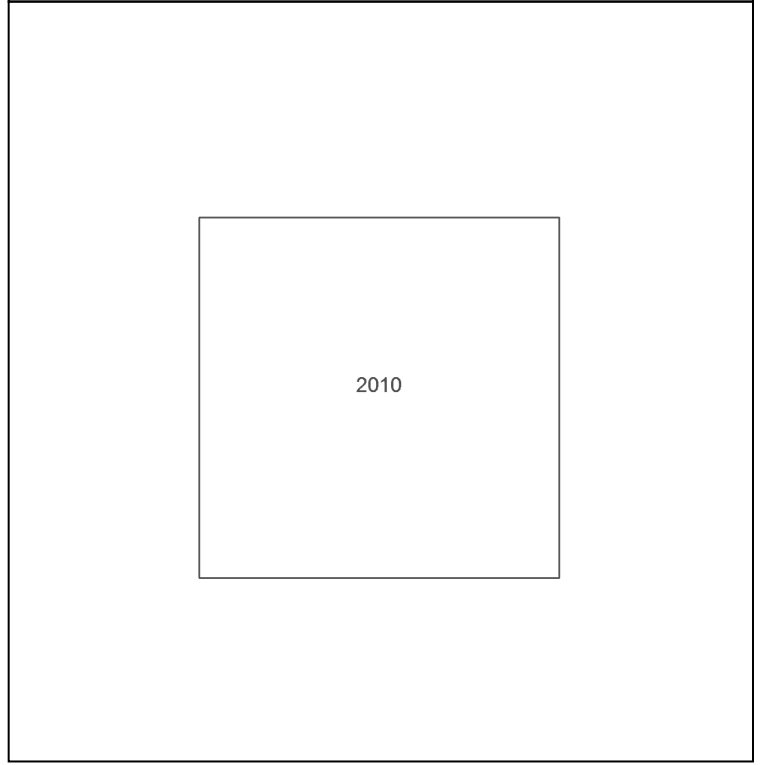


**Site Details:**  
 THE LODGE, OSHWAL HOUSE,  
 COOPERS LANE ROAD,  
 NORTHAW, POTTERS BAR,  
 EN6 4DG

**Client Ref:** M42853  
**Report Ref:** GS-5901400  
**Grid Ref:** 527716, 201237

**Map Name:** National Grid  
**Map date:** 2010  
**Scale:** 1:10,000  
**Printed at:** 1:10,000



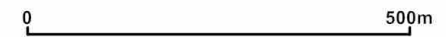
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Production date: 25 March 2019

Map legend available at:  
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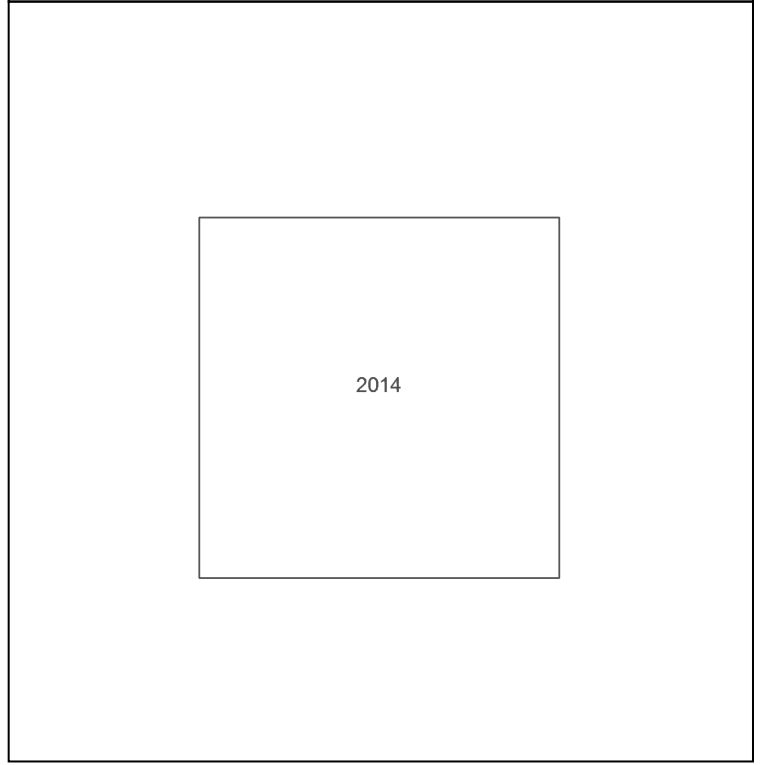





**Site Details:**  
 THE LODGE, OSHWAL HOUSE,  
 COOPERS LANE ROAD,  
 NORTHAW, POTTERS BAR,  
 EN6 4DG

**Client Ref:** M42853  
**Report Ref:** GS-5901400  
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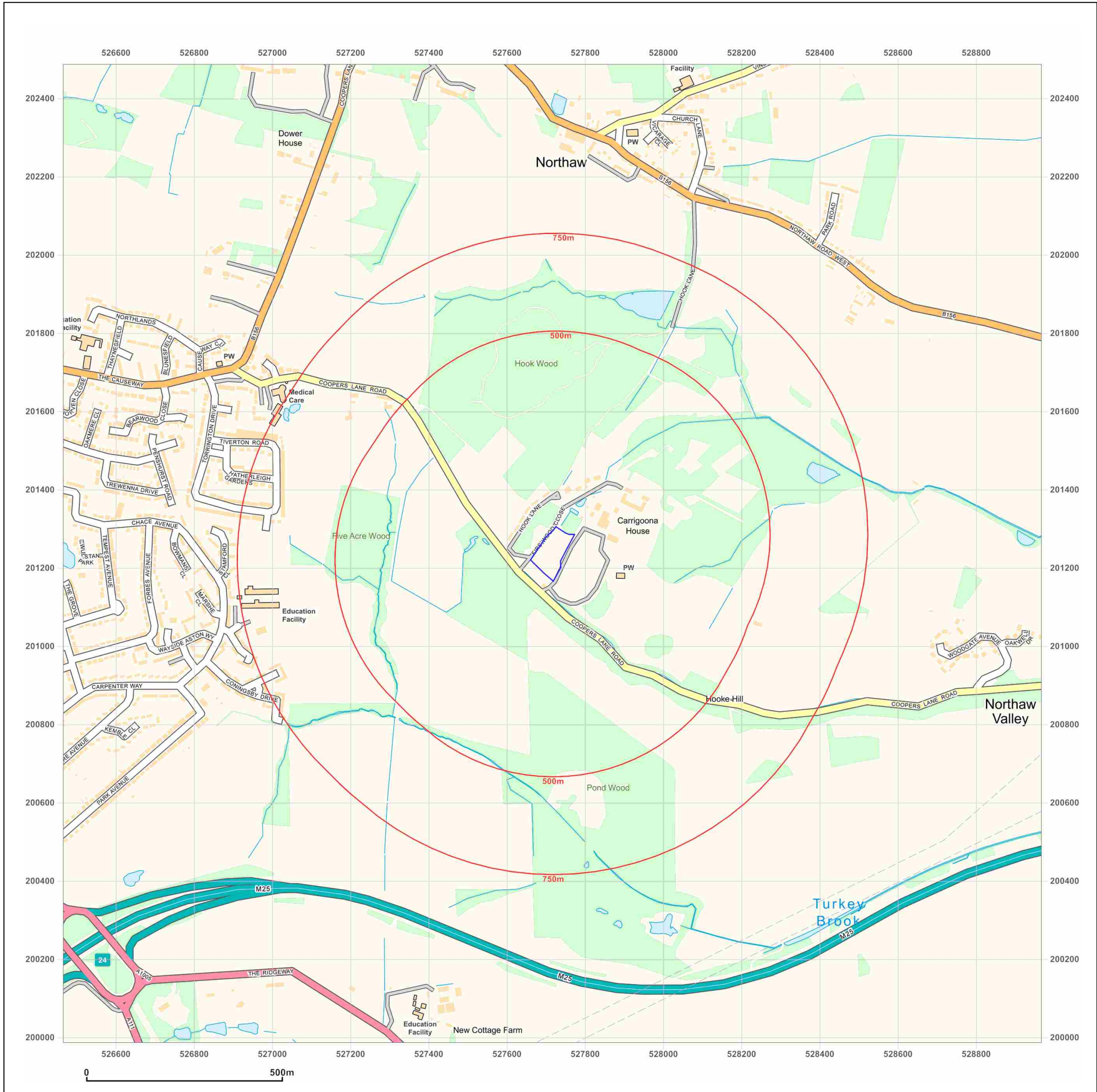
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[www.groundsure.com/sites/default/files/groundsure\\_legend.pdf](http://www.groundsure.com/sites/default/files/groundsure_legend.pdf)



# Appendix E

## UK Contaminated Land Legislative Framework



Given that the site is being assessed with the potential for future development, the most applicable appraisal relates to the requirements of the Planning Regime as described in the National Planning Policy Framework. In order to proceed with an assessment of contamination issues it is essential that there is compliance with UK guidance as detailed within reports published by the Environment Agency 'Model Procedures for the Management of Land Contamination' (Environment Agency, 2004), and 'Guiding Principles for Land Contamination' (Environment Agency, 2010).

Part IIA of the Environmental Protection Act, 1990, which was enacted by Section 57 of the Environment Act 1995, and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227), was introduced on 1 April 2000. It created a new statutory regime for the identification and remediation of land where contamination poses an unacceptable risk to human health and the environment. The guidance was subject to a review by DEFRA in 2012, and a revision was published.

Part IIA provides a statutory definition of contaminated land:

*“any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused”.*

Controlled waters are considered to be all groundwaters, inland surface waters, and estuarine and coastal waters.

To determine whether land falls under the Part IIA definition of contaminated land, the site should be evaluated in the context of a risk-based framework. The assessment of contaminated land is typically a two-phase process, which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element that seeks to determine the degree and the significance of the harm. Land is only defined as 'Contaminated Land' if a "significant pollutant linkage" is present.

A pollutant linkage must comprise the following:




**Source** - a contaminant at a concentration capable of causing adverse health or environmental effects.

**Receptor** - there must be a receptor (e.g. human, controlled waters, ecological, or property) present, which may be at risk of harm or impact from the source.

**Pathway** - there must be an exposure pathway through which the receptor comes into contact with the contamination source.

Each of these elements can exist independently, but they create risk only when they are linked together, so that a particular contaminant affects a particular receptor, through a particular pathway.

The responsible authority then needs to consider whether the identified pollution linkage:

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





If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.

In addition, **jnp group** has undertaken a preliminary risk assessment based on the **probability** of receptor exposure to the identified source and the **consequences** of such exposure.

**Risk management**, which can include site surfacing, formal management systems, legal requirements; is then considered to provide an overall residual risk. The categories of environmental risk used by **jnp group** are given in the table that follows.

---

Table 16-1: Risk Matrix


Environmental Risks		
HIGH		Issues within this category likely to provide a significant cost or liability. Further detailed investigation may be required to clarify the risk.
MEDIUM		It is possible that issues within this category may provide a cost or liability. Further investigation may be required to clarify the risk.
LOW		It is unlikely that issues within this category will provide a significant cost or liability. Basic investigation may be required to clarify the risk.
NONE		No source – pathway – receptor linkage present.





# Appendix F

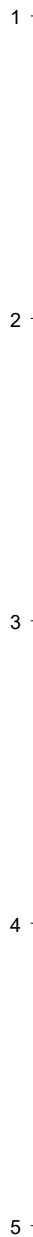
## Exploratory Hole Records



# Trial Pit Log

Project Name: Firs Wood Close	Project No. M42853	Co-ords: 527719.00 - 201213.00 Level: 109.40	Date 22/03/2019
Location: Northaw, Potters bar		Dimensions (m): Depth 3.00 	Scale 1:25
Client: DLA Town Planning			Logged CAW

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.25	109.15		Dark brown TOPSOIL with roots. TOPSOIL
							Stiff orange and grey mottled slightly gravelly silty CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL
				2.00	107.40		Stiff pale grey sandy CLAY. DOLLIS HILL GRAVEL
				2.40	107.00		Pale grey silty SAND. DOLLIS HILL GRAVEL
				3.00	106.40		End of pit at 3.00 m



Remarks: Trial pit used for soakaway test. Slight inflow at 2.60m.

Stability:





# Trial Pit Log


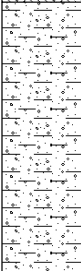

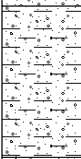
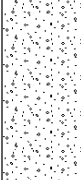
Trialpit No

**SA2**

Sheet 1 of 1

Project Name: <b>Firs Wood Close</b>	Project No. <b>M42853</b>	Co-ords: 527693.00 - 201236.00 Level: 110.20	Date <b>22/03/2019</b>
--------------------------------------	---------------------------	---	---------------------------

Location: <b>Northaw, Potters bar</b>	Dimensions (m):	<div style="border: 1px solid black; width: 100px; height: 30px; margin: 0 auto;"></div>	Scale <b>1:25</b>
Client: <b>DLA Town Planning</b>	Depth <b>2.60</b>		Logged <b>CAW</b>

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	109.90		Dark brown TOPSOIL with roots. TOPSOIL	
				1.20	109.00		Stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
				1.50	108.70		Orange and grey mottled clayey sandy GRAVEL. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	
				2.00	108.20		Stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	
				2.60	107.60		Pale brown orange gravelly SAND. DOLLIS HILL GRAVEL	2
							----- End of pit at 2.60 m	3
								4
								5

Remarks: Trial pit used for soakaway test. Slight inflow at 2.00m.

Stability:







# Borehole Log

Borehole No.

**BH1**

Sheet 1 of 1

Project Name: Firs Wood Close

 Project No.  
 M42853

Co-ords: 527683.00 - 201220.00

 Hole Type  
 WLS

Location: Northaw, Potters bar


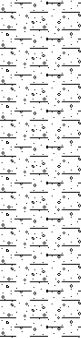

Level: 110.70

 Scale  
 1:50

Client: DLA Town Planning

Dates: 22/03/2019 - 22/03/2019

 Logged By  
 CAW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.25	110.45		Dark brown TOPSOIL with roots. TOPSOIL	
		0.70	D	HVP=58 HVP=77				Firm orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
		1.30		N=7 (1,2/1,2,2,2)					
		1.70	D	HVP=64 HVP=78					2
		2.30		N=11 (2,2/2,3,3,3)					
		2.70	D	HVP=95 HVP=90	2.60	108.10		Firm to stiff grey brown CLAY. LONDON CLAY	3
		3.30		N=14 (2,2/3,4,3,4)					4
		4.30		N=14 (2,3/3,3,4,4)					5
	▼	5.30		N=17 (3,2/3,4,5,5)	5.45	105.25		End of borehole at 5.45 m	6
									7
									8
									9
									10

**Remarks**

Groundwater seepage at 4.50 m. Water at 4.50 m on backfilling.



# Borehole Log

Borehole No.

**BH2**

Sheet 1 of 1

Project Name: Firs Wood Close

 Project No.  
 M42853

Co-ords: 527711.00 - 201197.00

 Hole Type  
 WLS

Location: Northaw, Potters bar


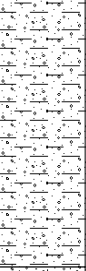
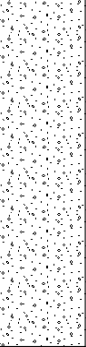
Level: 109.90

 Scale  
 1:50

Client: DLA Town Planning

Dates: 22/03/2019 - 22/03/2019

 Logged By  
 CAW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30	109.60		Dark brown TOPSOIL with roots. TOPSOIL	
		1.00	D	HVP=90				Stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
		1.30		N=13 (2,2/3,3,3,4)					
		2.00	D	HVP=130	2.10	107.80			2
		2.30		N=27 (5,3/5,7,7,8)				Medium dense pale brown orange gravelly SAND. DOLLIS HILL GRAVEL	3
		3.30		N=24 (7,5/6,5,5,8)					4
		4.30		N=11 (4,2/2,3,3,3)	4.45	105.45			5
								End of borehole at 4.45 m	6
									7
									8
									9
									10

**Remarks**

Groundwater inflow at 3.00 m. Water at 2.50 m on backfilling. Borehole terminated due to partial collapse.



# Borehole Log

Borehole No.

**BH3**

Sheet 1 of 1

Project Name: Firs Wood Close

 Project No.  
 M42853

Co-ords: 527729.00 - 201242.00

 Hole Type  
 WLS

Location: Northaw, Potters bar


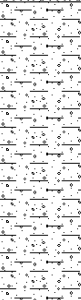



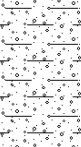
Level: 108.60

 Scale  
 1:50

Client: DLA Town Planning

Dates: 22/03/2019 - 22/03/2019

 Logged By  
 CAW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.30	108.30		Dark brown TOPSOIL with roots. TOPSOIL	
	▼	0.70	ES	HVP=62 HVP=77				Firm to stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
		1.30		N=11 (2,2/3,2,3,3)					
		1.70	ES	HVP=82 HVP=68					2
	▼	2.30		N=16 (2,2/3,4,4,5)	2.30	106.30		Medium dense orange SAND. DOLLIS HILL GRAVEL	
		2.70	ES		2.50	106.10		Stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	3
		3.30		N=36 (12,12/10,10,8,8)	3.00	105.60		Medium dense orange and grey mottled clayey sandy GRAVEL. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	4
		4.30		N=26 (10,10/9,8,5,4)	4.45	104.15			5
								End of borehole at 4.45 m	6
									7
									8
									9
									10

## Remarks

Groundwater inflow at 2.30 m. Water at 0.75 m on backfilling. Borehole terminated due to partial collapse.



# Borehole Log

Borehole No.

**BH4**

Sheet 1 of 1

Project Name: Firs Wood Close

Project No.  
M42853

Co-ords: 527740.00 - 201284.00

Hole Type  
WLS

Location: Northaw, Potters bar


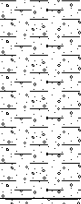
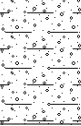
Level: 107.20

Scale  
1:50

Client: DLA Town Planning

Dates: 22/03/2019 - 22/03/2019

Logged By  
CAW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.20	107.00		Dark brown TOPSOIL with roots. TOPSOIL	
		0.90	D					Stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
		1.30		N=18 (3,3/4,3,5,6)	1.60	105.60		Very dense orange and grey mottled clayey sandy GRAVEL. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	2
		2.30		N=50 (7,7/50 for 285mm)	2.45	104.75		End of borehole at 2.45 m	3
									4
									5
									6
									7
									8
									9
									10

Remarks  
Borehole terminated on refusal. Borehole dry.



# Borehole Log

Borehole No.

**BH5**

Sheet 1 of 1

Project Name: Firs Wood Close

 Project No.  
 M42853

Co-ords: 527717.00 - 201283.00

 Hole Type  
 WLS

Location: Northaw, Potters bar


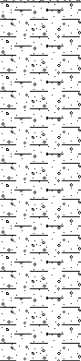
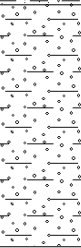

Level: 108.00

 Scale  
 1:50

Client: DLA Town Planning

Dates: 22/03/2019 - 22/03/2019

 Logged By  
 CAW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.30	107.70		Dark brown TOPSOIL with roots. TOPSOIL	
		0.90	D	HVP=76				Firm to stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
		1.30		HVP=115 N=10 (2,2/2,2,3,3)					
		1.90	D	HVP=130					2
		2.30		HVP=100 N=13 (2,2/3,3,3,4)					
		2.90	ES	HVP=117	2.70	105.30		Medium dense orange and grey mottled clayey GRAVEL. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	3
		3.30		N=14 (2,3/3,3,3,5)					
		3.90	ES						4
		4.30		N=18 (3,2/3,4,5,6)	4.30	103.70		Stiff grey brown CLAY. LONDON CLAY	5
		5.30		N=19 (3,3/4,4,5,6)	5.45	102.55			
								End of borehole at 5.45 m	6
									7
									8
									9
									10

 Remarks  
 Borehole dry.


# Borehole Log

Borehole No.

**BH6**

Sheet 1 of 1

Project Name: Firs Wood Close

 Project No.  
 M42853

Co-ords: 527711.00 - 201256.00

 Hole Type  
 WLS

Location: Northaw, Potters bar








































Level: 109.00

 Scale  
 1:50

Client: DLA Town Planning

Dates: 22/03/2019 - 22/03/2019

 Logged By  
 CAW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	108.70		Dark brown TOPSOIL with roots. TOPSOIL	
		0.90	ES	HVP=67				Firm to stiff orange and grey mottled slightly gravelly sandy CLAY. Gravel is subrounded and rounded medium flint. DOLLIS HILL GRAVEL	1
		1.30		HVP=78 N=9 (2,1/2,2,3,2)					
		1.90	D	HVP=120					
		2.30		HVP=95 N=11 (2,3/2,3,3,3)					2
		2.90	D		3.00	106.00			
		3.30		N=16 (3,3/3,3,5,5)	3.50	105.50		Brown orange clayey sandy sub-angular and sub-rounded fine to coarse flint GRAVEL. DOLLIS HILL GRAVEL	3
		4.30		N=14 (2,3/2,4,3,5)					
		5.30		N=15 (2,3/3,4,4,4)	5.45	103.55		Stiff grey brown CLAY. LONDON CLAY	4
									5
									6
									7
									8
									9
									10
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									

 Remarks  
 Borehole dry.

Project Id: M42853

Project Title: Firs Wood Close

Location: Northaw, Potters bar

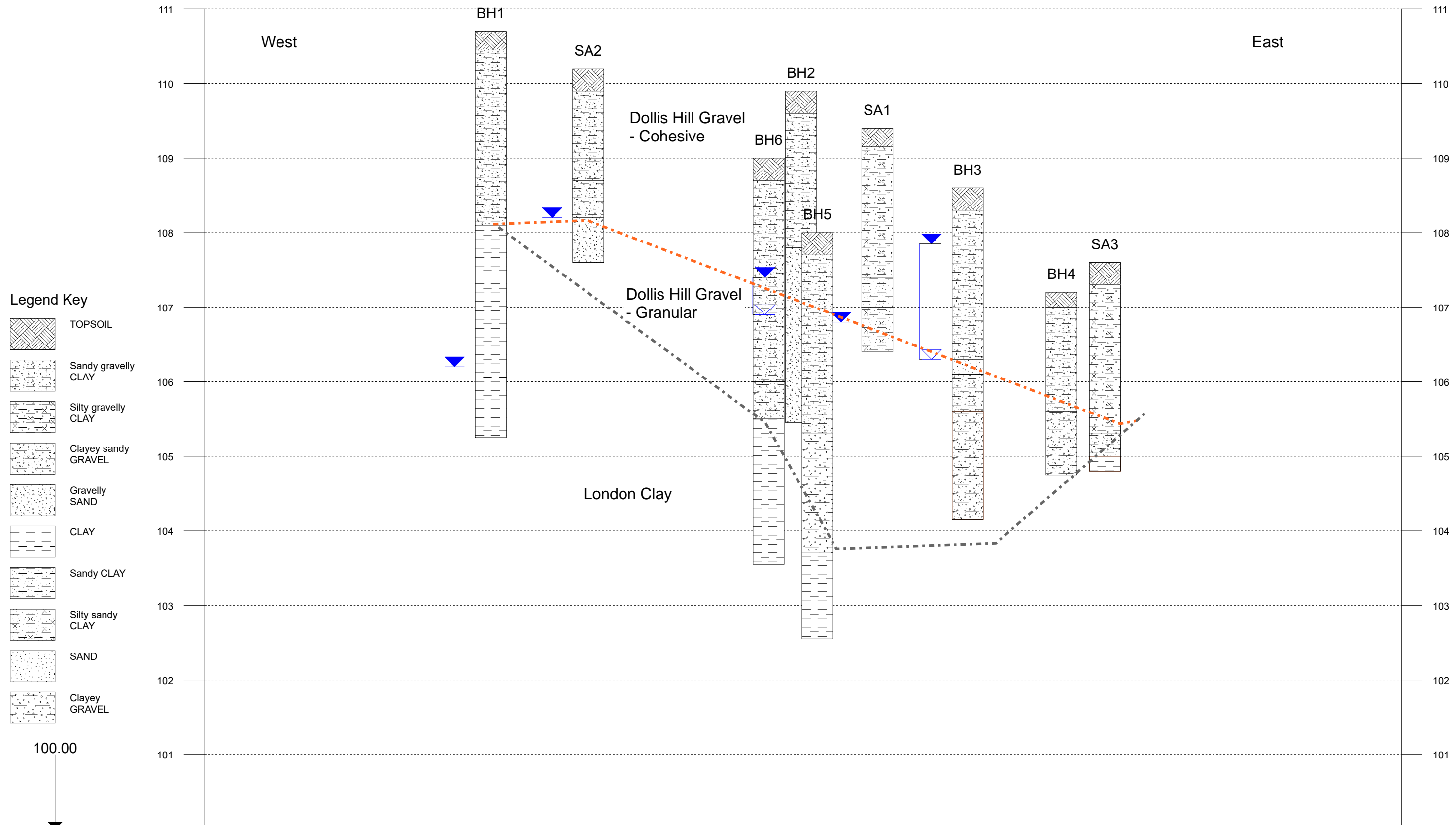
Client: DLA Town Planning

Title: Section line East - West

Vertical Scale: 1:50

Horizontal Scale: 1:350

Engineer: Charles Wake



- Legend Key**
- TOPSOIL
  - Sandy gravelly CLAY
  - Silty gravelly CLAY
  - Clayey sandy GRAVEL
  - Gravelly SAND
  - CLAY
  - Sandy CLAY
  - Silty sandy CLAY
  - SAND
  - Clayey GRAVEL

100.00

Chainage (m)	0.00		20.30	29.45		46.40	49.40	50.99	56.61	65.10	73.91	77.99		88.90
Elevation (mAOD)			110.70	110.20		109.00	109.00	109.00	109.40	108.60	107.20	107.60		



# Appendix G

## Human Health Quantitative Risk Assessment



Qualitative assessment of risks may be sufficient in many cases to eliminate the possibility of significant pollutant linkages. However, quantitative risk assessment is formally required to determine whether there is a 'significant possibility of significant harm being caused'. Part IIA of the Environmental Protection Act 1990 recommends that 'authoritative and scientifically based guideline values for concentrations of the potential pollutants in or under the land' be used to quantify the risk posed by contamination.

Under the Planning Regime, a quantitative risk assessment can be used to decide whether the site is suitable for the proposed use. In addition, the National Planning Policy Framework (March 2012) also indicates that after remediation, as a minimum land should not be capable of being determined as contaminated land under Part IIA.

### **Current UK Screening Values**

The UK technical guidance for assessing risks to human health is issued from various UK bodies, including the Environment Agency (EA), DEFRA, Contaminated Land: Applications in Real Environment (CL:AIRE), Chartered Institute of Environmental Health (CIEH), and Land Quality Management (LQM) Ltd (part of the University of Nottingham).

New and updated screening values in the form of provisional Category 4 Screening Levels (C4SL) (published in 2014), and Suitable for Use Levels (S4UL), (published 2015), have been produced by DEFRA and CIEH / LQM respectively using modified versions of the EA's Contaminated Land Exposure Assessment (CLEA) software.

#### **C4SL**

Provisional C4SL have been derived by CL:AIRE (project team for DEFRA's SP1010 project) following revised statutory guidance, and as a tool to assist in applying the Part IIA Category 1-4 classifications to a site. The purpose of the C4SL is to provide a simple test for deciding that land is suitable for use, and definitely not contaminated land under Part IIA. They describe a level of risk that is above minimal but is still low.

In calculating provisional C4SL some of the exposure modelling scenarios and exposure parameters used in the CLEA software have been modified. These modifications are not discussed further, but reference should be made to the original CL:AIRE / DEFRA publications should further information or clarification be required. A list of the new publications is included in the references section at the end of this report.

To date, six contaminants have been assigned provisional C4SL: arsenic; benzene; benzo[a]pyrene; cadmium; chromium VI, and lead, for the standard land uses (residential with, and without plant uptake, allotments, commercial, and public open space (parks and residential)).

The C4SL are also considered suitable to be used under the planning regime, and DEFRA have confirmed this to all local authorities.

#### **S4UL**

The LQM / CIEH S4UL represent generic assessment criteria based on minimal or tolerable risk that are intended to be protective of human health. They have been derived in accordance with current UK legislation using a modified version of the CLEA software and are still based on many conservative assumptions. They represent values above which further assessment of the risks or remedial actions may be needed.

S4UL have been derived for a comprehensive list of metals, non-metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, chlorinated hydrocarbons, phenolic compounds, explosives, and pesticides, for the standard land uses (residential with, and without plant uptake, allotments, commercial, and public open space (residential and park)).






For details of the exposure parameters and scenarios used to derive the S4UL the reader is reference to the original LQM / CIEH document "The LQM/CIEH S4UL for Human Health Risk Assessment" (2015).

Both sets of screening values can be used to undertake a generic risk assessment by comparing the data directly to the screening value which is considered a conservative approach or statistically to the screening value. Alternatively and if a sufficient dataset is available, a statistical assessment can be undertaken following the

guidance given in the joint Chartered Institute of Environmental Health (CIEH) and the Contaminated Land: Applications in Real Environment (CL:AIRE) organisation publication "Guidance On Comparing Soil Contamination Data with a Critical Concentration" (CIEH / CL:AIRE May 2008).

The Society of Brownfield Risk Assessment (SoBRA) have produced some Generic Assessment Criteria for assessing chronic risks from the inhalation of vapours arising from groundwater (GACgwvap) for a short list of 66 organic contaminants (SoBRA February 2017). These are designed to defensible screening criteria to assist in evaluating this exposure pathway. They represent concentrations below which the chronic risks from vapour migration and inhalation can be considered low / tolerable. GACgwvap have been developed in line with current UK risk assessment guidance, and CLEA v1.07 software was used for residential and commercial land use scenarios.

Further details of the input parameters selected for use to generate the GACgwvap can be found in the SoBRA report and have not been reproduced here. However, it should be noted that they have been derived using some conservative assumptions:

-  Impacted ground / perched water is beneath the buildings;
-  An infinite source term is present;
-  There is no biodegradation;
-  Groundwater depth is 0.65m below ground;
-  Use of a sand soil type (in line with SR3)

### **Water Supply Pipes**

Where plastic water supply pipes are proposed, the local water supply company threshold values have been used to compare the chemical test results with a published set of guideline values for metal, organic and inorganic contaminants found in soil, that may have a detrimental effect upon plastic water supply pipes.

---

# Appendix H

## Geotechnical Test Results







**Charles Wake**  
JNP Midlands LLP  
3rd Floor  
Marlborough House  
48 Holly Walk  
Leamington Spa  
CV32 4XP

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:** charles.wake@jnpgroup.co.uk

## **Analytical Report Number : 19-35157**

<b>Project / Site name:</b>	Firs Wood Close	<b>Samples received on:</b>	27/03/2019
<b>Your job number:</b>	M42853	<b>Samples instructed on:</b>	27/03/2019
<b>Your order number:</b>		<b>Analysis completed by:</b>	10/04/2019
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	10/04/2019
<b>Samples Analysed:</b>	6 soil samples		

**Signed:**

Rexona Rahman  
Head of Customer Services  
**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.



# TEST CERTIFICATE

## Liquid and Plastic Limits

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



4041

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

Client: JNP Midlands LLP  
Client Address: 3rd Floor, Marlborough House,  
48 Holly Walk, Leamington Spa,  
CV32 4XP  
Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

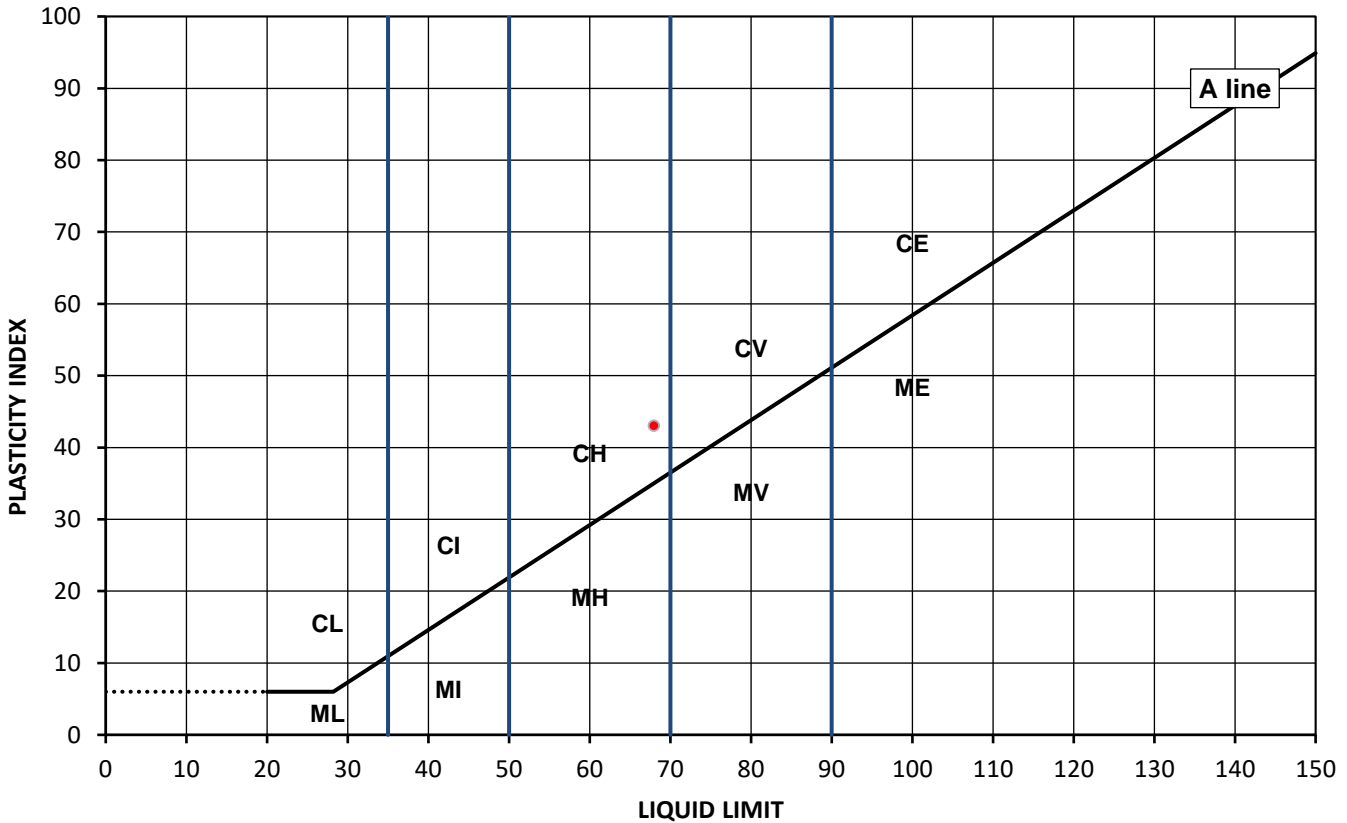
### Test Results:

Laboratory Reference: 1188898  
Hole No.: BH1  
Sample Reference: 1  
Soil Description: Mottled brown slightly gravelly CLAY

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

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	68	25	43	94



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	L	Low	Liquid Limit	below 35
M	Silt	I	Medium		35 to 50
		H	High		50 to 70
		V	Very high		70 to 90
		E	Extremely high		exceeding 90
	Organic	O	append to classification for organic material ( eg CHO )		

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 232.5

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Rudzka Staska, Poland.\*

\*Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.\*



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Environmental Science

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Client: JNP Midlands LLP  
Client Address: 3rd Floor, Marlborough House,  
48 Holly Walk, Leamington Spa,  
CV32 4XP  
Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

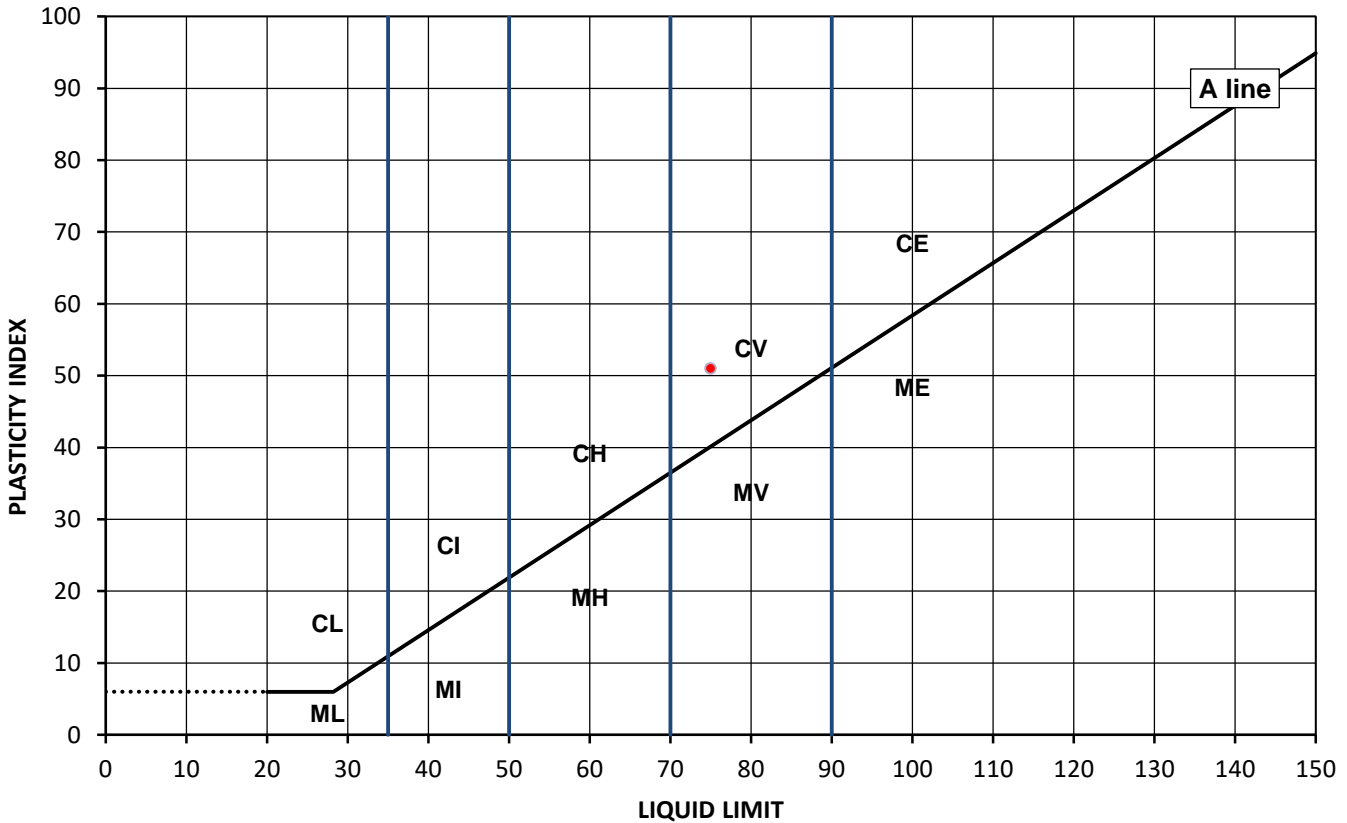
### Test Results:

Laboratory Reference: 1188899  
Hole No.: BH1  
Sample Reference: 3  
Soil Description: Brown CLAY

Depth Top [m]: 2.70  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	75	24	51	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	L	Low	Liquid Limit	below 35
M	Silt	I	Medium		35 to 50
		H	High		50 to 70
		V	Very high		70 to 90
		E	Extremely high		exceeding 90
	Organic	O	append to classification for organic material ( eg CHO )		

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

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48 Holly Walk, Leamington Spa,  
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Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

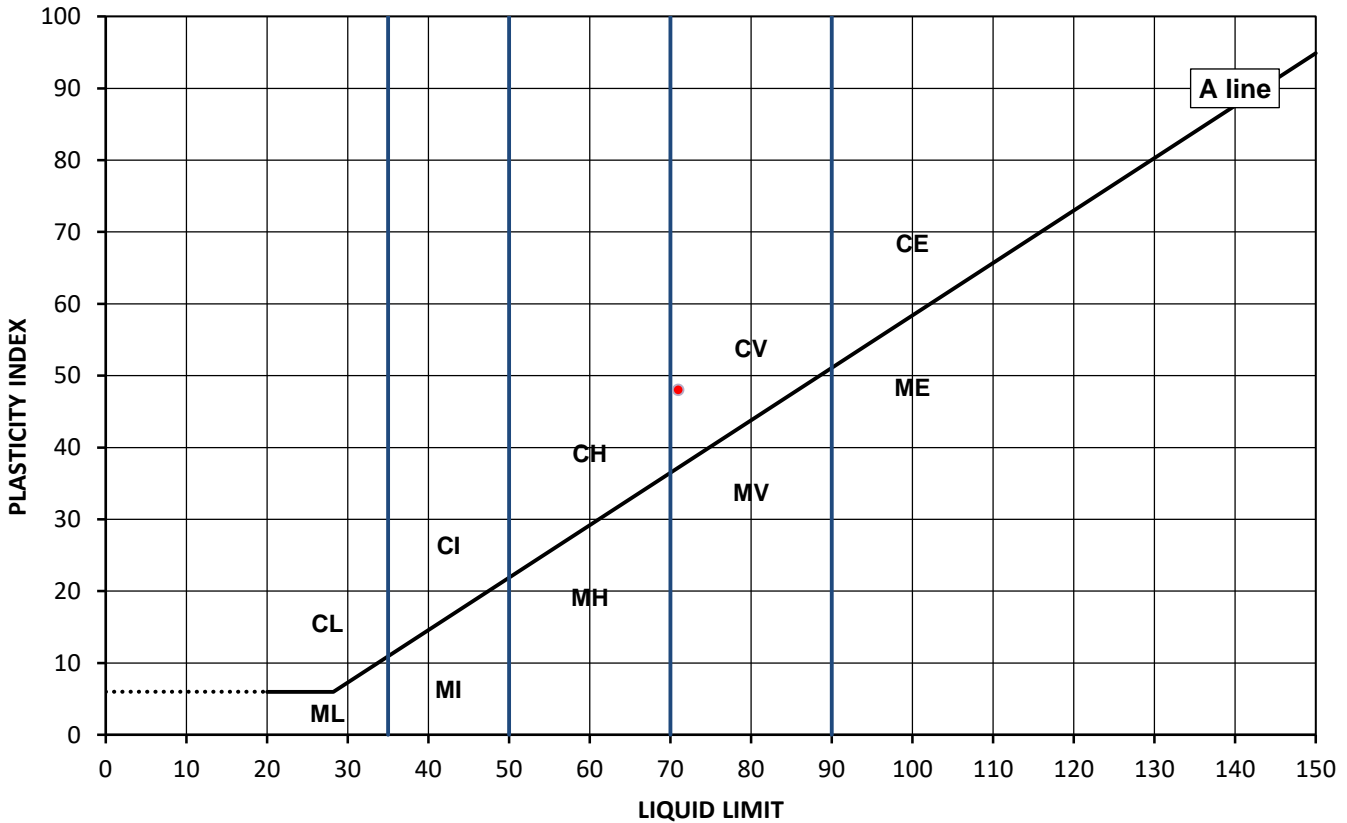
### Test Results:

Laboratory Reference: 1188900  
Hole No.: BH2  
Sample Reference: 1  
Soil Description: Brown mottled grey CLAY

Depth Top [m]: 1.00  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
25	71	23	48	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	L	Low	Liquid Limit	below 35
M	Silt	I	Medium		35 to 50
		H	High		50 to 70
		V	Very high		70 to 90
		E	Extremely high		exceeding 90
	Organic	O	append to classification for organic material ( eg CHO )		

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

Signed: Darren Berrill  
Geotechnical General Manager  
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48 Holly Walk, Leamington Spa,  
CV32 4XP  
Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

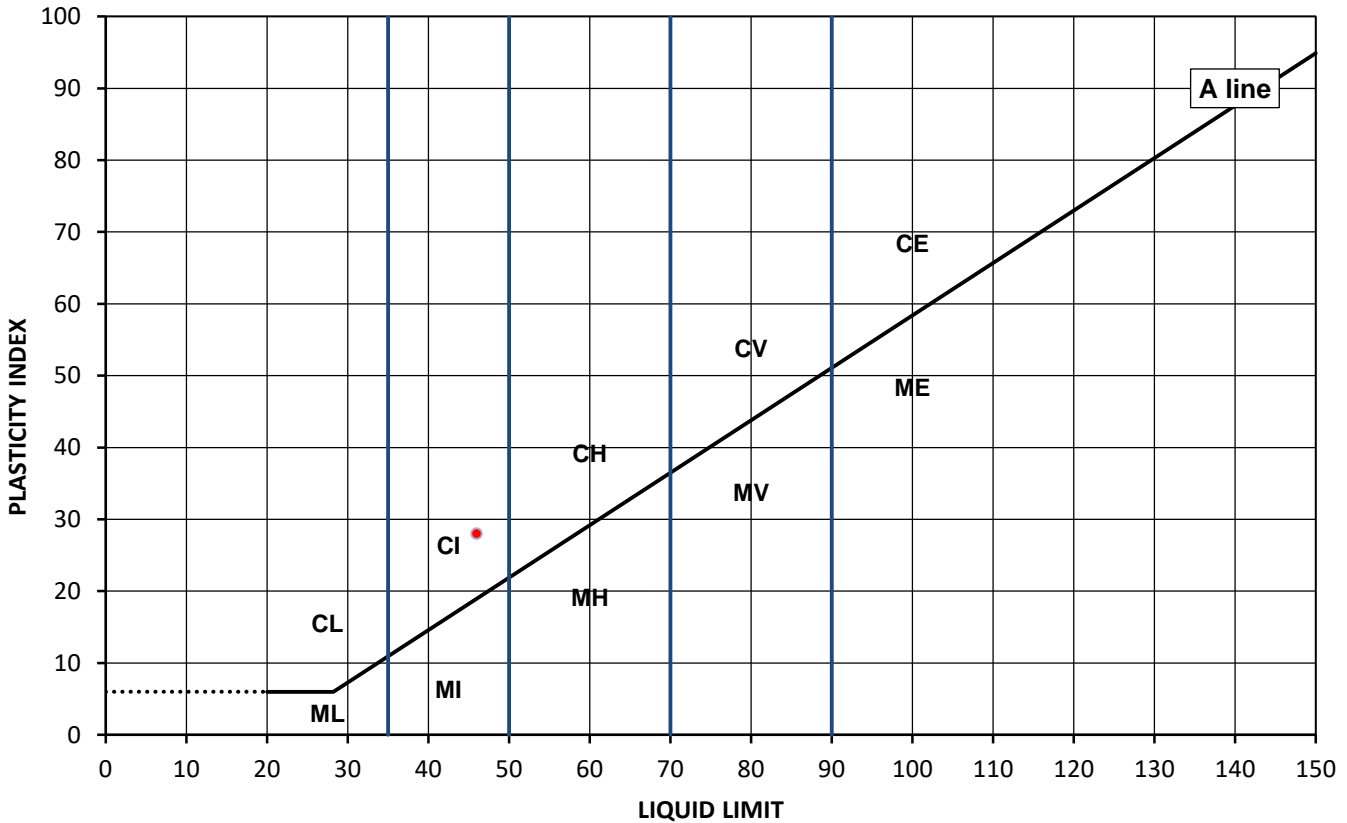
### Test Results:

Laboratory Reference: 1188901  
Hole No.: BH2  
Sample Reference: 2  
Soil Description: Brown mottled grey slightly sandy CLAY

Depth Top [m]: 2.00  
Depth Base [m]: Not Given  
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
16	46	18	28	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	Low
		I	Medium
		H	High
		V	Very high
		E	Extremely high
	Organic	O	append to classification for organic material ( eg CHO )

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

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CV32 4XP  
Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

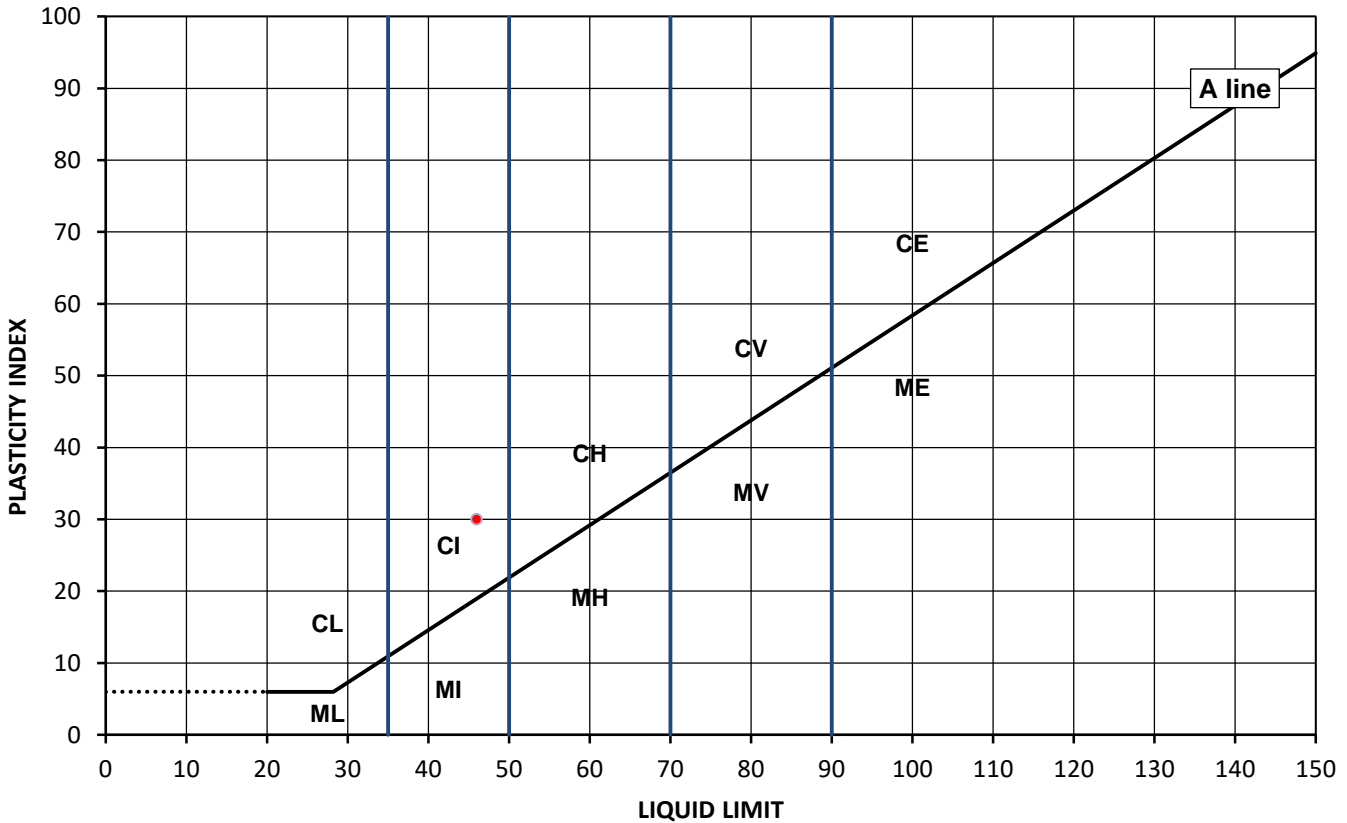
### Test Results:

Laboratory Reference: 1188902  
Hole No.: BH4  
Sample Reference: 1  
Soil Description: Orangish brown mottled grey slightly gravelly sandy CLAY

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

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
16	46	16	30	96



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	L	Low	Liquid Limit	below 35
M	Silt	I	Medium		35 to 50
		H	High		50 to 70
		V	Very high		70 to 90
		E	Extremely high		exceeding 90
	Organic	O	append to classification for organic material ( eg CHO )		

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

Signed: Darren Berrill  
Geotechnical General Manager  
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Watford Herts WD18 8YS



4041

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Client: JNP Midlands LLP  
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48 Holly Walk, Leamington Spa,  
CV32 4XP  
Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

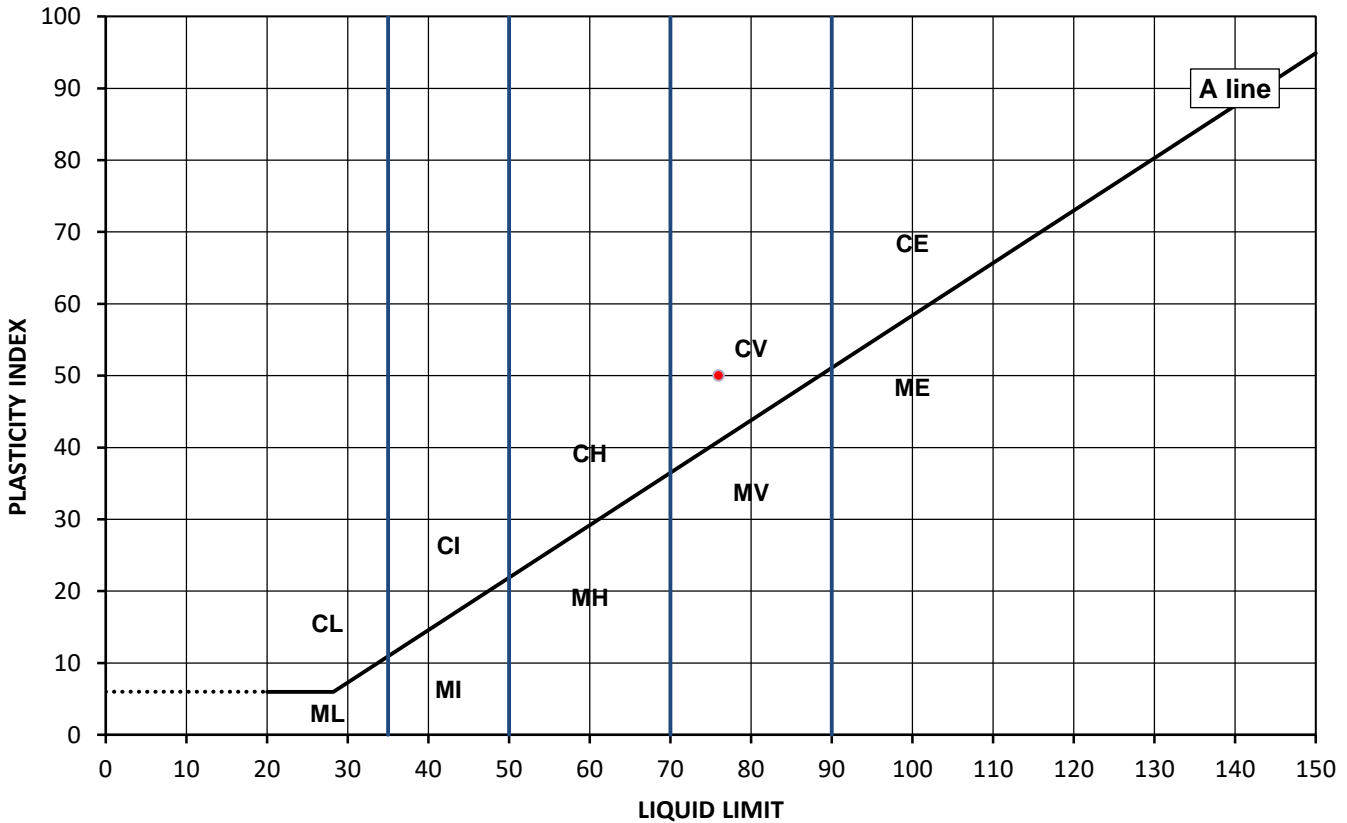
### Test Results:

Laboratory Reference: 1188903  
Hole No.: BH5  
Sample Reference: 1  
Soil Description: Brown mottled grey slightly gravelly CLAY

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

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
19	76	26	50	75



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	Low
		I	Medium
		H	High
		V	Very high
		E	Extremely high
	Organic	O	append to classification for organic material ( eg CHO )

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

Signed: Darren Berrill  
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Contact: Charles Wake  
Site Name: Firs Wood Close  
Site Address: Not Given

Client Reference: M42853  
Job Number: 19-35172  
Date Sampled: 25/03/2019  
Date Received: 27/03/2019  
Date Tested: 02/04/2019  
Sampled By: Not Given

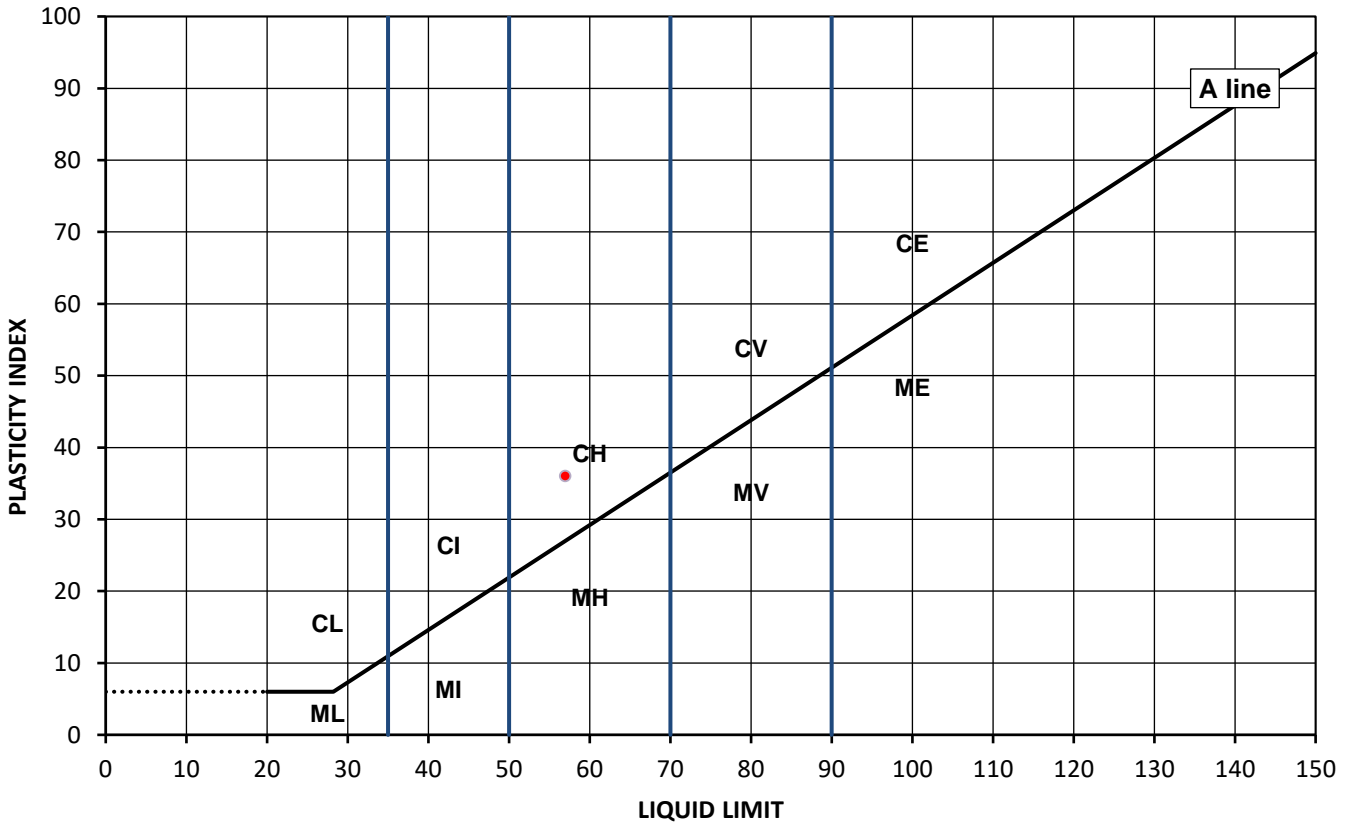
### Test Results:

Laboratory Reference: 1188904  
Hole No.: BH6  
Sample Reference: 1  
Soil Description: Brown mottled grey slightly gravelly slightly sandy CLAY

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

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
21	57	21	36	95



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	L	Low	Liquid Limit	
M	Silt	I	Medium		below 35
		H	High		35 to 50
		V	Very high		50 to 70
		E	Extremely high		70 to 90
					exceeding 90
	Organic	O	append to classification for organic material ( eg CHO )		

Note: Moisture Content by BS 1377-2: 1990: Caluse 3.2

Remarks:

Approved: Dariusz Piotrowski  
PL Geotechnical Laboratory Manager  
Date Reported: 10/04/2019

Signed: Darren Berrill  
Geotechnical General Manager  
for and on behalf of i2 Analytical Ltd GF 232.5

\*Opinions and interpretations expressed here in are outside of the scope of the UKAS Accreditation.  
This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
The results included within the report are representative of the samples submitted for analysis.  
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Rudzka Staska, Poland.\*

\*Any assessment of compliance with specifications based the analytical results in a report take in to account 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.\*



4041

Client: JNP Midlands LLP  
 Client Address: 3rd Floor, Marlborough House,  
 48 Holly Walk, Leamington Spa,  
 CV32 4XP  
 Contact: Charles Wake  
 Site Name: Firs Wood Close  
 Site Address: Not Given

# SUMMARY REPORT

## Summary of Classification Test Results

Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg  
 by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990:  
 Clause 8.2

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



Environmental Science

Client Reference: M42853  
 Job Number: 19-35172  
 Date Sampled: 25/03/2019  
 Date Received: 27/03/2019  
 Date Tested: 02/04/2019  
 Sampled By: Not Given

### Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	MC %	WC %	Atterberg				Density			Total Porosity# %
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	LL %	PL %	PI %	bulk Mg/m3	dry Mg/m3	PD Mg/m3	
1188898	BH1	1	0.70	Not Given	D	Mottled brown slightly gravelly CLAY	Atterberg 1 Point	26		94	68	25	43				
1188899	BH1	3	2.70	Not Given	D	Brown CLAY	Atterberg 1 Point	27		100	75	24	51				
1188900	BH2	1	1.00	Not Given	D	Brown mottled grey CLAY	Atterberg 1 Point	25		100	71	23	48				
1188901	BH2	2	2.00	Not Given	D	Brown mottled grey slightly sandy CLAY	Atterberg 1 Point	16		100	46	18	28				
1188902	BH4	1	0.90	Not Given	D	Orangish brown mottled grey slightly gravelly sandy CLAY	Atterberg 1 Point	16		96	46	16	30				
1188903	BH5	1	0.90	Not Given	D	Brown mottled grey slightly gravelly CLAY	Atterberg 1 Point	19		75	76	26	50				
1188904	BH6	1	1.90	Not Given	D	Brown mottled grey slightly gravelly slightly sandy CLAY	Atterberg 1 Point	21		95	57	21	36				

Note: # Non accredited; NP - Non plastic

### Comments:

Approved: Dariusz Piotrowski  
 PL Geotechnical Laboratory Manager  
 Date Reported: 10/04/2019

Signed: Darren Berrill  
 Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 234.7

"Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.  
 This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.  
 The results included within the report are representative of the samples submitted for analysis.  
 The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."



Analytical Report Number: 19-35157

Project / Site name: Firs Wood Close

Lab Sample Number	1188845	1188846	1188847	1188848	1188849			
Sample Reference	BH3	BH3	BH3	BH5	BH5			
Sample Number	2	3	4	2	3			
Depth (m)	0.70	1.70	2.70	2.90	3.90			
Date Sampled	25/03/2019	25/03/2019	25/03/2019	25/03/2019	25/03/2019			
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	%	N/A	NONE	19	13	7.1	19	20
Total mass of sample received	kg	0.001	NONE	0.89	0.71	0.83	0.56	0.56

#### General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	5.6	7.6	7.9	7.8	7.4
pH - Automated	pH Units	N/A	MCERTS	5.6	7.6	7.9	7.8	7.4
Total Sulphate as SO <sub>4</sub>	%	0.005	MCERTS	0.043	0.024 **	0.049	0.057	0.977
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.019	0.013	0.018	0.31	2.0
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	< 0.5	< 0.5	1.3	10	16
Total Sulphur	%	0.005	MCERTS	0.015	<0.005 **	0.020	0.023	0.382
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	4.7	< 2.0

#### Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	< 5.0	6.0	< 5.0	49	300
Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	6.0	< 5.0	49	300
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	3.0	< 2.5	24	150

\*\* Despite repeating Total Sulphate and Total Sulphur analysis, the results remain contradictory.

Analytical Report Number: 19-35157

Project / Site name: Firs Wood Close

Lab Sample Number				1188850				
Sample Reference				BH6				
Sample Number				2				
Depth (m)				0.90				
Date Sampled				25/03/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	18				
Total mass of sample received	kg	0.001	NONE	0.57				

#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.9				
Total Sulphate as SO <sub>4</sub>	%	0.005	MCERTS	0.032				
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.027				
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	1.5				
Total Sulphur	%	0.005	MCERTS	0.013				
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0				

#### Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	6.5				
Magnesium (leachate equivalent)	mg/l	2.5	NONE	3.3				

\*\* Despite repeating Total Sulphate and Total Sulphur analysis, the results remain contradic



**Analytical Report Number : 19-35157**

**Project / Site name: Firs Wood Close**

\* 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 *
1188845	BH3	2	0.70	Brown clay with chalk.
1188846	BH3	3	1.70	Brown clay and sand with gravel and vegetation.
1188847	BH3	4	2.70	Brown clay and gravel with chalk.
1188848	BH5	2	2.90	Brown clay.
1188849	BH5	3	3.90	Brown clay with vegetation.
1188850	BH6	2	0.90	Light grey clay with gravel.



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Environmental Science

**Analytical Report Number : 19-35157****Project / Site name: Firs Wood Close****Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-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.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	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
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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests <sup>***</sup>	L038	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 based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	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

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.****For method numbers ending in 'PL' 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 30°C.**

# Appendix I

## Chemical Test Results





**Charles Wake**  
JNP Midlands LLP  
3rd Floor  
Marlborough House  
48 Holly Walk  
Leamington Spa  
CV32 4XP

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
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**t:** 01923 225404  
**f:** 01923 237404  
**e:** reception@i2analytical.com

**e:** charles.wake@jnpgroup.co.uk

## **Analytical Report Number : 19-34910**

<b>Project / Site name:</b>	Firs Wood Close	<b>Samples received on:</b>	27/03/2019
<b>Your job number:</b>	M42853	<b>Samples instructed on:</b>	27/03/2019
<b>Your order number:</b>		<b>Analysis completed by:</b>	05/04/2019
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	05/04/2019
<b>Samples Analysed:</b>	5 soil samples		

**Signed:**

Dr Claire Stone  
Quality Manager  
**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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Environmental Science

Analytical Report Number: 19-34910

Project / Site name: Firs Wood Close

Lab Sample Number	1187405	1187406	1187407	1187408	1187409			
Sample Reference	BH1	BH2	BH3	BH4	BH5			
Sample Number	1	1	1	1	1			
Depth (m)	0.10	0.20	0.10	0.20	0.10			
Date Sampled	25/03/2019	25/03/2019	25/03/2019	25/03/2019	25/03/2019			
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	%	N/A	NONE	22	24	23	18	15
Total mass of sample received	kg	0.001	NONE	0.42	0.45	0.39	0.45	0.41

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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**General Inorganics**

Organic Matter	%	0.1	MCERTS	4.4	-	-	-	3.9
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**Speciated PAHs**

Compound	mg/kg	Limit of detection	Accreditation Status	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
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	< 0.05
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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

**Total PAH**

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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**Heavy Metals / Metalloids**

Compound	mg/kg	Limit of detection	Accreditation Status	6.0	9.4	7.4	12	11
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.0	9.4	7.4	12	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	33	42	49	46	55
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.39	0.59	0.71	0.55	0.59
Boron (water soluble)	mg/kg	0.2	MCERTS	1.1	0.9	1.1	0.9	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	24	24	26	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23	20	21	19	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	76	86	100	95
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.0	< 0.3	1.0	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	6.6	8.4	8.7	8.7	10
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	34	40	44	48	41
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	37	47	50	44	49

**Petroleum Hydrocarbons**

Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-	< 0.1
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TPH (C10 - C25)	mg/kg	10	MCERTS	-	< 10	< 10	-	< 10
TPH (C25 - C40)	mg/kg	10	MCERTS	-	< 10	< 10	-	< 10



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Environmental Science

**Analytical Report Number : 19-34910**

**Project / Site name: Firs Wood Close**

\* 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 *
1187405	BH1	1	0.10	Brown loam and clay with gravel and vegetation.
1187406	BH2	1	0.20	Brown loam and clay with gravel and vegetation.
1187407	BH3	1	0.10	Brown loam and clay with gravel and vegetation.
1187408	BH4	1	0.20	Brown loam and clay with gravel and vegetation.
1187409	BH5	1	0.10	Brown loam and clay with gravel and vegetation.



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Environmental Science

**Analytical Report Number : 19-34910****Project / Site name: Firs Wood Close****Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	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
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/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.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
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
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
TPH Oils (Soils)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS

**For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.****For method numbers ending in 'PL' 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.**

# Appendix J

## Soakaway Test Results





**SOIL INFILTRATION TEST**

**Project:**  
Firs Wood Close, Northaw

**Project No:**  
M42853

Test Location: SA1

Test No: 1

Date: 22 Mar 2019

Water level during test

Time mins	Depth m bgl
0	1.900
5	1.900
11	1.900
32	1.900
66	1.900
105	1.900
180	1.900
225	1.900
252	1.900

Trial pit dimensions

depth (m)	3.00
length (m)	2.60
width (m)	0.60

$$f = \frac{V_{p75-25}}{a_{s50} \times t_{p75-25}}$$

*f* = soil infiltration rate

*V*<sub>p75-25</sub> = volume of water from 75% to 25% effective depth

*a*<sub>s50</sub> = internal surface area at 50% effective depth

*t*<sub>p75-25</sub> = time for the water level to fall from 75% to 25% effective depth

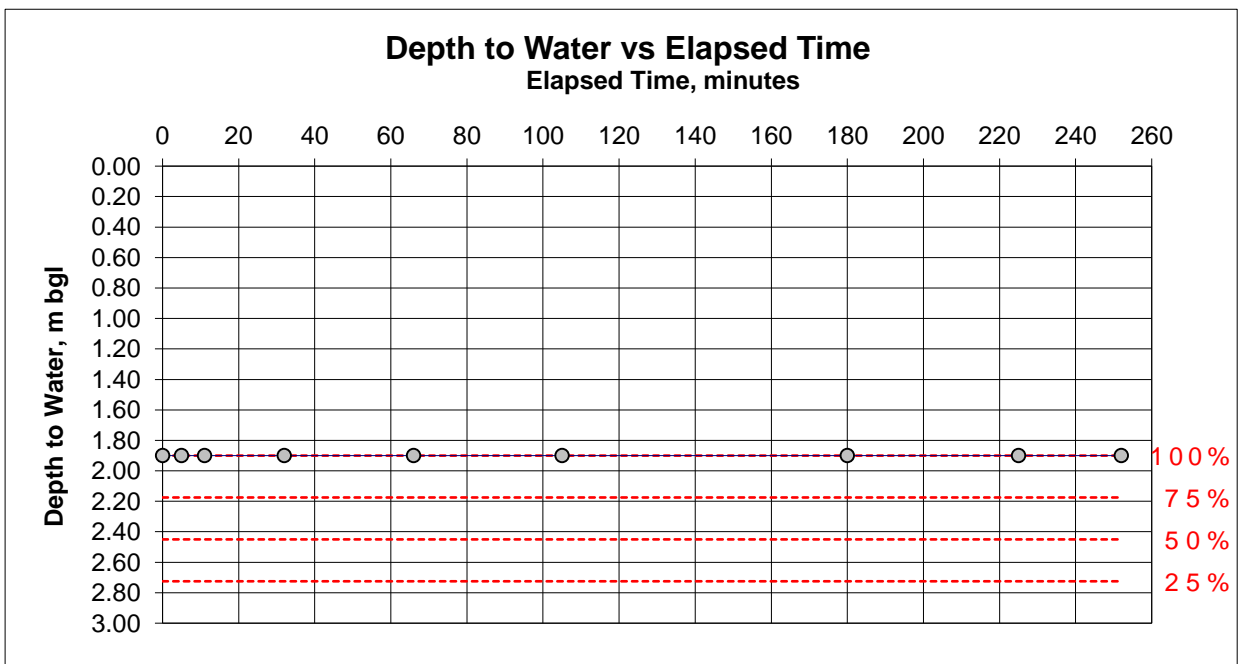
time at 75% effective depth (mins) N/A

time at 25% effective depth (mins) N/A

Test incomplete - Infiltration rate could not be determined

**Calculated Soil Infiltration Rate = N/A**

**Depth to Water vs Elapsed Time**  
Elapsed Time, minutes





**SOIL INFILTRATION TEST**

**Project:**  
Firs Wood Close, Northaw

**Project No:**  
M42853

Test Location: SA2

Test No: 1

Date: 22 Mar 2019

Water level during test

Time mins	Depth m bgl
0	1.570
4	1.570
16	1.570
40	1.570
63	1.570
120	1.570
160	1.570
202	1.570
240	1.570

Trial pit dimensions

depth (m)	2.60
length (m)	2.40
width (m)	0.60

$$f = \frac{V_{p75-25}}{a_{s50} \times t_{p75-25}}$$

*f* = soil infiltration rate

*V<sub>p75-25</sub>* = volume of water from 75% to 25% effective depth

*a<sub>s50</sub>* = internal surface area at 50% effective depth

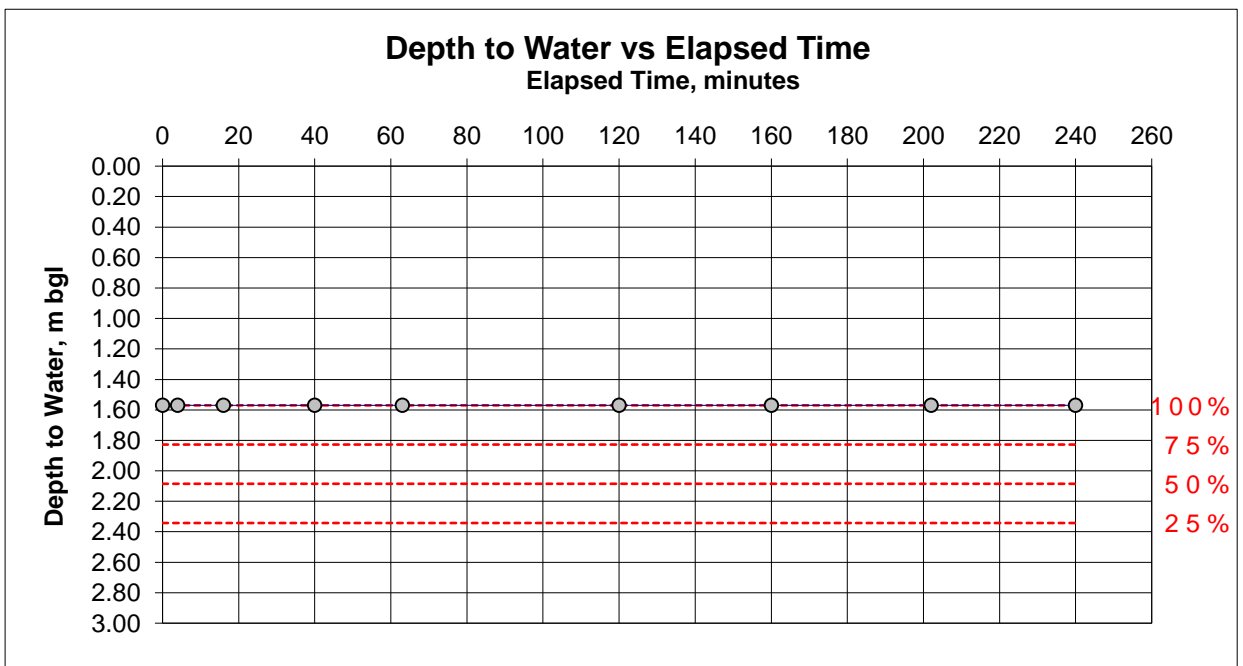
*t<sub>p75-25</sub>* = time for the water level to fall from 75% to 25% effective depth

time at 75% effective depth (mins) N/A

time at 25% effective depth (mins) N/A

Test incomplete - Infiltration rate could not be determined

**Calculated Soil Infiltration Rate = N/A**





**SOIL INFILTRATION TEST**

**Project:**  
Firs Wood Close, Northaw

**Project No:**  
M42853

Test Location: SA2

Test No: 1

Date: 22 Mar 2019

Water level during test

Time mins	Depth m bgl
0	1.750
2	1.750
10	1.750
30	1.750
50	1.750
115	1.750
145	1.750
194	1.750
210	1.750

Trial pit dimensions

depth (m)	2.80
length (m)	2.60
width (m)	0.60

$$f = \frac{V_{p75-25}}{a_{s50} \times t_{p75-25}}$$

*f* = soil infiltration rate

*V*<sub>p75-25</sub> = volume of water from 75% to 25% effective depth

*a*<sub>s50</sub> = internal surface area at 50% effective depth

*t*<sub>p75-25</sub> = time for the water level to fall from 75% to 25% effective depth

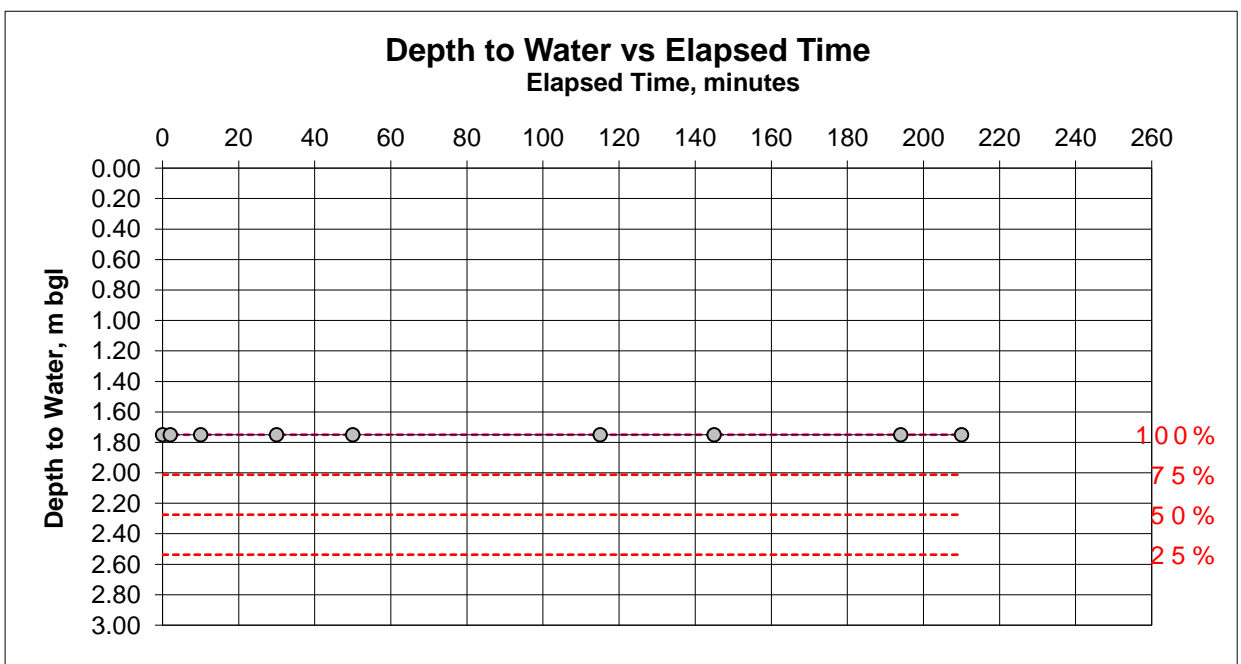
time at 75% effective depth (mins) N/A

time at 25% effective depth (mins) N/A

Test incomplete - Infiltration rate could not be determined

**Calculated Soil Infiltration Rate = N/A**

**Depth to Water vs Elapsed Time**  
Elapsed Time, minutes







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