as a Principal Aquifer.
- 3.4.2 The site is located within a designated Source Protection Zone 3 (Total Catchment) area.
- 3.4.3 The site is also recorded to be within a Nitrate Vulnerable Zone.
- 3.4.4 The closest surface water feature is an inland river located approximately 330m south to site.

3.5 Site history

- 3.5.1 A full review of the site history is outside the scope of this report, however a summary is provided as follows.
- 3.5.2 Since earliest historical mapping in the late 1800s, the site has been an agricultural field, with a building present by the 1900s. Orchards were present across majority of the site until they were cleared by the 1980s. Up to the 1950s, fewer smaller buildings and a larger building was constructed on the northern boundary and by the 1980s, no buildings were mapped and the site was largely woodland with limited areas of open land.
- 3.5.3 A small gravel pit was mapped immediately north to the site with allotment gardens to the east. An area mapped as Mount Pleasant appeared to comprise 'potential groundworkings'. By 1900, the gravel pit and potential groundworkings were no longer mapped. The allotments were developed into residential properties by the mid-1900s.

3.6 Landfills

- 3.6.1 There are no active, historic or recent landfills recorded on site or in the near vicinity. However, there is an area of infilled land mapped immediately north of the site, which is associated with a historical gravel pit (refer to paragraph 3.3.2).

3.7 Radon

- 3.7.1 The site is located within a lower probability area (less than 1% of homes are estimated to be at or above the action level). Therefore, no radon protection measures are deemed necessary in the construction of new dwellings or extensions.

4.0 Site Photographs



Photograph 4.1 General view across the site.



Photograph 4.2 Another general view across the site.



Photograph 4.3 View from the north of the site looking east.



Photograph 4.4 Further general view across the site.

5.0 Ground Investigation

- 5.1.1 The ground investigation was completed on 18th July 2023 and comprised:
- 8 windowless sampler boreholes to a maximum depth of 4.0m bgl with the installation of 4 groundwater and ground gas monitoring wells; and
 - 8 TRL Dynamic cone penetration tests to measure in-situ CBR values.
- 5.1.2 Statutory undertakers' plans were obtained and reviewed in advance of the ground investigation. Each position was scanned using a cable avoidance tool and signal generator prior to breaking ground. No services were mapped on statutory undertaker's plans or detected on site during the investigation. The location of each position is shown on the exploratory hole plans (Drawing 01 and 02), included within Appendix A.
- 5.1.3 Hand pocket penetrometer testing were used to determine the undrained shear strength of the clays and SPT testing was completed to assess the density of the granular soils. Photographic records of the windowless sampler borehole logs are presented within Appendix B.

6.0 Ground Conditions

6.1 Soils

Topsoil

- 6.1.1 Topsoil was encountered in all windowless sampler boreholes, from Ground Level to a maximum depth of 0.40m bgl and was found to generally consist of a brown slightly silty sandy Topsoil with gravels of sandstone and flint. It was noted that brick fragments were present in WS06.

Made Ground

- 6.1.2 Made Ground was encountered within WS02, WS04 and WS05 to depths of between 0.3m and 0.35m to 0.55m and 0.6m bgl respectively. The Made Ground comprised of a brown slightly gravelly Sand with sandstone, flint and brick.

Glaciofluvial Deposits

- 6.1.3 The superficial Glaciofluvial Deposits were encountered underlying the Topsoil in all windowless sampler boreholes to the maximum investigated depth of 4.0m bgl. It generally consisted of a variable soft to firm brown gravelly sandy Clay with gravels of sandstone, flint and chalk and an orange brown gravelly clayey Sand, with gravels of sandstone flint and chalk. Within WS07 from 0.9m to 2.0m, an orange brown silty sandy Gravel was recovered to 2.0m depth.
- 6.1.4 Pocket Penetrometer testing were completed to measure the undrained shear strength of the cohesive Glaciofluvial Deposits and the results ranged from 35 to 155 kPa indicating low to very high strength soils.
- 6.1.5 The SPT tests within both the cohesive and granular soils recorded results of between 7 and 43 indicating loose to dense granular soils with the vast majority of SPT results recording medium dense granular soils.

6.2 Groundwater

- 6.2.1 No groundwater was encountered during the fieldwork investigations.

7.0 Laboratory Testing

7.1 Geotechnical testing

7.1.1 The Geotechnical testing undertaken is summarised in Table 7.1.

Summary of Geotechnical Laboratory Testing Strategy		
Sample reference and depth	Soil type	Laboratory testing scheduled
WS02 @ 0.90m	Glaciofluvial Deposits	1 point plasticity index, moisture content
WS02 @ 1.50m	Glaciofluvial Deposits	1 point plasticity index, moisture content
WS06 @ 1.90m	Glaciofluvial Deposits	1 point plasticity index, moisture content
WS08 @ 0.70m	Glaciofluvial Deposits	1 point plasticity index, moisture content

Table 7.1

7.2 Chemical testing

7.2.1 The Chemical testing undertaken is summarised in Table 7.2

Summary of Contamination Laboratory Testing Strategy		
Sample reference and depth	Soil type	Laboratory testing scheduled
WS01 @ 0.1m	Topsoil	Metals, metalloids, inorganics, PAHs and asbestos.
WS02 @ 0.4m	Made Ground	Metals, metalloids, inorganics, PAHs and asbestos.
WS03 @ 0.2m	Topsoil	Metals, metalloids, inorganics, PAHs and pesticides.
WS04 @ 0.5m	Made Ground	Metals, metalloids, inorganics, PAHs and asbestos.
WS05 @ 0.1m	Topsoil	Metals, metalloids, inorganics, PAHs and pesticides.
WS06 @ 0.2m	Topsoil	Metals, metalloids, inorganics, PAHs and asbestos.
WS07 @ 0.7m	Glaciofluvial Deposits	Metals, metalloids, inorganics, PAHs and asbestos.
WS08 @ 0.1m	Topsoil	Metals, metalloids, inorganics, PAHs and asbestos.
WS01 @ 0.7m	Glaciofluvial Deposits	BRE SD1 Suite.
WS03 @ 1.4m	Glaciofluvial Deposits	BRE SD1 Suite.
WS04 @ 1.0m	Glaciofluvial Deposits	BRE SD1 Suite.
WS05 @ 2.0m	Glaciofluvial Deposits	BRE SD1 Suite.
WS07 @ 1.7m	Glaciofluvial Deposits	BRE SD1 Suite.

Table 7.2

7.2.2 Laboratory testing was carried out by I2Analytical who are UKAS and MCERTS accredited.

8.0 Contamination Assessment

8.1 Legislation and framework

8.1.1 Statutory legislative Part 2A of the Environmental Protection Act 1990 establishes the legal framework for dealing with Contaminated Land in England. Contaminated land is defined by the legislation as, 'Any land that appears to the local authority by reasons of substances in, on or under the land that significant harm is being caused if there is a significant possibility of such harm being caused or Pollution of controlled waters is being or is likely to be caused'.

8.1.2 An analytical framework has been adopted which is based on a risk assessment methodology using the identification and analysis of the pollutant linkages between source-pathway-receptor. Definition of risk as outlined by the model procedure in the government's Land Contamination Risk Management system (LQRM – previously known as CLR 11) is 'a combination of probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'. The pollutant linkage comprises the following elements. Each can exist independently but they create a risk only where they are linked together.

- A contaminant (source): a substance that is in, or under the land and has the potential to cause harm or to cause pollution to controlled waters
- A pathway: a route or means by which a receptor can be exposed to, or affected by, a contaminant
- A receptor: in general terms, something that could be adversely affected by a contaminant such as people, an ecological system, property, or a water body.

8.1.3 Our approach considers the above in terms of a Conceptual Model. This is a diagrammatic or written representation of the characteristics of a site showing possible relationships between contaminants, pathways, and receptors. Risks from landfill type gases are considered using the same analytical methodology and following BS8485: 2015, CIRIA C665 and NHBC. If there is no pollutant linkage in the Conceptual Model, there is not a risk. If the Conceptual Model determines there to be a pollutant linkage, it still needs to be determined whether remediation is necessary.

8.1.4 The proceeding assessment firstly considers a qualitative approach, taking into account all of the aspects of the desk study and site walkover to derive a Preliminary Conceptual Model. This is then supplemented by a quantitative risk assessment utilising quantitative data (laboratory testing or gas measurements where appropriate) to support the assessment and derive conclusions.

8.1.5 It is important to consider the uncertainties in these assessments such as limitations or restrictions in the investigations and justify how conclusions have been derived.

9.0 Preliminary Conceptual Model

9.1 Overview of sources of contamination

- 9.1.1 In summary, since earliest historical mapping in the late 1800s, the site was an agricultural field, with a building present by the 1900s. Orchards were present across majority of the site until they were cleared by the 1980s. Up to the 1950s, fewer smaller buildings and a larger building was constructed on the northern boundary and by the 1980s, no buildings were mapped and the site was largely woodland with limited areas of open land.
- 9.1.2 Up to the 1900 historical mapping, a small gravel pit was mapped immediately north of the site and an area mapped as Mount Pleasant appeared to comprise 'potential groundworkings'
- 9.1.3 As such, possible sources of onsite contamination from Made Ground and general agricultural usage include metals, metalloids, asbestos, pesticides and PAHs. Possible pathways include direct contact through ingestion, inhalation and dermal contact and migration through leaching and shallow groundwater.
- 9.1.4 The historical gravel pit is also an offsite potential source of ground gases from infilled ground depending on the presence and nature of the backfill material.

9.2 Pollutant linkages and model summary

- 9.2.1 A full source-pathway-receptor conceptual model is presented within the Phase I Desk study, which has been reviewed and reproduced below for our contamination risk assessment on the next page.

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Pollutant Linkage Summary					
Sources of Contamination	Receptors	Exposure Pathways			Risk
		Identified		Present	
On site: Made Ground associated with the former buildings on site and general agricultural usage Potential source of metals, metalloids, inorganics, PAHs, asbestos pesticides. Off site: Ground gas from historical backfilled gravel pits	Human Health				
	Future residents	Yes	Ingestion	Yes	Low
			Inhalation	Yes	
			Absorption	Yes	
			Consumption (via vegetables)	Yes	
	Construction operatives	Yes	Ingestion	Yes	Low
			Inhalation	Yes	
			Absorption	Yes	
			Consumption (via vegetables)	No	
	Controlled Waters				
	Surface Water	Yes	Leaching	Yes	Very Low
			Run-off	Yes	
			Saturation	No	
	Aquifers	Yes	Leaching	Yes	Very Low
			Run-off	Yes	
			Saturation	No	
	Building Materials	Yes	Chemical attack	Yes	Low
	Plants	Yes	Phytotoxicity	Yes	Low

Table 9.2

Table 9.2

10.0 Generic Quantitative Risk Assessment

10.1 Assessment criteria

- 10.1.1 On the basis that the proposed development comprises residential dwellings with private gardens, the more stringent residential with plant uptake end use is considered the most appropriate model for exposure following CLEA and the associated guideline values have been adopted for our Tier 1 Screening. These are considered to be screening values by which any exceedance should be further considered as to whether it presents a potentially unacceptable risk of harm to receptors identified by our conceptual model. We have directly compared the measured concentrations with the screening values.
- 10.1.2 Screening values adopted for our risk assessment are sourced from current guidance including Category 4 Screening Levels (C4SL) from DEFRA, Suitable 4 Use Levels (S4UL's) from LQM CIEH and Atkins ATRISK SSV (derived using CLEA Software) limits. For plants we have compared the laboratory results with topsoil thresholds from BS3882 where available for zinc and copper. The risk from sulphate attack has been assessed and soil aggressivity classified accordingly in Section 11.4.
- 10.1.3 The test results are presented in full in Appendix C. A summary and discussion of the results is provided as follows.

Summary of Contamination Laboratory Testing results (metals, metalloids and inorganics) – Topsoil					
Contaminant	Number of samples tested	Highest test result mg/kg	Tier 1 screening value mg/kg	Number of samples exceeding Tier 1	Guideline value source
Arsenic	5	36	37	0	S4UL
Cadmium	5	<0.2	11	0	S4UL
Chromium	5	33	910	0	S4UL
Hexavalent Chromium	5	2.6	6	0	S4UL
Copper	5	47	2400 (200)	0	S4UL (BS3882)
Lead	5	150	200	0	C4SL
Mercury	5	1.4	40	0	S4UL
Nickel	5	41	180	0	S4UL
Selenium	5	<1.0	250	0	S4UL
Zinc	5	220	3700 (300)	0	S4UL (BS3882)
Cyanide	5	<1.0	34	0	SSV
Table 10.1a					
Reference guideline values: DEFRA C4SL LQM/CIEH S4ULs ATRISK SSV BS3882 pH>7					

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Summary of Contamination Laboratory Testing results (polycyclic aromatic hydrocarbons) – Topsoil					
Contaminant	Number of samples tested	Highest test result mg/kg	Tier 1 screening value mg/kg	Number of samples exceeding Tier 1	Guideline value source
Naphthalene	5	0.19	2.3	0	S4UL
Acenaphthylene	5	0.17	170	0	
Acenaphthene	5	0.06	210	0	
Fluorene	5	<0.05	170	0	
Phenanthrene	5	0.74	95	0	
Anthracene	5	0.28	2400	0	
Fluoranthene	5	1.7	280	0	
Pyrene	5	1.6	620	0	
Benzo(a)anthracene	5	0.73	7.2	0	
Chrysene	5	0.93	15	0	
Benzo(b)fluoranthene	5	1.3	2.6	0	
Benzo(k)fluoranthene	5	0.37	77	0	
Benzo(a)pyrene	5	0.95	2.2	0	
Indeno(1,2,3-cd)pyrene	5	0.54	27	0	
Dibenz(a,h)anthracene	5	<0.05	0.24	0	
Benzo(ghi)perylene	5	0.65	320	0	

Table 10.1b

Reference guideline values: LQM/CIEH S4UL 1% SOM

Summary of Contamination Laboratory Testing results (metals, metalloids and inorganics) – Made Ground					
Contaminant	Number of samples tested	Highest test result mg/kg	Tier 1 screening value mg/kg	Number of samples exceeding Tier 1	Guideline value source
Arsenic	2	37	37	0	S4UL
Cadmium	2	<0.2	11	0	S4UL
Chromium	2	23	910	0	S4UL
Hexavalent Chromium	2	<1.8	6	0	S4UL
Copper	2	33	2400 (200)	0	S4UL (BS3882)
Lead	2	47	200	0	C4SL
Mercury	2	<0.3	40	0	S4UL
Nickel	2	39	180	0	S4UL
Selenium	2	<1.0	250	0	S4UL
Zinc	2	140	3700 (300)	0	S4UL (BS3882)
Cyanide	2	<1.0	34	0	SSV

Table 10.1c

Reference guideline values: DEFRA C4SL LQM/CIEH S4ULs ATRISK SSV BS3882 pH>7

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Summary of Contamination Laboratory Testing results (polycyclic aromatic hydrocarbons) – Made Ground					
Contaminant	Number of samples tested	Highest test result mg/kg	Tier 1 screening value mg/kg	Number of samples exceeding Tier 1	Guideline value source
Naphthalene	2	<0.05	2.3	0	S4UL
Acenaphthylene	2	<0.05	170	0	
Acenaphthene	2	<0.05	210	0	
Fluorene	2	<0.05	170	0	
Phenanthrene	2	0.11	95	0	
Anthracene	2	<0.05	2400	0	
Fluoranthene	2	0.16	280	0	
Pyrene	2	0.14	620	0	
Benzo(a)anthracene	2	0.11	7.2	0	
Chrysene	2	0.1	15	0	
Benzo(b)fluoranthene	2	0.13	2.6	0	
Benzo(k)fluoranthene	2	0.05	77	0	
Benzo(a)pyrene	2	0.1	2.2	0	
Indeno(1,2,3-cd)pyrene	2	<0.05	27	0	
Dibenz(a,h)anthracene	2	<0.05	0.24	0	
Benzo(ghi)perylene	2	<0.05	320	0	

Table 10.1d

Reference guideline values: LQM/CIEH S4UL 1% SOM

Summary of Contamination Laboratory Testing results (metals, metalloids and inorganics) – Glaciofluvial Deposits					
Contaminant	Number of samples tested	Highest test result mg/kg	Tier 1 screening value mg/kg	Number of samples exceeding Tier 1	Guideline value source
Arsenic	1	18	37	0	S4UL
Cadmium	1	<0.2	11	0	S4UL
Chromium	1	50	910	0	S4UL
Hexavalent Chromium	1	<1.8	6	0	S4UL
Copper	1	25	2400 (200)	0	S4UL (BS3882)
Lead	1	19	200	0	C4SL
Mercury	1	<0.3	40	0	S4UL
Nickel	1	19	180	0	S4UL
Selenium	1	<1.0	250	0	S4UL
Zinc	1	85	3700 (300)	0	S4UL (BS3882)
Cyanide	1	<1.0	34	0	SSV

Table 10.1e

Reference guideline values: DEFRA C4SL LQM/CIEH S4ULs ATRISK SSV BS3882 pH>7

Summary of Contamination Laboratory Testing results (polycyclic aromatic hydrocarbons) – Glaciofluvial Deposits

Contaminant	Number of samples tested	Highest test result mg/kg	Tier 1 screening value mg/kg	Number of samples exceeding Tier 1	Guideline value source
Naphthalene	1	<0.05	2.3	0	S4UL
Acenaphthylene	1	0.13	170	0	
Acenaphthene	1	<0.05	210	0	
Fluorene	1	0.19	170	0	
Phenanthrene	1	0.54	95	0	
Anthracene	1	0.25	2400	0	
Fluoranthene	1	0.45	280	0	
Pyrene	1	0.31	620	0	
Benzo(a)anthracene	1	0.19	7.2	0	
Chrysene	1	0.12	15	0	
Benzo(b)fluoranthene	1	<0.05	2.6	0	
Benzo(k)fluoranthene	1	<0.05	77	0	
Benzo(a)pyrene	1	<0.05	2.2	0	
Indeno(1,2,3-cd)pyrene	1	<0.05	27	0	
Dibenz(a,h)anthracene	1	<0.05	0.24	0	
Benzo(ghi)perylene	1	<0.05	320	0	

Table 10.1f

Reference guideline values: LQM/CIEH S4UL 1% SOM

10.2 Metals, metalloids, inorganics and PAH

10.2.1 With reference to the preceding tables and results, all of the five samples of Topsoil, two samples of Made Ground and one sample of Glaciofluvial Deposits tested were below all S4UL guideline values for residential with plant uptake end use, except for the Made Ground sample from WS04 at 0.5m bgl which had an Arsenic result of 37mg/kg which is the same as the 37mg/kg screening value. However the result is not above the screening value and therefore is not considered to represent a risk to human health.

10.3 Asbestos

10.3.1 Six samples of Topsoil, Made Ground and the underlying Glaciofluvial Deposits were screened for asbestos and asbestos containing materials. No asbestos was detected within the samples screened.

10.4 Pesticides

10.4.1 Two Topsoil samples were tested for pesticides, all results were recorded below the limit of detection. Based on the low concentrations encountered, the risk from pesticides is considered to be very low.

10.5 Controlled Waters

- 10.5.1 Groundwater was not encountered during the investigation and it is considered that groundwater is not present within the Glaciofluvial Deposits. Therefore, the risk to controlled waters is considered very low.

10.6 Ground Gas

- 10.6.1 The desk study recorded off site backfilled gravel pits which were considered a low risk of potential land gas generation despite the age of the identified features.
- 10.6.2 A total of four combined groundwater and ground gas monitoring wells were installed to give good coverage of the site. Three rounds of ground gas monitoring have been undertaken to date.
- 10.6.3 The results are summarised within the below table with the results presented in Appendix B.

Summary of ground gas monitoring results							
Monitoring Well	Methane % range	Carbon Dioxide % range	Oxygen % range	Flow rate l/hr range	Borehole pressure range mb	Water level (m bgl) range	Atmospheric pressure range mb
WS01	0.0-0.1	1.4-1.8	19.4-20.1	0.1-0.2	0.11-0.14	Dry	1005-1009
WS04	0.0-0.2	1.3-1.6	19.4-19.7	0.2	0.17	Dry	1005-1009
WS07	0.1-0.2	1.3-1.4	20.0-20.4	0.1	0.2-0.4	Dry	1005-1009
WS08	0.1-0.2	1.2-1.5	20.3-20.7	<0.1	0.1-0.2	Dry	1005-1009

Table 10.6

- 10.6.4 During the preliminary gas monitoring, a maximum concentration of 0.2% Methane and a maximum concentration of 1.8% Carbon Dioxide were detected with a maximum flow recorded of 0.2l/hr. The above results give a gas screening value (GSV) of 0.0036l/hr for the site which corresponds with Characteristic Situation 1 (CS1) and NHBC Green classification therefore no specific requirements are required for new buildings to mitigate gas risk at this stage.

10.7 Assessment and discussion

- 10.7.1 With reference to the preceding tables and the tested metals, metalloids, inorganics and PAH compounds, none of the measured concentrations in the Topsoil, Made Ground or underlying natural Glaciofluvial Deposits exceed the residential (with plant uptake) screening values. In addition, six samples were screened for the presence of asbestos fibres/fragments, the results indicate no fragments or fibres of asbestos were detected.

10.7.2 Based on Topsoil conditions encountered across the site together with our quantitative assessment, the site does not present an unacceptable risk of harm to identified receptors with an overall derived low to very low risk for each of the receptors identified by our conceptual model.

10.7.3 The Topsoil across the site is considered to be suitable for re use within residential gardens and soft landscaping areas, this is solely from a perspective of human health risk and the soils have not been assessed as a growth medium.

Phytotoxic risk

10.7.4 We have not identified any concentrations of chemical contaminants to indicate a phytotoxic risk to vegetation. The soils have not been assessed as a growth medium. We suggest that a landscape consultant is provided with soils testing data from our report to determine appropriate planting for the ground conditions encountered.

10.8 Water supply pipes

10.8.1 We have not identified any concentration of chemical contaminants to suggest a risk to water supply pipes.

10.8.2 Water pipes would be laid within natural soil and therefore no artificial contamination is anticipated to warrant protective pipe. We recommend provision of this report to the local water supplier to determine their requirements. The water supply company may request more specific testing along the proposed line of service routes.

10.9 Unsuspected contamination during construction works

10.9.1 Should any conditions be exposed during the course of the development works that could suggest contaminated soils from visual or olfactory evidence, we should be consulted to determine the most appropriate course of action.

10.10 Waste classification

10.10.1 It is considered that natural soils not affected by any artificial contamination can be classified as inert for offsite disposal. Topsoil, due to potentially higher organic content may be classified as non-hazardous rather than inert, testing should be completed to confirm the classification for off-site disposal if required. Topsoil should be maintained on site or recycled and reused in preference wherever possible and not disposed of to landfill.

10.10.2 Following WM3, we have carried out analysis of our laboratory test data of the Made Ground samples using HazWasteOnline™. A copy of the generated report is provided in Appendix C. This analysis determines the sample to be **non-hazardous**.

11.0 Engineering assessment

11.1 Geotechnical laboratory results

11.1.1 A summary of the geotechnical laboratory testing undertaken from the site is presented in Table 11.1. The complete results are included within Appendix D.

Summary of plasticity classification results				
Sample reference and depth	Soil type	Plasticity Index %	Modified Plasticity %	Plasticity term (Volume Change Potential)
WS02 @ 0.90m	Glaciofluvial Deposits	19	13	Medium (Low)
WS02 @ 1.50m	Glaciofluvial Deposits	25	16	Medium (Low)
WS08 @ 1.90m	Glaciofluvial Deposits	38	17	High (Low)
WS08 @ 0.70m	Glaciofluvial Deposits	19	12	High (Low)

Table 11.1

11.1.2 The results of the plasticity testing indicate that clays of the Glaciofluvial Deposits should be considered to have a Low volume change potential in accordance with NHBC Standards Chapter 4.2.

11.2 Foundations

11.2.1 Topsoil was encountered in all windowless sampler boreholes over a thin covering of Made Ground in three of the boreholes to a maximum depth of 0.6m bgl. Underlying the Topsoil and Made Ground (where encountered) were Glaciofluvial Deposits, which generally consisted of a variable soft to firm brown gravelly sandy Clay with gravels of sandstone, flint and chalk and an orange brown gravelly clayey Sand, with gravels of sandstone flint and chalk

11.2.2 The plasticity index testing has confirmed the cohesive soils beneath the site to be of **Low volume change potential** and based on the variable cohesive and granular soils underlying the site, for the design purposes the whole site should be considered to be Low volume change potential.

11.2.3 On the basis of the ground conditions encountered, with the results of the pocket penetrometer and SPT test results obtained within the soils, traditional strip/trench fill foundations are considered suitable. We suggest an allowable bearing capacity of 110kN/m² onto the natural deposits, limiting settlement to within acceptable limits. Where possible foundations should be deepened to ensure that they are founded onto consistent soil type to help reduce potential impacts of differential movement.

11.2.4 The site is considered to have a Low volume change potential, therefore in accordance with NHBC Chapter 4.2, a minimum foundation depth of 0.75m bgl should apply with deepening based on the influence of trees and vegetation (including potentially from long grasses) and through any desiccated soils. Should any soft, low strength deposits or inconsistent soils be encountered in the base of the excavation, foundations should be deepened to extend through to more competent and consistent strata.

11.2.5 There is the potential for foundations to span both granular and cohesive soils across the site. Therefore, due to the potential variability of the formations, a light mesh reinforcement should be considered to accommodate any minor differential settlement.

Vegetation and trees

11.2.6 For plots within the influence of trees and vegetation, deepening of foundations will be required along with the installation of heave precautions in line with NHBC Chapter 4.2: Building near trees guidance. This includes the boundary trees.

11.2.7 All foundations should be extended 0.3m beneath the deepest roots observed when excavating foundation trenches and fully penetrate any desiccated soils. Where foundations are deepened due to tree influence, they should be stepped accordingly in line with NHBC standards.

11.2.8 In addition, where areas of the site comprised unmaintained vegetation, such overgrowth can potentially cause desiccation of shallow clay soils to depths of up to 1.5m. This can occur during dry summers and effected soils normally rehydrate during winter months although could take longer. It is recommended that development occurs following winter and the site strip of vegetation occurs prior to summer months. Otherwise, foundations should prudently be deepened to 1.5m depth and deeper than any apparent desiccation, unless granular soils are encountered before this depth. It may be possible to carry out laboratory testing to confirm the depth of any desiccation present in such areas prior to construction and thus determine foundation depth, however from our experience, this often proves inconclusive within Glacial Till soils due to the variation in granular content.

11.3 Floor Slabs

11.3.1 Suspended floor slabs are recommended for the proposed development due to the potential of heave from the cohesive soils beneath. The sub floor void should be designed in accordance with NHBC standards.

11.3.2 Based on the assessment carried out to date within the desk study and this phase II ground investigation, ground gas protection measures are not required for the proposed development.

11.3.3 The site is located in an area of lowest radon potential and therefore no radon protection measures are required for new buildings on site.

11.4 Soil aggressivity

- 11.4.1 An assessment of laboratory test results following BRE Special Digest 1 'Concrete in aggressive ground' has been carried out on the Glaciofluvial Deposits.
- 11.4.2 Concentrations of water-soluble sulphate were measured in the range of 0.0013g/l to 0.0032g/l. The calculated oxidisable sulphate did not exceed 0.3% and therefore total potential sulphate has not been considered. Groundwater conditions are considered to be static with pH in the range of 7.7-8.3. Therefore, a classification of DS-1, ACEC-1s is applicable for the Glaciofluvial Deposits.

11.5 Excavations

- 11.5.1 The windowless sampler boreholes generally remained stable whilst in the clay soils, however there is potential for some instability of the granular soils in larger foundation excavations. The nature of the ground conditions means that it will quickly deteriorate in wet conditions therefore it is important to pour concrete as soon as practically possible to reduce the risk of the soils becoming wet and softening. It is recommended that any soft soils are cleaned out of trenches before pouring concrete.
- 11.5.2 Human entry should always be avoided where possible, however, where entry is necessary then the contractor should ensure that the excavations are suitably managed with supports or benched to prevent collapse. Any entry should be undertaken in accordance with suitable Risk Assessments and Method Statements in accordance with the relevant guidance and recommendations.

11.6 Pavement design

- 11.6.1 An equilibrium Californian Bearing Ratio (CBR) design value can be derived from the classification testing. Near surface soils were cohesive and granular natural and Made Ground soils at likely formation levels across the site. Based on the worst case of clay soils with a modified plasticity index of 17% and no groundwater present, a preliminary design CBR value of 3% can be assumed for the natural Glaciofluvial Deposit soils. Where any Made Ground is present at formation level, a CBR <2% should be assumed.
- 11.6.2 A TRL Dynamic Cone Penetrometer has been used to assess the in-situ CBR values for near surface soils. The probe comprises a 60° 20mm diameter steel cone which is driven vertically into the ground by the force of an 8kg weight dropped vertically by 575mm height. The depth of penetrations is then recorded per blow up to 950mm. The test is aborted if the depth of penetrations is less than 2mm per blow.
- 11.6.3 Following the methodology described in TRRL LR1132 (The Structural Design of Bituminous Roads – Powell, Potter, Mayhew, and Nunn, 1984), soil strength expressed as mm/blow can be converted to CBR using the equation: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$.
- 11.6.4 TRL-DCPs were carried out in seven positions as shown on Drawing 01 included within Appendix A and the TRL DCP results are provided in Appendix B. We have discounted the results within Topsoil and Made Ground. The lowest derived CBR for the

underlying natural soils recorded as 18% (the results ranged from 18% to 28%). At this stage we suggest a precautionary CBR of 3% for design purposes to be reassessed during construction works with insitu CBR to determine whether an increased CBR value can be achieved. Should any Made Ground remain at formation level, a CBR of <2% should be assumed and ground improvement necessary to improve the CBR.

- 11.6.5 There is also potential for near surface soils close to trees to be affected by seasonal shrinkage and swelling. Any such clay soils within the zone of influence, potentially desiccated soils or where roots and rootlets are observed should be removed and replaced with granular soils to reduce the risk of this occurring. Should any soft spots be encountered during preparation of the formation level, it is recommended that these are excavated and replaced with a suitable compacted fill.
- 11.6.6 All topsoil material and Made Ground should be removed from proposed pavements and any obvious soft or loose spots excavated and backfilled with a suitable fill. Reference should be made to the compaction requirements outlined in Highways England Volume 1: Specification for Highway Works Series 600: Earthworks.
- 11.6.7 The cohesive and granular soils beneath the site are considered to be frost susceptible due the fines content present.

11.7 Infiltration potential

- 11.7.1 A BRE365 soakage test letter report has also been produced by Geo-Environmental dated October 2021 (reference: GE20375/SA02/211027) to which the reader is referred.
- 11.7.2 Soakage testing was completed at 10 locations across the site with detailed results presented in the report.
- 11.7.3 The report concludes: *“The testing undertaken indicates that the majority of the granular soils of the Glaciofluvial Deposits are likely to be suitable for drainage via conventional soakaways. However, where more cohesive soils and bands have been identified as part of the investigation (SA101 and SA109), soakaways in these soils are considered unlikely to be effective. The near-surface soils tested are also likely to be suitable for permeable paving. Soakaways should be designed with suitable clearance above groundwater levels. Soakaways should be located no closer than 5m from any buildings.”*

12.0 References

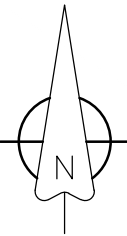
- 12.1 BN EN1997-1:2004 +A1:2013 Eurocode 7 - Geotechnical Design Part 1: General Rules
- 12.2 BS EN 1997-2:2007 Eurocode 7 – Geotechnical Design Part 2: Ground investigation and testing
- 12.3 BS EN ISO 14688-2:2004 Geotechnical investigation and testing – Identification and classification of soil – Part 2: Principles for a classification
- 12.4 BS 1377-2 1990 Soils for Engineering purposes classification tests
- 12.5 BS 5930:2015 Code of Practice for ground investigations
- 12.6 BS 8004:2015 Code of practice for foundations
- 12.7 MJ Tomlinson Foundation Design and Construction 7th Edition
- 12.8 BS 10175:2011+A2:2017 Investigation of potentially contaminated sites – Code of Practice
- 12.9 The LQM/CIEH S4ULs for Human Health Risk Assessment
- 12.10 Land Contamination Risk Management – replacement for Contaminated Land Report 11 Model Procedures for the Management of Land Contamination
- 12.11 Guidelines for Environmental Risk Assessment and Management (Green Leaves III) DEFRA
- 12.12 CIRIA C552 Contaminated Land Risk Assessment – A Guide to Good Practice
- 12.13 CIRIA C665 Assessing Risks Posed by Hazardous Gases to Buildings
- 12.14 BS 8485:2015 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- 12.15 BS3882:2015 Specification for Topsoil
- 12.16 BRE Special Digest 1 ‘Concrete in Aggressive Ground’
- 12.17 Manual of Contract documents for Highway Works volume 1 Specification for Highway Works, Series 600 – Earthworks



**Appendix A
Drawing**

Base drawing:
Proposed Site Plan provided by AT Architecture,
dated March 2018, drawing number: A_1622 PL100.

- KEY
- WS Windowless sample borehole
 - WS Windowless sample borehole with monitoring well installation
 - DCP TRL - Dynamic cone penetration test



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Scale at A3 NTS Drawn by LB Checked by AP Date September 2023

Status FOR INFORMATION Project ref 26671 Drawing no. 01

Client	Manor Oak Homes
Project	Gray's Lane, Hitchin
Title	Investigation Positions over Proposed Site Plan
Status	FOR INFORMATION
Project ref	26671
Drawing no.	01
Date	September 2023
Revision	



**Appendix B
Fieldwork Records**



Dynamic Sampling Log

Project Name: Land off Gray's Lane		Client: Manor Oak Homes		Date: 18/07/2023	
Location: Hitchin		Contractor: Keystone Site Solutions Ltd			
Project No. : 26671		Crew Name:		Drilling Equipment: Premier 110	
Borehole Number WS01	Hole Type WLS	Level	Logged By TM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.20			Brown slightly gravelly slightly silty sandy TOPSOIL with frequent roots and rootlets. Gravel consists of subrounded to angular fine to medium sandstone and flint.	1
					0.50			Brown gravelly fine to medium SAND with occasional pockets of clay. Gravel consists of subrounded to angular fine to coarse sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	
		0.70	D		0.80			Firm brown gravelly sandy silty CLAY. Gravel consists of subrounded to angular fine to coarse sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	
		0.90	PP	130.00				Firm brown slightly gravelly sandy silty CLAY. Gravel consists of subrounded to angular fine to coarse sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	
		1.00	SPT	N=11 (2,2/2,3,3,3)	1.00			Firm orangish brown slightly gravelly slightly sandy silty CLAY with occasional sand pockets. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	2
		1.50	D						
		1.70	PP	70.00					
		1.90	PP	45.00	1.85			Soft orangish brown slightly gravelly sandy silty CLAY with occasional sand pockets. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	
		2.00	SPT	N=8 (2,2/2,2,2,2)					3
					2.55			Soft orangish brown slightly gravelly sandy silty CLAY with occasional sand pockets. Gravel consists of subangular to angular fine to medium sandstone, flint and chalk. (GLACIOFLUVIAL DEPOSITS)	
					2.70				
		3.00	SPT	N=24 (4,4/5,5,6,8)	3.00			Loose to medium dense dark orangish brown slightly gravelly slightly silty fine to medium SAND. Gravel consists of subangular to angular fine to coarse sandstone, flint and chalk. (GLACIOFLUVIAL DEPOSITS)	
					3.55			Medium dense dark orangish brown slightly gravelly clayey fine to medium SAND. Gravel consists of subangular to angular fine to coarse sandstone, flint and chalk. (GLACIOFLUVIAL DEPOSITS)	4
		3.70	PP	75.00				Firm orange slightly gravelly sandy silty CLAY. Gravel consists of subangular to angular fine to medium sandstone, flint and chalk. (GLACIOFLUVIAL DEPOSITS)	
		3.90	PP	125.00					
		4.00	SPT	N=35 (9,9/8,8,9,10)	4.00				
								End of Borehole at 4.000m	5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

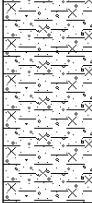
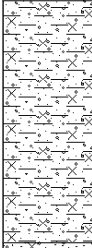
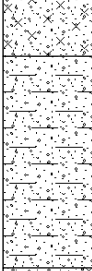
Remarks	
No groundwater encountered.	



Remarks	
No groundwater encountered.	



Dynamic Sampling Log

Project Name: Land off Gray's Lane			Client: Manor Oak Homes			Date: 18/07/2023					
Location: Hitchin			Contractor: Keystone Site Solutions Ltd								
Project No. : 26671			Crew Name:			Drilling Equipment: Premier 110					
Borehole Number WS03		Hole Type WLS		Level		Logged By TM		Scale 1:25		Page Number Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.20	ES		0.30			Brown slightly gravelly slightly silty sandy TOPSOIL with frequent roots and rootlets. Gravel consists of subrounded to angular fine to medium sandstone and flint.			
		0.90	D		1.50			Stiff brown gravelly sandy silty CLAY. Gravel consists of subangular to angular fine to coarse sandstone and flint. (GLACIOFLUVIAL DEPOSITS)		1	
		0.90	PP	225.00							
		1.00	SPT	N=21 (5,4/4,5,6,6)							
		1.40	D		2.00			Firm yellowish brown gravelly sandy silty CLAY with occasional sand pockets. Gravel consists of subangular to angular fine to coarse sandstone and flint. (GLACIOFLUVIAL DEPOSITS)			
		1.70	PP	85.00							
		1.80	D								
		1.90	PP	85.00							
		2.00	SPT	N=16 (4,4/3,4,4,5)	2.80			Firm orangish brown slightly gravelly sandy silty CLAY. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)		2	
2.70	PP	90.00	3.00			Medium dense reddish brown slightly gravelly slightly silty fine to medium SAND. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)		3			
3.00	SPT	N=10 (2,2/2,2,3,3)									
			3.70			Medium dense reddish brown slightly gravelly clayey fine to medium SAND. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)					
			4.00			Firm reddish brown gravelly sandy silty CLAY. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)		4			
		4.00	SPT	N=20 (4,4/5,5,5,5)	4.00		End of Borehole at 4.000m		5		
Remarks											
No groundwater encountered.											



Remarks	
No groundwater encountered.	



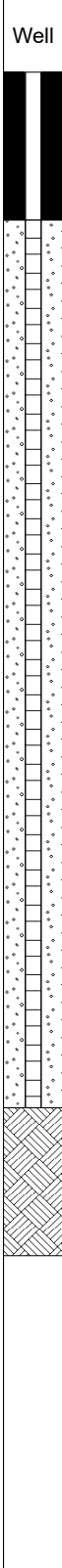
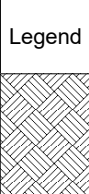
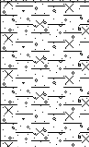
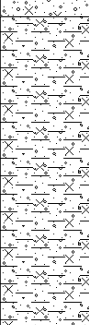
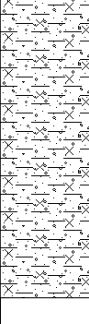
Remarks	
No groundwater encountered.	



Dynamic Sampling Log

Project Name: Land off Gray's Lane			Client: Manor Oak Homes				Date: 18/07/2023				
Location: Hitchin			Contractor: Keystone Site Solutions Ltd								
Project No. : 26671			Crew Name:				Drilling Equipment: Premier 110				
Borehole Number WS06		Hole Type WLS		Level		Logged By TM		Scale 1:25		Page Number Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.20	ES		0.35			Brown slightly gravelly slightly silty sandy TOPSOIL with frequent roots and rootlets. Gravel consists of subrounded to angular fine to medium sandstone, flint and brick.		1	
		0.70	D		1.00			Stiff orangish brown and occasional grey mottled slightly gravelly slightly sandy silty CLAY with occasional roots and rootlets. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)			
		0.70	PP	205.00							
		0.90	PP	225.00							
		1.00	SPT	N=16 (5,5/4,4,4,4)	1.75			Medium dense brown and orangish brown clayey slightly sandy subangular to angular fine to coarse sandstone and flint GRAVEL. (GLACIOFLUVIAL DEPOSITS)			
		1.70	PP	80.00	2.00			Firm orangish brown gravelly sandy silty CLAY. Gravel consists of subrounded to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)			
1.90	D										
1.90	PP	50.00									
2.00	SPT	N=7 (1,2/2,1,2,2)									
2.70	PP	50.00	3.70			Medium dense light greyish brown clayey gravelly fine to medium SAND with a low flint cobble content. (GLACIOFLUVIAL DEPOSITS)					
2.90	PP	45.00									
3.00	SPT	N=22 (2,2/2,4,8,8)									
4.00	SPT	N=32 (5,6/6,8,9,9)	4.00			End of Borehole at 4.000m		4			
								5			
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
Remarks											
No groundwater encountered.											



Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Brown slightly gravelly slightly silty sandy TOPSOIL with frequent roots and rootlets. Gravel consists of subrounded to angular fine to medium sandstone and flint.	
					0.40				
		0.70 0.70 0.70	D ES PP	225.00				Stiff orangish brown and occasional grey mottled slightly gravelly slightly sandy silty CLAY with occasional roots and rootlets. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	
		1.00	SPT	N=43 (10,10/11,12,11,9)	0.90				1
								Dense orangish brown and light brown slightly silty sandy subrounded to angular fine to coarse sandstone and flint GRAVEL. (GLACIOFLUVIAL DEPOSITS)	
		1.70	D						
		2.00	SPT	N=13 (2,3/4,3,3,3)	2.00			<u>becomes slightly clayey from 1.90m bgl</u> Soft to firm orangish brown gravelly slightly sandy silty CLAY. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	2
		2.70 2.70 2.90 3.00	D PP PP SPT	65.00 55.00 N=11 (2,3/3,2,2,3)					
								<u>becomes soft and damp from 3.00m bgl</u>	3
		3.70 3.70 3.90 4.00	D PP PP SPT	20.00 30.00 N=8 (2,2/2,2,2,2)	4.00				
								End of Borehole at 4.000m	4
									5

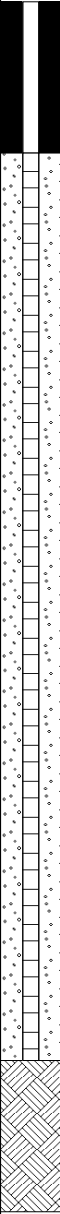
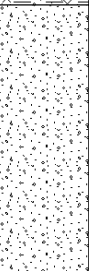
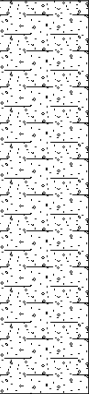
[illegible]

No groundwater encountered.



Dynamic Sampling Log

Project Name: Land off Gray's Lane		Client: Manor Oak Homes		Date: 18/07/2023	
Location: Hitchin		Contractor: Keystone Site Solutions Ltd			
Project No. : 26671		Crew Name:		Drilling Equipment: Premier 110	
Borehole Number WS08	Hole Type WLS	Level	Logged By TM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES					Brown slightly gravelly slightly silty sandy TOPSOIL with frequent roots and rootlets. Gravel consists of subrounded to angular fine to medium sandstone and flint.	
					0.30			Stiff orangish brown slightly gravelly sandy silty CLAY. Gravel consists of subangular to angular fine to medium sandstone and flint. (GLACIOFLUVIAL DEPOSITS)	
		0.70	PP	225.00					
		0.80	D						
		1.00	SPT	N=12 (3,3/3,3,3,3)	0.90			Medium dense light brown slightly gravelly fine to medium SAND. Gravel consists of subangular to angular fine sandstone, flint and chalk. (GLACIOFLUVIAL DEPOSITS)	1
					1.80				
		2.00	SPT	N=16 (4,4/4,4,4,4)	2.00			Medium dense yellowish brown medium to coarse SAND. (GLACIOFLUVIAL DEPOSITS)	
		2.30	D					Medium dense light brown slightly gravelly slightly clayey medium to coarse SAND. (GLACIOFLUVIAL DEPOSITS)	2
		3.00	SPT	N=13 (3,4/3,3,3,4)					
					3.30			Medium dense yellowish brown slightly gravelly silty fine to medium SAND. Gravel consists of subangular to angular fine chalk and flint. (GLACIOFLUVIAL DEPOSITS)	3
		3.50	D						
		4.00	SPT	N=16 (3,3/4,4,4,4)	4.00				
								End of Borehole at 4.000m	4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
Remarks											
No groundwater encountered.											

Photographic Records – Windowless samples

Project: Gray's Lane, Hitchin

Project Ref: 26671

Date: July 2023

Revision: 0



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W: www.jppuk.net



WS01



WS02

Photographic Records – Windowless samples

Project: Gray's Lane, Hitchin

Project Ref: 26671

Date: July 2023

Revision: 0



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WS03



WS04

Photographic Records – Windowless samples

Project: Gray's Lane, Hitchin

Project Ref: 26671

Date: July 2023

Revision: 0



T: 01604 781811

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W: www.jppuk.net



WS05



WS06

Photographic Records – Windowless samples

Project: Gray's Lane, Hitchin

Project Ref: 26671

Date: July 2023

Revision: 0



T: 01604 781811

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WS07



WS08

Summary of SPT Data

Project: Gray's Lane, Hitchin

Project Ref : 26671

Date: August 2023

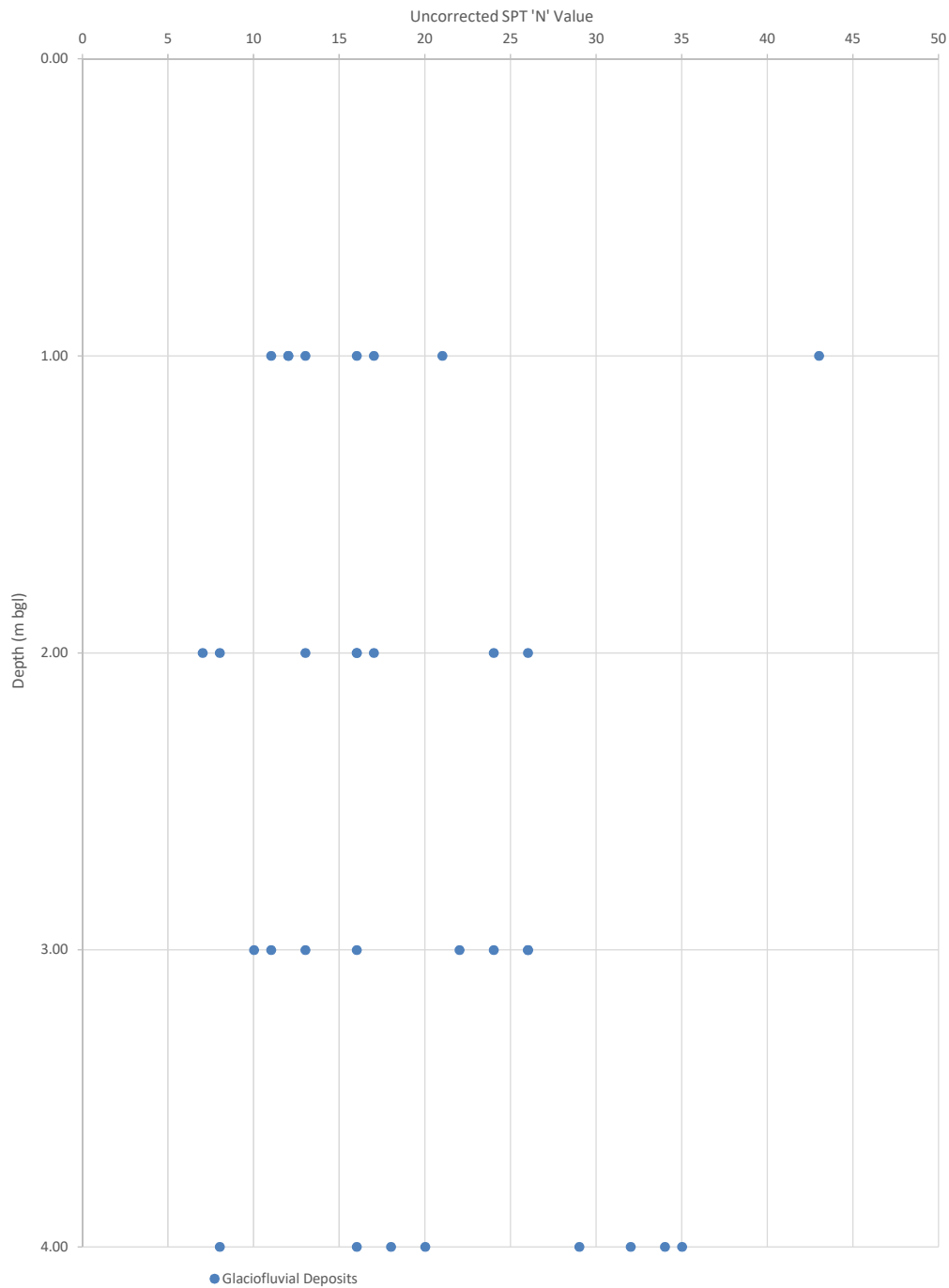
Revision:



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Summary of Undrained Shear Strength Data

Project: Gray's Lane, Hitchin

Project Ref : 26671

Date: August 2023

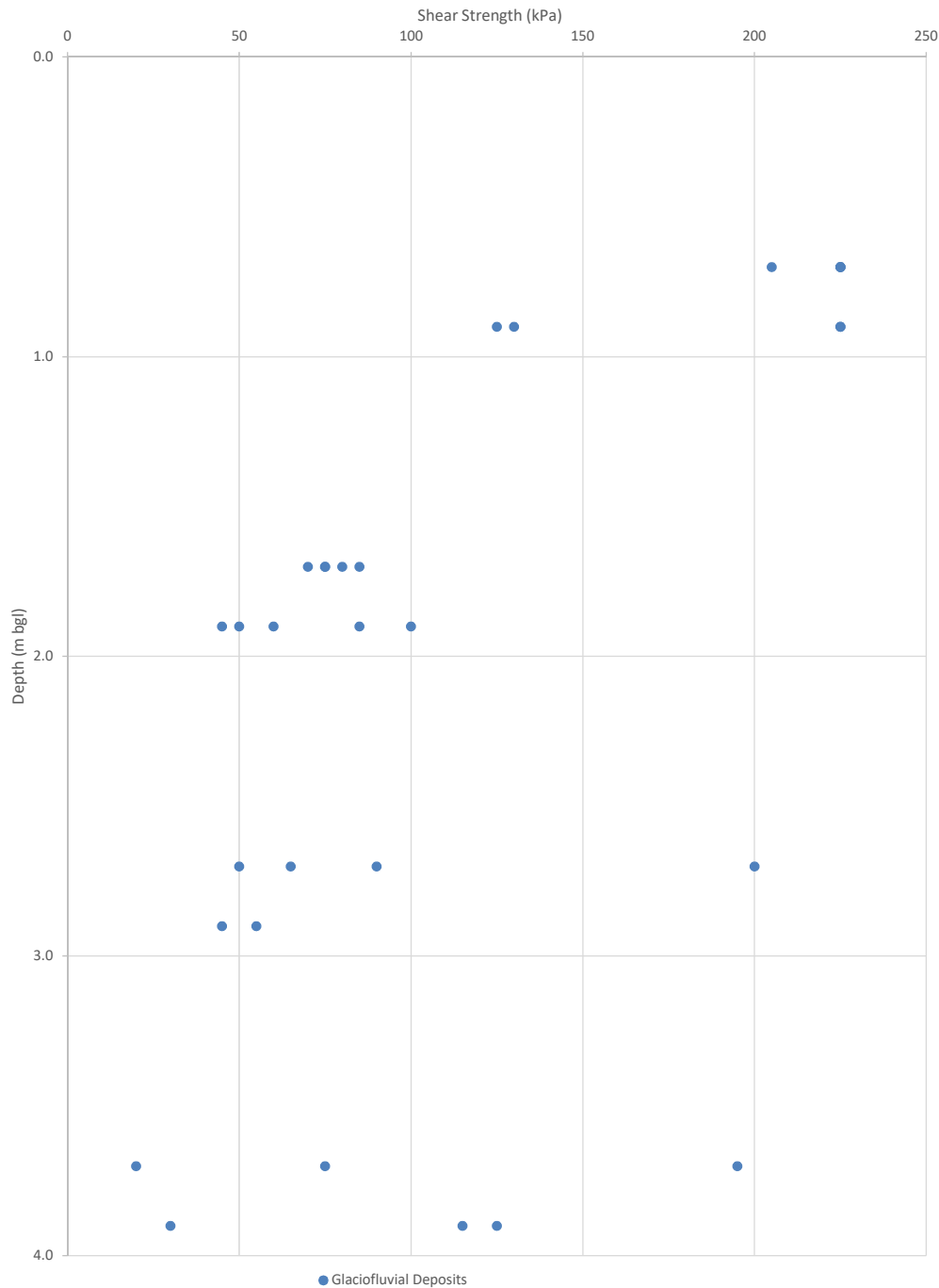
Revision:



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DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP01



Project : Gray's Lane, Hitchin

Project Ref : 26671

Depth of Test : G.L.

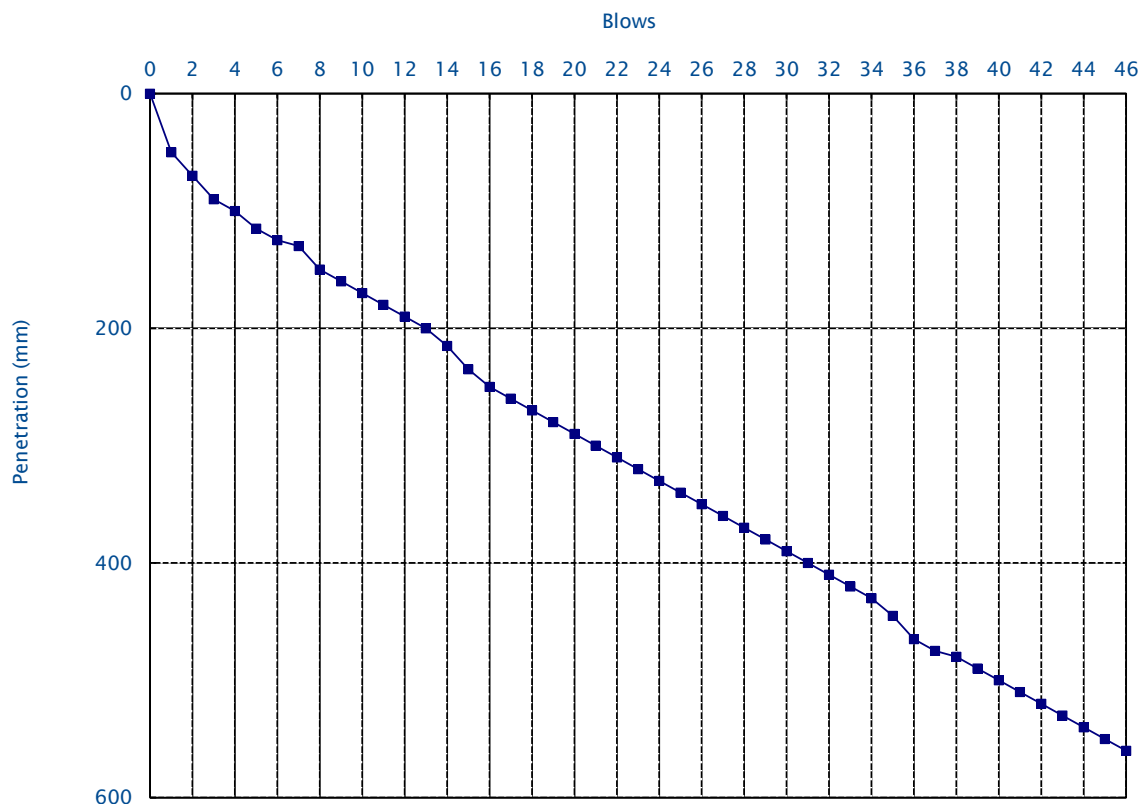
Calcs By : LB

Date : 07 September 2023

T: 01604 781811

E: mail@jppuk.net

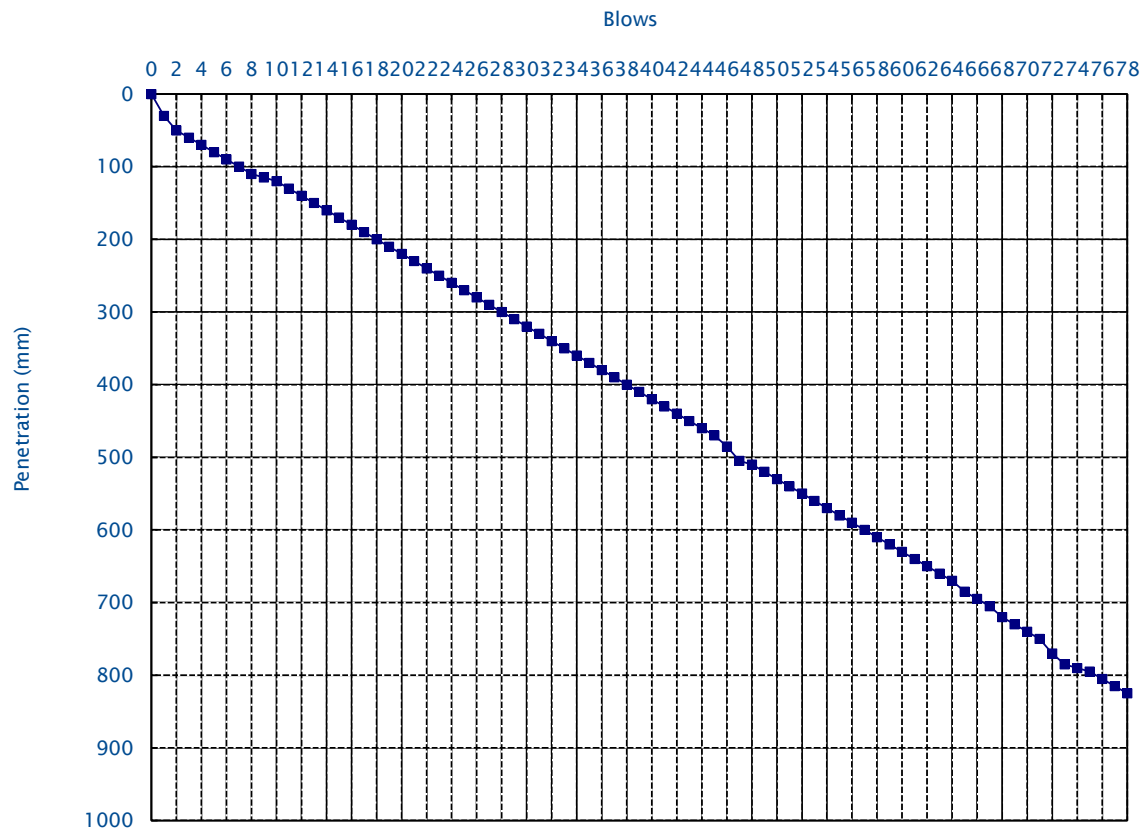
W: www.jppuk.net



Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	17.00	15	170	170	Topsoil
2	10.83	24	390	560	Glaciofluvial Deposits

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

DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP02		 T: 01604 781811 E: mail@jppuk.net W: www.jppuk.net
Project : Gray's Lane, Hitchin		
Project Ref : 26671		
Depth of Test : G.L.		
Calcs By : LB		
Date : 07 September 2023		



Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	14.29	18	100	100	Topsoil
2	10.13	26	405	505	Made Ground
3	10.32	26	320	825	Glaciofluvial Deposits

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

DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP03



Project : Gray's Lane, Hitchin

Project Ref : 26671

Depth of Test : G.L.

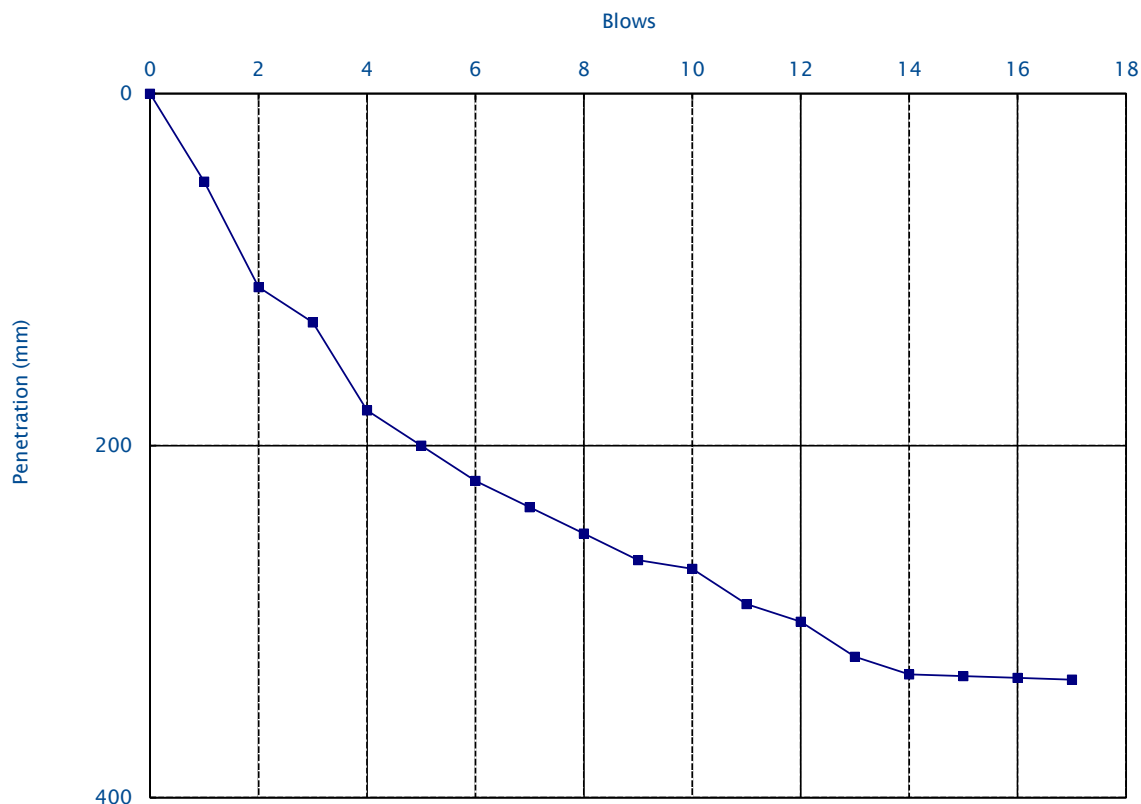
Calcs By : LB

Date : 07 September 2023

T: 01604 781811

E: mail@jppuk.net

W: www.jppuk.net



Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	43.33	6	130	130	Topsoil
2	14.50	18	203	333	Glaciofluvial Deposits

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

DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP04



Project : Gray's Lane, Hitchin

Project Ref : 26671

Depth of Test : G.L.

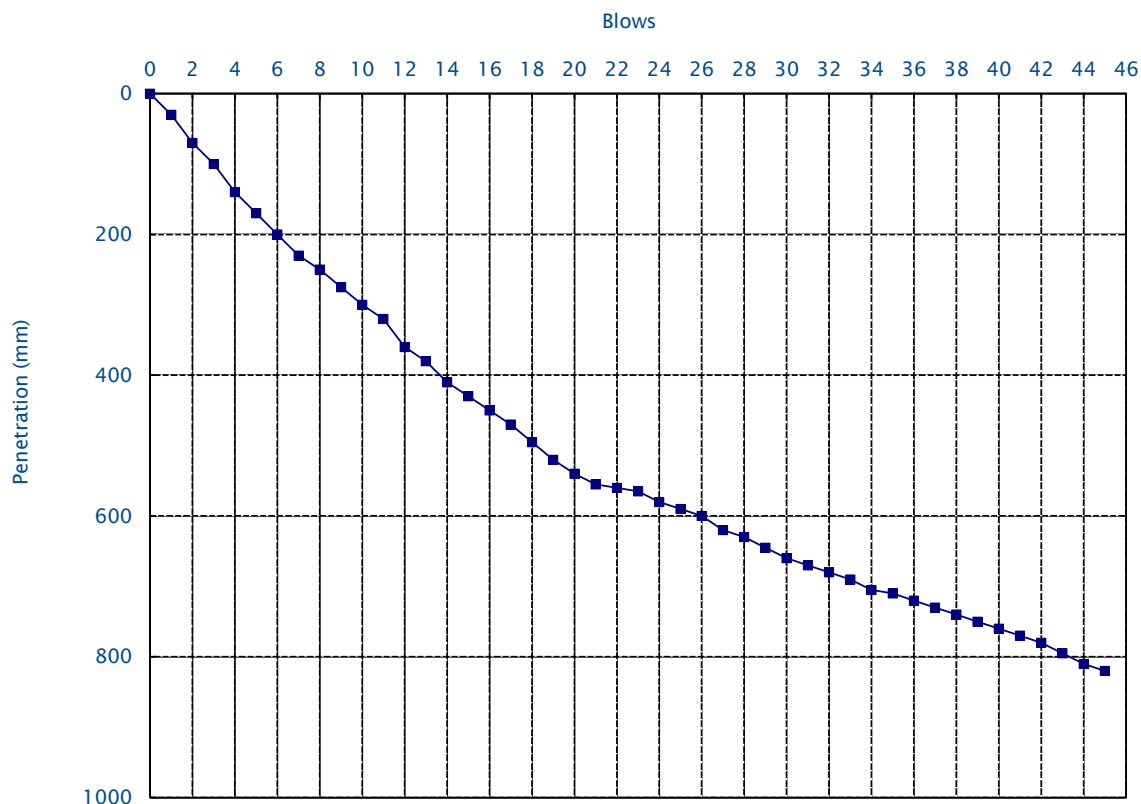
Calcs By : LB

Date : 07 September 2023

T: 01604 781811

E: mail@jppuk.net

W: www.jppuk.net



Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	29.09	9	320	320	Topsoil
2	20.42	12	245	565	Made Ground
3	11.59	23	255	820	Glaciofluvial Deposits

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

DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP05

Project : Gray's Lane, Hitchin

Project Ref : 26671

Depth of Test : G.L.

Calcs By : LB

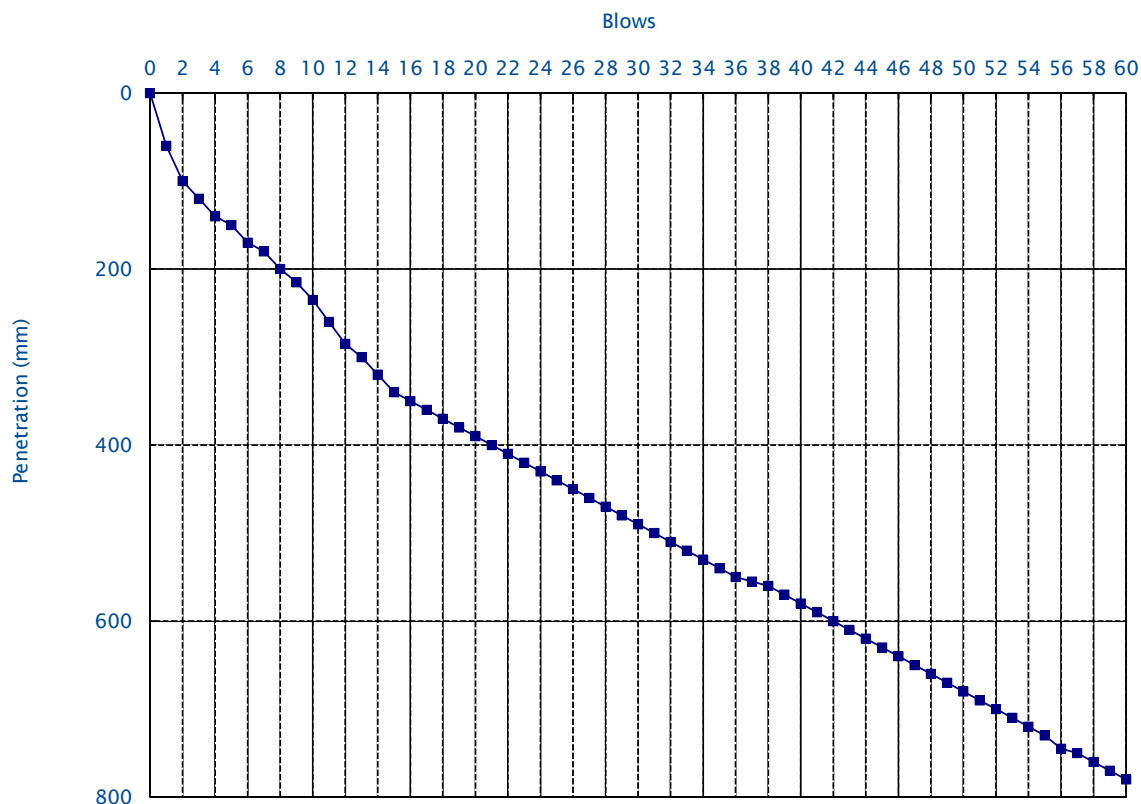
Date : 07 September 2023



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Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	22.67	11	340	340	Topsoil
2	9.77	27	215	555	Glaciofluvial Deposits
3	9.78	27	225	780	Glaciofluvial Deposits

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

DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP06



Project : Gray's Lane, Hitchin

Project Ref : 26671

Depth of Test : G.L.

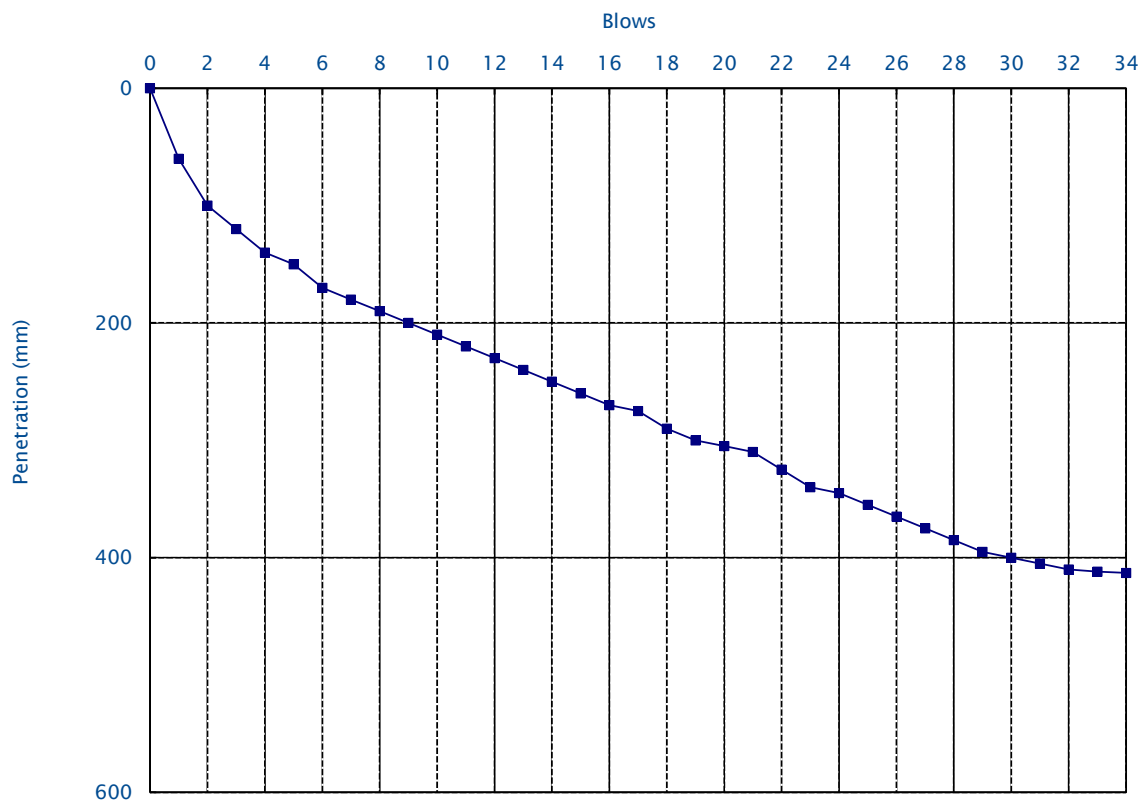
Calcs By : LB

Date : 07 September 2023

T: 01604 781811

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Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	28.33	9	170	170	Topsoil
2	9.40	28	235	405	Glaciofluvial Deposits

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

DYNAMIC CONE PENETROMETER (DCP) RESULTS - DCP07

Project : Gray's Lane, Hitchin

Project Ref : 26671

Depth of Test : G.L.

Calcs By : LB

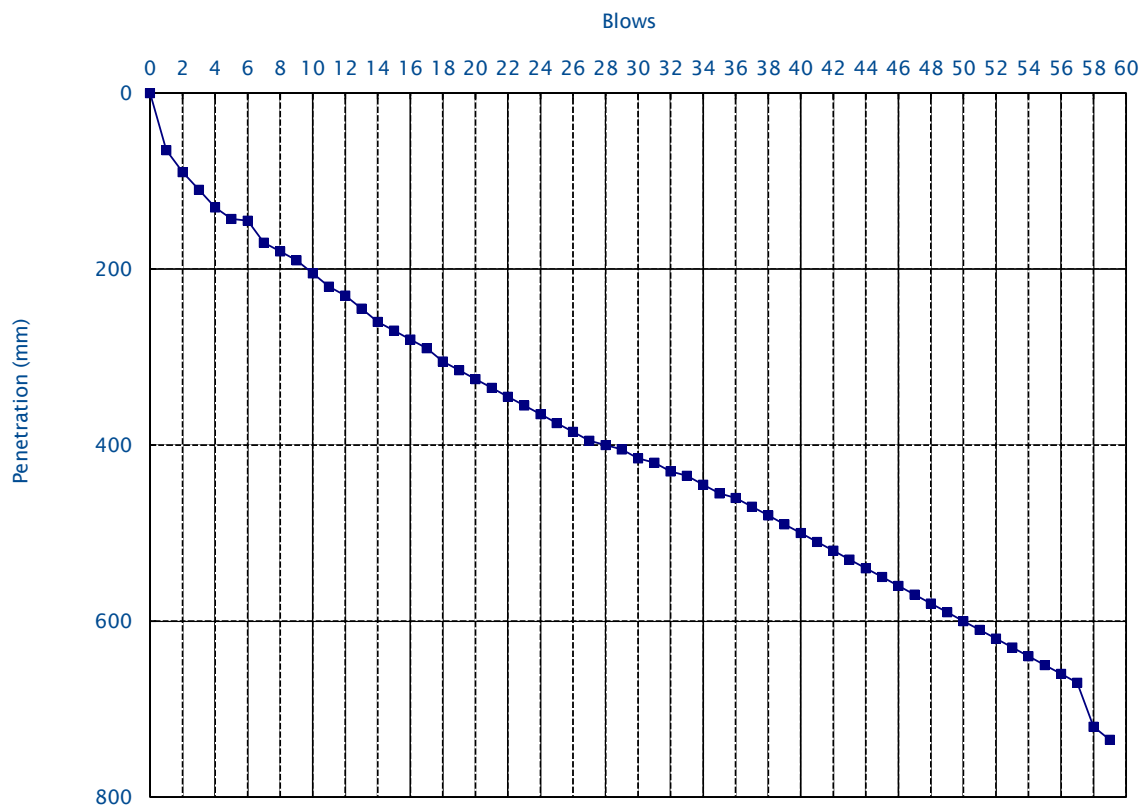
Date : 07 September 2023



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W: www.jppuk.net



Layer	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)	Strata
1	24.17	10	145	145	Topsoil
2	11.06	24	575	720	Glaciofluvial Deposits

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

Gas Monitoring Results

Project: Gray's Lane, Hitchin
Project Ref: 26671
Date: 07/09/2023

Notes:
1. Monitoring equipment used Geotech GA5000



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Revision:

Borehole ref.	Date Time	Atmospheric pressure mb	Temp. °C	Weather conditions	Differential pressure (mbar)	Flow l/hr		Methane %v/v		LEL (%)		Carbon dioxide %v/v		Oxygen %v/v		Depth to water (m)	Top of response zone (m)	Base of response zone (m)	Notes/observations
						Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady				
WS01	04/08/2023	1009	21	Cloudy	0.11	0.2	0.1	0.1	0.1	2	2	1.8	1.8	19.4	19.4	Dry		3.57	
WS04					0.17	0.2	0.2	0.1	0.1	2	2	1.7	1.4	19.4	19.7	Dry		3.55	
WS07					0.4	0.1	0.1	0.2	0.2	4	4	1.3	1.3	20	20	Dry		3.55	
WS08					0.2	0	0	0.2	0.2	4	4	1.3	1.5	20.3	20.3	Dry		3.48	
WS01	22/08/2023	1005	20	Cloudy	0.14	0.2	0.2	0.1	0.1	2	2	1.5	1.4	20.1	20.1	Dry		3.57	
WS04					0.17	0.2	0.2	0.1	0.1	2	2	1.6	1.6	19.2	19.4	Dry		3.55	
WS07					0.2	0.1	0.1	0.2	0.2	4	4	1.3	1.3	20.4	20.4	Dry		3.55	
WS08					0.1	0	0	0.2	0.1	4	2	1.3	1.3	20.7	20.8	Dry		3.48	
WS01	07/09/2023	1008	29	Sunny	0.39	-0.1	0	0	0	0	0	1.4	1.4	19.3	19.3	Dry		3.54	
WS04					0.55	-0.1	0	0	0	0	0	1.3	1.3	19	19	Dry		3.55	
WS07					0.24	-0.1	0	0.1	0.1	2	2	1.4	1.4	20	20	Dry		3.54	
WS08					0.21	0.1	0	0.1	0.1	2	2	1.2	1.2	20.6	20.6	Dry		3.57	

Appendix C

Chemical Testing



Tom McGrath
JPP
Grand Union Works
Whilton Locks
Daventry
Northamptonshire
NN11 2NH

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

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

e: tom.mcgrath@ippuk.net

Analytical Report Number : 23-46699

Project / Site name:	Grays Lane, Hitchin	Samples received on:	24/07/2023
Your job number:	26671	Samples instructed on/ Analysis started on:	24/07/2023
Your order number:		Analysis completed by:	02/08/2023
Report Issue Number:	1	Report issued on:	02/08/2023
Samples Analysed:	8 soil samples		

Signed:



Dominika Warjan
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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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: 23-46699
Project / Site name: Grays Lane, Hitchin

Lab Sample Number				2757875	2757876	2757877	2757878	2757879
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.40	0.20	0.50	0.10
Date Sampled				18/07/2023	18/07/2023	18/07/2023	18/07/2023	18/07/2023
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	11	3.8	12	5.1	18
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.4	0.5	0.6

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	-
Asbestos Analyst ID	N/A	N/A	N/A	LFT	LFT	N/A	LFT	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7	7.5	7.4	7.5	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	640	200	740	330	250
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	19	6.2	16	5.5	16
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0096	0.0031	0.008	0.0027	0.0078
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	9.6	3.1	8	2.7	7.8
Organic Matter (automated)	%	0.1	MCERTS	6.2	0.9	6.2	1.3	4.5

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.17
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.64	< 0.05	0.6	0.11	0.74
Anthracene	mg/kg	0.05	MCERTS	0.18	< 0.05	0.12	< 0.05	0.28
Fluoranthene	mg/kg	0.05	MCERTS	1.2	0.11	1	0.16	1
Pyrene	mg/kg	0.05	MCERTS	1.1	0.12	0.85	0.14	0.77
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.58	0.06	0.54	0.11	0.47
Chrysene	mg/kg	0.05	MCERTS	0.56	< 0.05	0.59	0.1	0.45
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.61	0.07	0.69	0.13	0.45
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.33	0.05	0.34	0.05	0.23
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.56	< 0.05	0.54	0.1	0.35
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.25	< 0.05	0.29	< 0.05	0.17
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.29	< 0.05	0.28	< 0.05	0.22

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.34	< 0.80	5.84	0.9	5.33
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	25	17	26	37	25
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	2.6
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	17	23	23	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	45	24	46	33	35
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	36	150	47	87
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.4	< 0.3	1.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	22	34	39	32
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	160	80	160	140	150

Analytical Report Number: 23-46699
Project / Site name: Grays Lane, Hitchin

Lab Sample Number				2757875	2757876	2757877	2757878	2757879
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.40	0.20	0.50	0.10
Date Sampled				18/07/2023	18/07/2023	18/07/2023	18/07/2023	18/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Pesticides

Alachlor	µg/kg	10	NONE	-	-	< 10	-	< 10
Aldrin	µg/kg	10	NONE	-	-	< 10	-	< 10
Azinphos-ethyl	µg/kg	10	NONE	-	-	-	-	< 10
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	< 10
BHC-alpha (benzene hexachloride)	µg/kg	10	NONE	-	-	< 10	-	< 10
BHC-beta	µg/kg	10	NONE	-	-	< 10	-	< 10
BHC-delta	µg/kg	10	NONE	-	-	< 10	-	< 10
BHC-gamma (Lindane, gamma HCH)	µg/kg	10	NONE	-	-	< 10	-	< 10
Carbophenothion	µg/kg	10	NONE	-	-	-	-	< 10
Chlordane-cis	µg/kg	10	NONE	-	-	< 10	-	< 10
Chlordane-trans	µg/kg	10	NONE	-	-	< 10	-	< 10
Chlorfenvinphos	µg/kg	10	NONE	-	-	-	-	< 10
Chlorothalonil	µg/kg	20	NONE	-	-	< 20	-	< 20
Chlorpyrifos	µg/kg	10	NONE	-	-	-	-	< 10
DDD-o,p'	µg/kg	10	NONE	-	-	< 10	-	< 10
DDD-p,p'	µg/kg	10	NONE	-	-	< 10	-	< 10
DDE-o,p'	µg/kg	10	NONE	-	-	< 10	-	< 10
DDE-p,p'	µg/kg	10	NONE	-	-	< 10	-	< 10
DDT-o,p'	µg/kg	10	NONE	-	-	< 10	-	< 10
DDT-p,p'	µg/kg	10	NONE	-	-	< 10	-	< 10
Demeton-O	µg/kg	10	NONE	-	-	-	-	< 10
Demeton-S	µg/kg	10	NONE	-	-	-	-	< 10
Diazinon	µg/kg	10	NONE	-	-	-	-	< 10
Dichlorobenzonitrile, 2,6-	µg/kg	10	NONE	-	-	< 10	-	< 10
Dichlorvos	µg/kg	10	NONE	-	-	-	-	< 10
Dieldrin	µg/kg	10	NONE	-	-	< 10	-	< 10
Dimethoate	µg/kg	10	NONE	-	-	-	-	< 10
Dimethylvinphos	µg/kg	10	NONE	-	-	-	-	< 10
Endosulfan I (alpha isomer)	µg/kg	10	NONE	-	-	< 10	-	< 10
Endosulfan II (beta isomer)	µg/kg	10	NONE	-	-	< 10	-	< 10
Endosulfan sulfate	µg/kg	10	NONE	-	-	< 10	-	< 10
Endrin	µg/kg	20	NONE	-	-	< 20	-	< 20
Endrin aldehyde	µg/kg	10	NONE	-	-	-	-	< 10
Endrin ketone	µg/kg	10	NONE	-	-	-	-	< 10
Ethion	µg/kg	10	NONE	-	-	-	-	< 10
Etrinfos	µg/kg	10	NONE	-	-	-	-	< 10
Fenitrothion	µg/kg	10	NONE	-	-	-	-	< 10
Fenthion	µg/kg	10	NONE	-	-	-	-	< 10
Fenvalerate (Sum)	µg/kg	10	NONE	-	-	-	-	< 10
Heptachlor	µg/kg	10	NONE	-	-	< 10	-	< 10
Heptachlor exo-epoxide	µg/kg	10	NONE	-	-	< 10	-	< 10
Hexachlorobenzene	µg/kg	10	NONE	-	-	< 10	-	< 10
Hexachlorobutadiene	µg/kg	10	NONE	-	-	< 10	-	< 10
Isodrin	µg/kg	20	NONE	-	-	< 20	-	< 20
Malathion	µg/kg	10	NONE	-	-	-	-	< 10
Methacrifos	µg/kg	10	NONE	-	-	-	-	< 10
Methoxychlor, p,p'	µg/kg	20	NONE	-	-	< 20	-	< 20
Mevinphos, E+Z	µg/kg	10	NONE	-	-	-	-	< 10
Omethoate	µg/kg	20	NONE	-	-	-	-	< 20
Parathion	µg/kg	10	NONE	-	-	-	-	< 10
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	< 10

Analytical Report Number: 23-46699
Project / Site name: Grays Lane, Hitchin

Lab Sample Number				2757875	2757876	2757877	2757878	2757879
Sample Reference				WS01	WS02	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.40	0.20	0.50	0.10
Date Sampled				18/07/2023	18/07/2023	18/07/2023	18/07/2023	18/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Pendimethalin	µg/kg	10	NONE	-	-	< 10	-	-
Pentachlorobenzene	µg/kg	10	NONE	-	-	< 10	-	< 10
Phorate	µg/kg	10	NONE	-	-	-	-	< 10
Phosalone	µg/kg	10	NONE	-	-	-	-	< 10
Phosphamidon (Sum)	µg/kg	10	NONE	-	-	-	-	< 10
Pirimiphos-ethyl	µg/kg	10	NONE	-	-	-	-	< 10
Pirimiphos-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Propetamphos	µg/kg	10	NONE	-	-	-	-	< 10
Propyzamide	µg/kg	10	NONE	-	-	< 10	-	-
Tecnazene	µg/kg	10	NONE	-	-	< 10	-	< 10
Tetrachlorobenzene, 1,2,4,5-	µg/kg	10	NONE	-	-	< 10	-	< 10
Triadimefon	µg/kg	10	NONE	-	-	< 10	-	-
Triazophos	µg/kg	10	NONE	-	-	-	-	< 10
Trichlorobenzene, 1,2,3-	µg/kg	10	NONE	-	-	< 10	-	< 10
Trichlorobenzene, 1,3,5-	µg/kg	10	NONE	-	-	< 10	-	< 10
Trifluralin	µg/kg	10	NONE	-	-	< 10	-	< 10

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

Analytical Report Number: 23-46699
Project / Site name: Grays Lane, Hitchin

Lab Sample Number				2757880	2757881	2757882
Sample Reference				WS06	WS07	WS08
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.70	0.10
Date Sampled				18/07/2023	18/07/2023	18/07/2023
Time Taken				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
Moisture Content	%	0.01	NONE	19	15	11
Total mass of sample received	kg	0.001	NONE	0.5	0.6	0.5

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	LFT	LFT	LFT

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.4	7.7	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	560	140	700
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	28	18	180
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014	0.0092	0.088
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	14.1	9.2	87.8
Organic Matter (automated)	%	0.1	MCERTS	5.7	0.9	6

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.19	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.13	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.06	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.19	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.24	0.54	0.73
Anthracene	mg/kg	0.05	MCERTS	0.05	0.25	0.12
Fluoranthene	mg/kg	0.05	MCERTS	0.4	0.45	1.7
Pyrene	mg/kg	0.05	MCERTS	0.35	0.31	1.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.21	0.19	0.73
Chrysene	mg/kg	0.05	MCERTS	0.22	0.12	0.93
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.31	< 0.05	1.3
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.11	< 0.05	0.37
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.24	< 0.05	0.95
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.13	< 0.05	0.54
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.14	< 0.05	0.65

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.65	2.18	9.64
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	26	18	36
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	50	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	47	25	45
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	19	150
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	41	19	39
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	85	220

Analytical Report Number: 23-46699
Project / Site name: Grays Lane, Hitchin

Lab Sample Number				2757880	2757881	2757882
Sample Reference				WS06	WS07	WS08
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.70	0.10
Date Sampled				18/07/2023	18/07/2023	18/07/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Pesticides						
Alachlor	µg/kg	10	NONE	-	-	-
Aldrin	µg/kg	10	NONE	-	-	-
Azinphos-ethyl	µg/kg	10	NONE	-	-	-
Azinphos-methyl	µg/kg	10	NONE	-	-	-
BHC-alpha (benzene hexachloride)	µg/kg	10	NONE	-	-	-
BHC-beta	µg/kg	10	NONE	-	-	-
BHC-delta	µg/kg	10	NONE	-	-	-
BHC-gamma (Lindane, gamma HCH)	µg/kg	10	NONE	-	-	-
Carbophenothion	µg/kg	10	NONE	-	-	-
Chlordane-cis	µg/kg	10	NONE	-	-	-
Chlordane-trans	µg/kg	10	NONE	-	-	-
Chlorfenvinphos	µg/kg	10	NONE	-	-	-
Chlorothalonil	µg/kg	20	NONE	-	-	-
Chlorpyrifos	µg/kg	10	NONE	-	-	-
DDD-o,p'	µg/kg	10	NONE	-	-	-
DDD-p,p'	µg/kg	10	NONE	-	-	-
DDE-o,p'	µg/kg	10	NONE	-	-	-
DDE-p,p'	µg/kg	10	NONE	-	-	-
DDT-o,p'	µg/kg	10	NONE	-	-	-
DDT-p,p'	µg/kg	10	NONE	-	-	-
Demeton-O	µg/kg	10	NONE	-	-	-
Demeton-S	µg/kg	10	NONE	-	-	-
Diazinon	µg/kg	10	NONE	-	-	-
Dichlorobenzonitrile, 2,6-	µg/kg	10	NONE	-	-	-
Dichlorvos	µg/kg	10	NONE	-	-	-
Dieldrin	µg/kg	10	NONE	-	-	-
Dimethoate	µg/kg	10	NONE	-	-	-
Dimethylvinphos	µg/kg	10	NONE	-	-	-
Endosulfan I (alpha isomer)	µg/kg	10	NONE	-	-	-
Endosulfan II (beta isomer)	µg/kg	10	NONE	-	-	-
Endosulfan sulfate	µg/kg	10	NONE	-	-	-
Endrin	µg/kg	20	NONE	-	-	-
Endrin aldehyde	µg/kg	10	NONE	-	-	-
Endrin ketone	µg/kg	10	NONE	-	-	-
Ethion	µg/kg	10	NONE	-	-	-
Etrinfos	µg/kg	10	NONE	-	-	-
Fenitrothion	µg/kg	10	NONE	-	-	-
Fenthion	µg/kg	10	NONE	-	-	-
Fenvalerate (Sum)	µg/kg	10	NONE	-	-	-
Heptachlor	µg/kg	10	NONE	-	-	-
Heptachlor exo-epoxide	µg/kg	10	NONE	-	-	-
Hexachlorobenzene	µg/kg	10	NONE	-	-	-
Hexachlorobutadiene	µg/kg	10	NONE	-	-	-
Isodrin	µg/kg	20	NONE	-	-	-
Malathion	µg/kg	10	NONE	-	-	-
Methacrifos	µg/kg	10	NONE	-	-	-
Methoxychlor, p,p'-	µg/kg	20	NONE	-	-	-
Mevinphos, E+Z	µg/kg	10	NONE	-	-	-
Omethoate	µg/kg	20	NONE	-	-	-
Parathion	µg/kg	10	NONE	-	-	-
Parathion-methyl	µg/kg	10	NONE	-	-	-

Analytical Report Number: 23-46699
Project / Site name: Grays Lane, Hitchin

Lab Sample Number				2757880	2757881	2757882
Sample Reference				WS06	WS07	WS08
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.70	0.10
Date Sampled				18/07/2023	18/07/2023	18/07/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Pendimethalin	µg/kg	10	NONE	-	-	-
Pentachlorobenzene	µg/kg	10	NONE	-	-	-
Phorate	µg/kg	10	NONE	-	-	-
Phosalone	µg/kg	10	NONE	-	-	-
Phosphamidon (Sum)	µg/kg	10	NONE	-	-	-
Pirimiphos-ethyl	µg/kg	10	NONE	-	-	-
Pirimiphos-methyl	µg/kg	10	NONE	-	-	-
Propetamphos	µg/kg	10	NONE	-	-	-
Propyzamide	µg/kg	10	NONE	-	-	-
Tecnazene	µg/kg	10	NONE	-	-	-
Tetrachlorobenzene, 1,2,4,5-	µg/kg	10	NONE	-	-	-
Triadimefon	µg/kg	10	NONE	-	-	-
Triazophos	µg/kg	10	NONE	-	-	-
Trichlorobenzene, 1,2,3-	µg/kg	10	NONE	-	-	-
Trichlorobenzene, 1,3,5-	µg/kg	10	NONE	-	-	-
Trifluralin	µg/kg	10	NONE	-	-	-

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

Analytical Report Number : 23-46699
Project / Site name: Grays Lane, Hitchin

* 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 *
2757875	WS01	None Supplied	0.1	Brown loam and sand with gravel and vegetation.
2757876	WS02	None Supplied	0.4	Brown clay and loam with gravel and vegetation.
2757877	WS03	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2757878	WS04	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2757879	WS05	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
2757880	WS06	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2757881	WS07	None Supplied	0.7	Brown clay and loam with gravel and vegetation.
2757882	WS08	None Supplied	0.1	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-46699
Project / Site name: Grays Lane, Hitchin

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
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	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.	L038-PL	D	MCERTS
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	A001-PL	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
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.	L019-UK/PL	D	NONE
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 (Skalar)	L080-PL	W	MCERTS
Pesticides by GC-MS/MS	Determination of Pesticides in soil by GC MS/MS	In-house method	L055B-PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	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.

Sample Deviation Report



Analytical Report Number : 23-46699

Project / Site name: Grays Lane, Hitchin

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS01	None Supplied	S	2757875	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS02	None Supplied	S	2757876	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS03	None Supplied	S	2757877	b	Pesticides by GC-MS/MS	L055B-PL	b
WS03	None Supplied	S	2757877	b	Pesticides extraction	L055B-PL	b
WS03	None Supplied	S	2757877	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS04	None Supplied	S	2757878	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS05	None Supplied	S	2757879	b	Pesticides by GC-MS/MS	L055B-PL	b
WS05	None Supplied	S	2757879	b	Pesticides extraction	L055B-PL	b
WS05	None Supplied	S	2757879	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS06	None Supplied	S	2757880	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS07	None Supplied	S	2757881	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS08	None Supplied	S	2757882	b	Speciated EPA-16 PAHs in soil	L064-PL	b



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Analytical Report Number : 23-46690

Project / Site name:	Gray's Lane, Hitchin	Samples received on:	24/07/2023
Your job number:	26671	Samples instructed on/ Analysis started on:	24/07/2023
Your order number:		Analysis completed by:	02/08/2023
Report Issue Number:	1	Report issued on:	02/08/2023
Samples Analysed:	5 soil samples		

Signed:

Dominika Warjan
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: 23-46690
Project / Site name: Gray's Lane, Hitchin

Lab Sample Number				2757839	2757840	2757841	2757842	2757843
Sample Reference				WS01	WS03	WS04	WS05	WS07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	1.40	1.00	2.00	1.70
Date Sampled				18/07/2023	18/07/2023	18/07/2023	18/07/2023	18/07/2023
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	35
Moisture Content	%	0.01	NONE	3.8	8.4	9.6	8.3	5.4
Total mass of sample received	kg	0.001	NONE	0.6	1	1	1	1

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.9	7.8	8.3	8.3
Total Sulphate as SO ₄	%	0.005	MCERTS	0.014	0.008	0.01	0.017	< 0.005
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0024	0.0017	0.0015	< 0.0013	0.0032
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	2.4	1.7	1.5	< 1.3	3.2
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	0.6	< 0.5	< 0.5	0.5	0.7
Total Sulphur	%	0.005	MCERTS	0.008	< 0.005	0.008	0.008	< 0.005
Ammoniacal Nitrogen as NH ₄	mg/kg	0.5	MCERTS	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5

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

Analytical Report Number : 23-46690

Project / Site name: Gray's Lane, Hitchin

* 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 *
2757839	WS01	None Supplied	0.7	Brown clay and loam with gravel and vegetation.
2757840	WS03	None Supplied	1.4	Brown clay and sand with gravel.
2757841	WS04	None Supplied	1	Brown clay and sand with gravel and vegetation.
2757842	WS05	None Supplied	2	Brown sand.
2757843	WS07	None Supplied	1.7	Brown sand with gravel and stones.

Analytical Report Number : 23-46690
Project / Site name: Gray's Lane, Hitchin

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
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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.	L019-UK/PL	D	NONE
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	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.

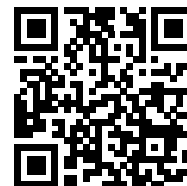
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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.

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



RZN8S-0FD9K-9P8E8

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

Gray's Lane, Hitchin

Description/Comments

Project

26671

Site

Gray's Lane, Hitchin

Classified by

Name: **Anthony Paton**
 Date: **04 Sep 2023 09:07 GMT**
 Telephone: **01604 781811**
 Company: **JPP Geotechnical & Environmental Ltd**
Grand Union Works
Whilton Locks
Daventry
NN11 2NH

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

-

Course

Hazardous Waste Classification

Date

-

Purpose of classification

2 - Material Characterisation

Address of the waste

Land off Gray's Lane, Hitchin

Post Code **SG5 2HN**

SIC for the process giving rise to the waste

Description of industry/producer giving rise to the waste

Construction of residential properties with associated access and infrastructure

Description of the specific process, sub-process and/or activity that created the waste

Waste created during excavations for the development

Description of the waste

Made Ground



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS02	0.40	Non Hazardous		3
2	WS04	0.50	Non Hazardous		5

Related documents

#	Name	Description
1	Example waste stream template for contaminated soils	waste stream template used to create this Job

Report

Created by: Anthony Paton

Created date: 04 Sep 2023 09:07 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	7
Appendix B: Rationale for selection of metal species	8
Appendix C: Version	8

Classification of sample: WS02

 **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
WS02	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.40 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
3.8%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 3.8% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				17 mg/kg	1.32	22.446 mg/kg	0.00224 %			
	033-003-00-0	215-481-4	1327-53-3								
2	cadmium { cadmium oxide }				<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %			<LOD
	048-002-00-0	215-146-2	1306-19-0								
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				17 mg/kg	1.462	24.846 mg/kg	0.00248 %			
		215-160-9	1308-38-9								
4	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<1.8 mg/kg	2.27	<4.086 mg/kg	<0.000409 %			<LOD
	024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				24 mg/kg	1.126	27.021 mg/kg	0.0027 %			
	029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	36 mg/kg	1.56	56.153 mg/kg	0.0036 %			
	082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				22 mg/kg	2.976	65.478 mg/kg	0.00655 %			
	028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc chromate }				80 mg/kg	2.774	221.932 mg/kg	0.0222 %			
	024-007-00-3	236-878-9	13530-65-9								
11	confirm TPH has NOT arisen from diesel or petrol				☒						
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
13	pH				7.5 pH		7.5 pH	7.5 pH			
			pH								
14	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-052-00-2	202-049-5	91-20-3								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
16	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
17	fluorene	201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
18	phenanthrene	201-581-5	85-01-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
19	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
20	fluoranthene	205-912-4	206-44-0		0.11 mg/kg		0.11 mg/kg	0.000011 %		
21	pyrene	204-927-3	129-00-0		0.12 mg/kg		0.12 mg/kg	0.000012 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.06 mg/kg		0.06 mg/kg	0.000006 %		
23	chrysene	601-048-00-0	205-923-4		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.07 mg/kg		0.07 mg/kg	0.000007 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
27	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
29	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
Total:								0.0408 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS04

 **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:
WS04	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.50 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
5.1%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 5.1% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				37 mg/kg	1.32	48.852 mg/kg	0.00489 %			
	033-003-00-0	215-481-4	1327-53-3								
2	cadmium { cadmium oxide }				<0.2 mg/kg	1.142	<0.228 mg/kg	<0.0000228 %			<LOD
	048-002-00-0	215-146-2	1306-19-0								
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				23 mg/kg	1.462	33.616 mg/kg	0.00336 %			
		215-160-9	1308-38-9								
4	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }				<1.8 mg/kg	2.27	<4.086 mg/kg	<0.000409 %			<LOD
	024-017-00-8										
5	copper { dicopper oxide; copper (I) oxide }				33 mg/kg	1.126	37.154 mg/kg	0.00372 %			
	029-002-00-X	215-270-7	1317-39-1								
6	lead { lead chromate }			1	47 mg/kg	1.56	73.311 mg/kg	0.0047 %			
	082-004-00-2	231-846-0	7758-97-6								
7	mercury { mercury dichloride }				<0.3 mg/kg	1.353	<0.406 mg/kg	<0.0000406 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
8	nickel { nickel chromate }				39 mg/kg	2.976	116.074 mg/kg	0.0116 %			
	028-035-00-7	238-766-5	14721-18-7								
9	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	028-031-00-5	239-125-2	15060-62-5								
10	zinc { zinc chromate }				140 mg/kg	2.774	388.381 mg/kg	0.0388 %			
	024-007-00-3	236-878-9	13530-65-9								
11	confirm TPH has NOT arisen from diesel or petrol				☒						
12	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
13	pH				7.5 pH		7.5 pH	7.5 pH			
			pH								
14	naphthalene				<0.05 mg/kg		<0.05 mg/kg	<0.000005 %			<LOD
	601-052-00-2	202-049-5	91-20-3								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
15	acenaphthylene	205-917-1	208-96-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
16	acenaphthene	201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
17	fluorene	201-695-5	86-73-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
18	phenanthrene	201-581-5	85-01-8		0.11 mg/kg		0.11 mg/kg	0.000011 %		
19	anthracene	204-371-1	120-12-7		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
20	fluoranthene	205-912-4	206-44-0		0.16 mg/kg		0.16 mg/kg	0.000016 %		
21	pyrene	204-927-3	129-00-0		0.14 mg/kg		0.14 mg/kg	0.000014 %		
22	benzo[a]anthracene	601-033-00-9	200-280-6		0.11 mg/kg		0.11 mg/kg	0.000011 %		
23	chrysene	601-048-00-0	205-923-4		0.1 mg/kg		0.1 mg/kg	0.00001 %		
24	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.13 mg/kg		0.13 mg/kg	0.000013 %		
25	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.05 mg/kg		0.05 mg/kg	0.000005 %		
26	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.1 mg/kg		0.1 mg/kg	0.00001 %		
27	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
28	dibenz[a,h]anthracene	601-041-00-2	200-181-8		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
29	benzo[ghi]perylene	205-883-8	191-24-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
Total:								0.0682 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

• **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database

Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

• **confirm TPH has NOT arisen from diesel or petrol**

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

• **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

GB MCL index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s):

20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

• **pH** (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

• **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

• **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

• **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

• **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

• **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

• **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

• **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

• **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Carc. 2; H351

• **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23 Jul 2015

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worst case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021

HazWasteOnline Classification Engine Version: 2023.237.5731.10565 (25 Aug 2023)

HazWasteOnline Database: 2023.237.5731.10565 (25 Aug 2023)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021



Appendix D

Geotechnical Testing



TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: JPP
Client Address: Grand Union Works, Whilton Locks,
Daventry, Northamptonshire,
NN11 2NH

Contact: Tom McGrath
Site Address: Grays Lane, Hitchin

Client Reference: 26671
Job Number: 23-46692-1
Date Sampled: 18/07/2023
Date Received: 24/07/2023
Date Tested: 28/07/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

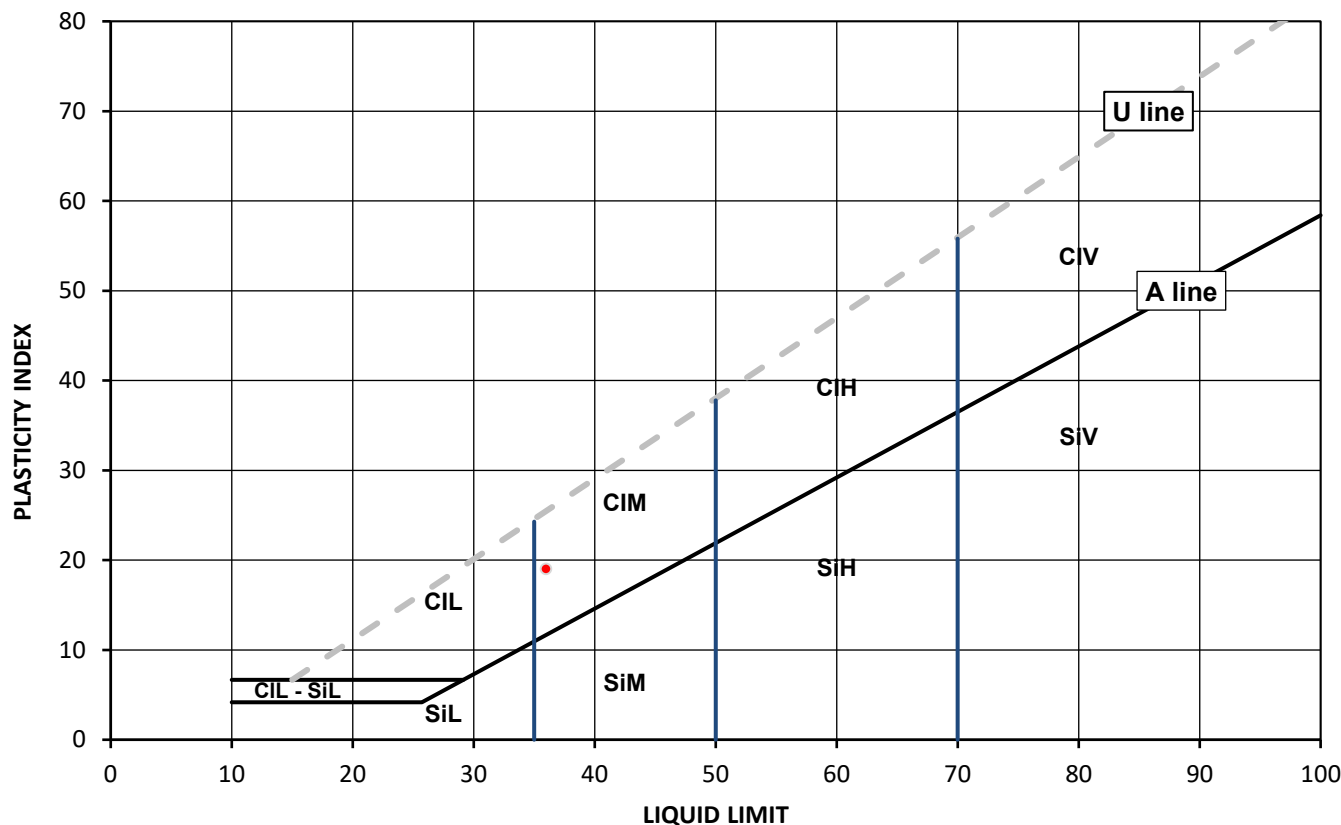
Test Results:

Laboratory Reference: 2757848
Hole No.: WS02
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY with rare chalk

Depth Top [m]: 0.90
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
13	36	17	19	68



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	L Low below 35
Si	Silt	M Medium 35 to 50
		H High 50 to 70
		V Very high exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

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Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

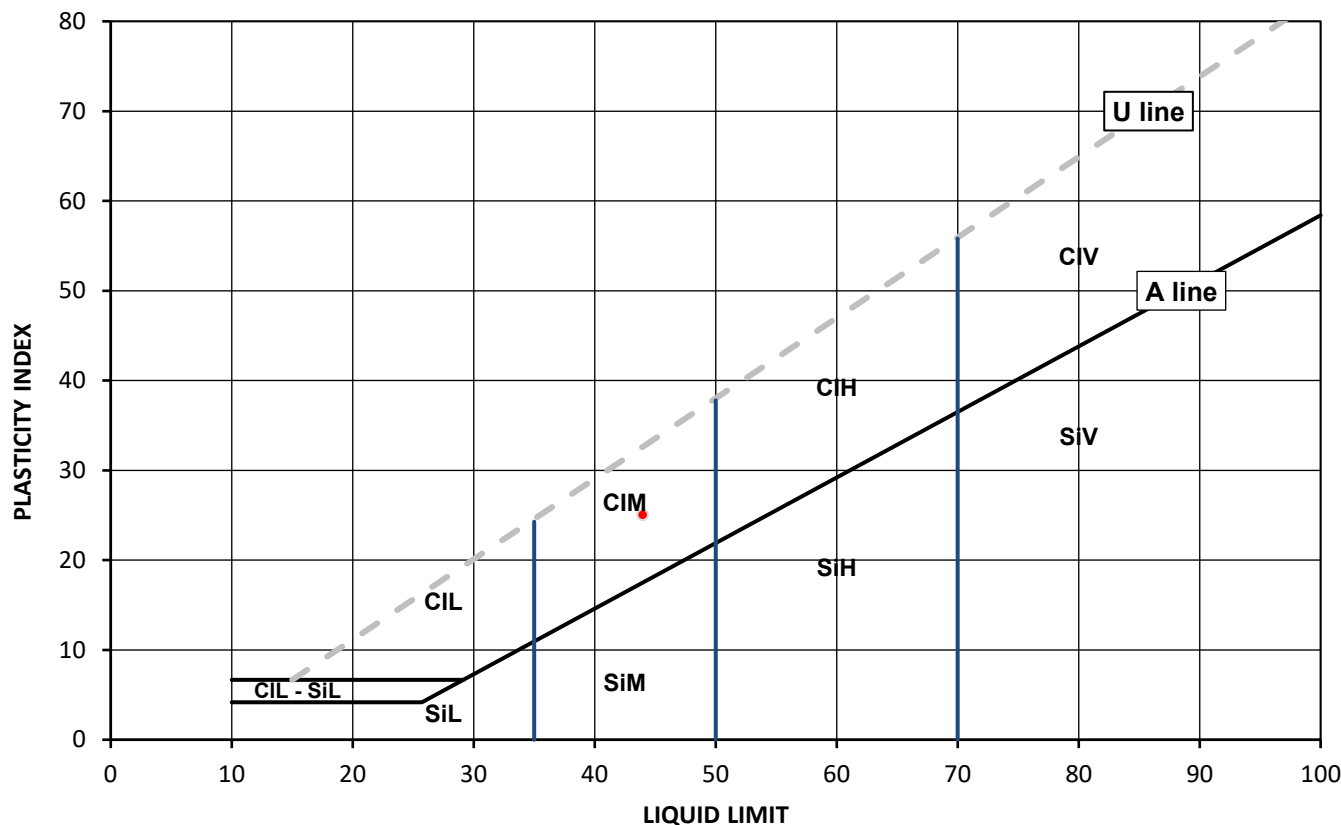
Test Results:

Laboratory Reference: 2757849
Hole No.: WS02
Sample Reference: Not Given
Sample Description: Yellowish brown gravelly sandy CLAY

Depth Top [m]: 1.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
11	44	19	25	64



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: JPP
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Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

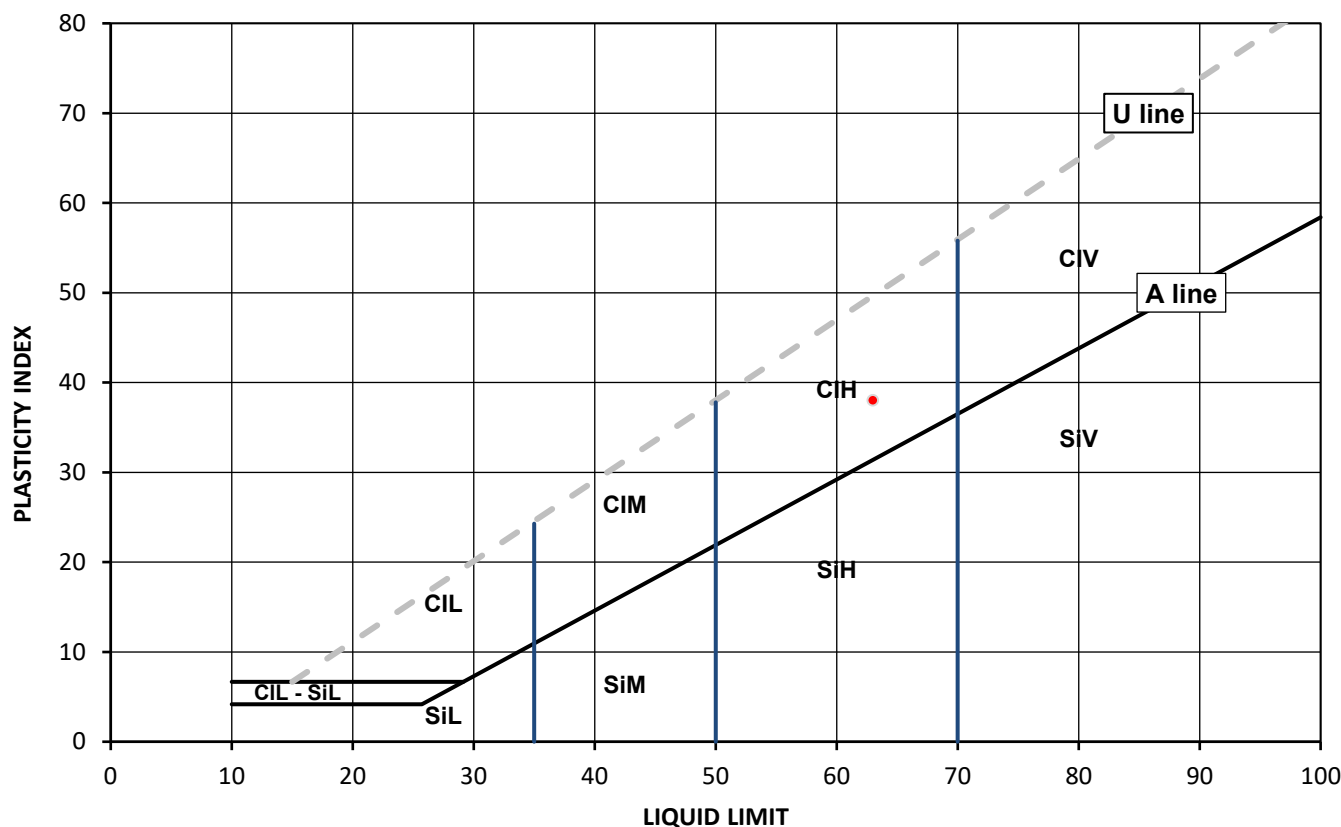
Test Results:

Laboratory Reference: 2757850
Hole No.: WS06
Sample Reference: Not Given
Sample Description: Brown gravelly CLAY

Depth Top [m]: 1.90
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	63	25	38	45



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	L Low below 35
Si	Silt	M Medium 35 to 50
		H High 50 to 70
		V Very high exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: JPP
Client Address: Grand Union Works, Whilton Locks,
Daventry, Northamptonshire,
NN11 2NH

Contact: Tom McGrath
Site Address: Grays Lane, Hitchin

Client Reference: 26671
Job Number: 23-46692-1
Date Sampled: 18/07/2023
Date Received: 24/07/2023
Date Tested: 28/07/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

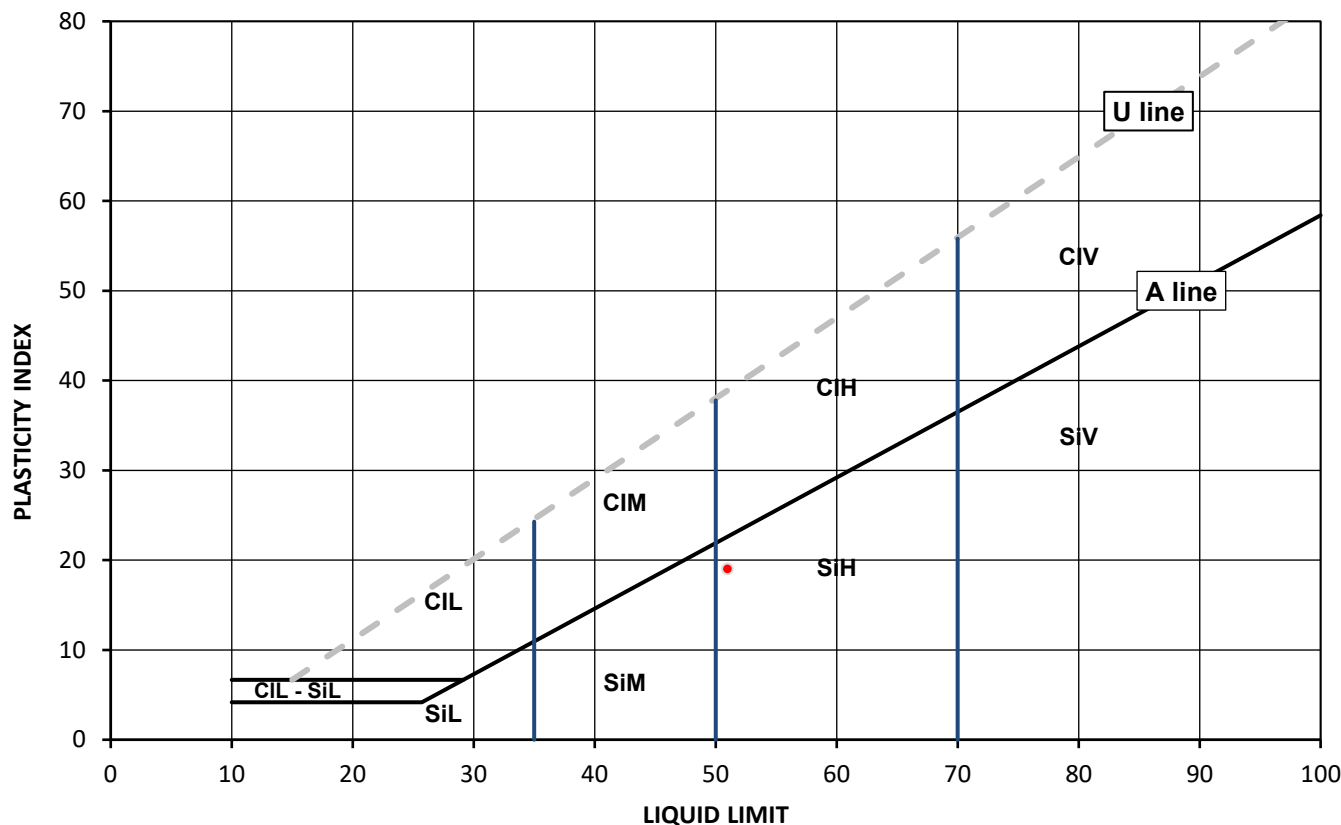
Test Results:

Laboratory Reference: 2757851
Hole No.: WS08
Sample Reference: Not Given
Sample Description: Yellowish brown gravelly slightly sandy clayey SILT

Depth Top [m]: 0.70
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
12	51	32	19	61



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: JPP
Client Address: Grand Union Works, Whilton Locks,
Daventry, Northamptonshire,
NN11 2NH
Contact: Tom McGrath
Site Address: Grays Lane, Hitchin

Water Content by BS 1377-2:1990: Clause 3.2
Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: 26671
Job Number: 23-46692-1
Date Sampled: 18/07/2023
Date Received: 24/07/2023
Date Tested: 28/07/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2757848	WS02	Not Given	0.90	Not Given	D	Brown slightly gravelly sandy CLAY with rare chalk	Atterberg 1 Point	13		68	36	17	19						
2757849	WS02	Not Given	1.50	Not Given	D	Yellowish brown gravelly sandy CLAY	Atterberg 1 Point	11		64	44	19	25						
2757850	WS06	Not Given	1.90	Not Given	D	Brown gravelly CLAY	Atterberg 1 Point	23		45	63	25	38						
2757851	WS08	Not Given	0.70	Not Given	D	Yellowish brown gravelly slightly sandy clayey SILT	Atterberg 1 Point	12		61	51	32	19						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:



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SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

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Date Tested: 28/07/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2757848	WS02	Not Given	0.90	Not Given	D	Brown slightly gravelly sandy CLAY with rare chalk		13	Sample was quartered, oven dried at 107.4 °C			
2757849	WS02	Not Given	1.50	Not Given	D	Yellowish brown gravelly sandy CLAY		11	Sample was quartered, oven dried at 107.4 °C			
2757850	WS06	Not Given	1.90	Not Given	D	Brown gravelly CLAY		23	Sample was quartered, oven dried at 107.4 °C			
2757851	WS08	Not Given	0.70	Not Given	D	Yellowish brown gravelly slightly sandy clayey SILT		12	Sample was quartered, oven dried at 107.4 °C			

Comments:

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