
APPENDIX E – Preliminary Risk Assessment & Geotechnical Risk Register Tables

Preliminary Risk
Assessment &
Geotechnical Risk
Register Tables

Contaminant	Receptor	Pathway ¹	Likelihood of Exposure	Severity of Exposure	Risk Classification	Notes
All contaminants in soils (Herbicides/pesticides, PAHs, Heavy metals, Petroleum hydrocarbons)	Future Residents	Dermal contact, ingestion and inhalation of soil particles	Low likelihood	Medium	Moderate/low risk	Exposure to pesticides, herbicides, and heavy metals from fertilisers is considered possible as this is a diffuse source of contamination. Contaminants from made ground and fuel spills are expected to be localised.
		Consumption of contaminated home grown produce	Low likelihood	Medium	Moderate/low risk	
		Migration of ground gases through pore space / preferential pathways	Unlikely	Mild	Very low risk	No evidence of landfilling or deep made ground based on historical maps
	Construction workers	Dermal contact, ingestion and inhalation of soil particles	Unlikely	Mild	Very low risk	Construction workers are assumed to be provided with appropriate PPE. In addition, exposure to contaminants would be for a short time only.
	Secondary Aquifers and non aquifer on site	Vertical infiltration and leaching from impacted on-site soils	Unlikely	Mild	Very low risk	Most contamination is expected to be localised, or not at high enough concentrations to have a detrimental effect on the groundwater or surface water and most of the site is expected to be underlain by clay
Asbestos fibres in soils	Surface water	Surface water run-off	Unlikely	Mild	Very low risk	Closest surface water features are up adjacent to the north west but topography flows down to the south.
	Future Residents	Inhalation of asbestos fibres	Unlikely	Severe	Moderate/low risk	The northern part of the site has not been previously developed. Any asbestos present on site is expected to be very localised. However health effects are severe even with only minor exposure.
	Future commercial workers	Inhalation of asbestos fibres	Unlikely	Severe	Moderate/low risk	
	Construction workers	Inhalation of asbestos fibres	Unlikely	Severe	Moderate/low risk	

The classification is based upon the consideration of both the magnitude of consequence and the likelihood of exposure as follows:

Likelihood		Consequence			
		Severe	Medium	Mild	Minor
	High likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very Low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Preliminary Geotechnical Risk Register

Geotechnical risk is the risk to building and construction work created by the site ground conditions. The Preliminary Geotechnical Risk Register has been compiled to provide an assessment of the likely risks that may impact on the proposed development based on the results of the desk study, and should be used to specify the type and extent of the intrusive investigation and testing undertaken, and to identify potential mitigation measures to control the risk to an acceptable level.

The inclusion of a risk in the register does not indicate that the risk is present, rather the likelihood of mitigation measures being required due to that risk, based on the available data. Equally, a risk classified as low indicates that mitigation measures are unlikely to be required for the hazard identified based on the available data.

The risk register should be developed and refined throughout the design process such that it will enable the management of geotechnical risk.

The Geotechnical Risk Register has been developed in accordance with the guidance presented in ICE/DETR Document "Managing Geotechnical Risk" (2002). The degree of risk (R) is determined by assessing the likelihood of a hazard (L) occurring and the effect of the hazard (E) on the project ($R=L \times E$). The effect may be measured in one or more aspect e.g. increased cost, delays in the program, health and safety etc. The scale of the likelihood, effect and risk are determined as follows:-

Likelihood of Occurrence		
Scale	Likelihood	Chance
4	Probable	>1 in 2
3	Likely	1 in 10 to 1 in 2
2	Unlikely	1 in 100 to 1 in 10
1	Negligible	<1 in 100

x

Effect of Hazard		
Scale	Effect	Increase in cost or time
4	Very High	>10%
3	High	4-10%
2	Low	1-4%
1	Very Low	<1%

=

Degree of Risk		
Degree of Risk	Risk Level	Action required
1-4	Low	None
5-8	Significant	Consider cost effective solutions or improvements at no extra cost
9-12	Substantial	Work must not start until risk has been reduced. Additional resource required
13-16	Intolerable	Work must not start until risk has been reduced. If risk can not be reduced, project should not proceed.

Hazard	Effect	Likelihood of Occurrence	Effect of Hazard	Risk Classification	Notes
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Preliminary Geotechnical Risk Register

Geotechnical risk is the risk to building and construction work created by the site ground conditions. The Preliminary Geotechnical Risk Register has been compiled to provide an assessment of the likely risks that may impact on the proposed development based on the results of the desk study, and should be used to specify the type and extent of the intrusive investigation and testing undertaken, and to identify potential mitigation measures to control the risk to an acceptable level.

The inclusion of a risk in the register does not indicate that the risk is present, rather the likelihood of mitigation measures being required due to that risk, based on the available data. Equally, a risk classified as low indicates that mitigation measures are unlikely to be required for the hazard identified based on the available data.

The risk register should be developed and refined throughout the design process such that it will enable the management of geotechnical risk.

The Geotechnical Risk Register has been developed in accordance with the guidance presented in ICE/DETR Document "Managing Geotechnical Risk" (2002). The degree of risk (R) is determined by assessing the likelihood of a hazard (L) occurring and the effect of the hazard (E) on the project ($R=L \times E$). The effect may be measured in one or more aspect e.g. increased cost, delays in the program, health and safety etc. The scale of the likelihood, effect and risk are determined as follows:-

Likelihood of Occurrence		
Scale	Likelihood	Chance
4	Probable	>1 in 2
3	Likely	1 in 10 to 1 in 2
2	Unlikely	1 in 100 to 1 in 10
1	Negligible	<1 in 100

x

Effect of Hazard		
Scale	Effect	Increase in cost or time
4	Very High	>10%
3	High	4-10%
2	Low	1-4%
1	Very Low	<1%

=

Degree of Risk		
Degree of Risk	Risk Level	Action required
1-4	Low	None
5-8	Significant	Consider cost effective solutions or improvements at no extra cost
9-12	Substantial	Work must not start until risk has been reduced. Additional resource required
13-16	Intolerable	Work must not start until risk has been reduced. If risk can not be reduced, project should not proceed.

Geotechnical Risk Register

Hazard	Effect	Likelihood of Occurrence	Effect of Hazard	Risk Classification	Notes
Made Ground	Deepened foundations	Unlikely	Low	Trivial	Site has not undergone extensive development, so any made ground present on site is expected to be localised around the small structure.
	Unstable excavations	Unlikely	Low	Trivial	
Compressible Ground	Bearing capacity failure	Unlikely	Low	Trivial	Solution features are not considered likely to be present.
	Excessive settlement	Unlikely	Low	Trivial	
High Groundwater Table	Unstable excavations/ running sands	Unlikely	Low	Trivial	Groundwater may be present within granular soils where present on site
	Dewatering	Likely	Low	Significant	
	Contamination	Likely	Low	Significant	
Deep Excavations	Deepened foundations	Negligible	High	Trivial	Absence of deep excavations on-site
Working in highway	Traffic Management	Negligible	Very low	Trivial	N/A
Shrinkable soils	Deepened foundations	Likely	Low	Significant	The Grinstead Clays may be susceptible to swelling and shrinkage. Large trees are located across and along the perimeter of the site and within site boundaries. Foundations may require deepening where clay soils are encountered near trees.
	Heave	Likely	Low	Significant	
Frost Susceptible soils	Road Design	Likely	Low	Significant	Clay deposits may be susceptible depending on silt content and high plasticity.
Aggressive ground conditions for Concrete	Concrete design	Likely	Low	Significant	Underlying geology may contain high concentrations of sulphates
Slope Stability/Retaining Structure	Local stability	Probable	Low	Significant	Site slopes down towards the south at approximately 3 degrees and 6 degree sand slope stability issues should not be discounted.
	Global stability	Unlikely	High	Significant	
Mining	Suitability for development	Likely	Low	Significant	Historical clay and sand pits are located around the site and an on site historical pit is noted
Ground dissolution/ Natural cavities	Remedial measures	Unlikely	Low	Trivial	Solution features are not expected.
Landfill	Land gas	Unlikely	Low	Trivial	
Contaminated land	Remedial measures	Likely	Low	Significant	Significant contamination is not expected across the site.
Archaeological remains	Remedial measures	Negligible	High	Trivial	N/A
UXO	UXO supervision	Unlikely	Low	Trivial	

APPENDIX F – Exploratory Logs

Exploratory Logs



Leap Environmental Ltd
The Atrium, Curtis Road
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Tel: 01306 646510
www.leapenvironmental.com

Trial Pit Log

Trialpit No

TP1

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531046 - 125549
Level: 115.99

Date
24/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m):

1.5

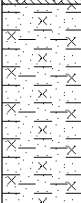
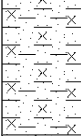
Client: Sigma Homes

Depth
2.00

0.5

Scale
1:25

Logged
SSC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20 0.20	ES ES		0.30	115.69		Brown sandy TOPSOIL with rootlets.	
	0.50 0.50	D D	HVP=92				Stiff orange brown and grey mottled sandy silty CLAY. <i>Hand Pen UCS at 0.5m = 90kPa</i>	
	1.00	B	HVP=95				<i>With much ironstone below 1.0m.</i>	1
	1.50 1.50	B B		1.40	114.59		Medium dense pale grey and orange fine SAND with occasional fine to coarse gravel of extremely weak siltstone.	
				2.00	113.99		End of pit at 2.00 m	2
								3
								4
								5

Remarks: Trial pit remained dry and stable. Backfilled with arisings. No further progress below 2.0m as too dense.

Stability: Stable

AGS



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Trial Pit Log

Trialpit No

TP3

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531051 - 125622
Level: 119.54

Date
24/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m):

1.3

Client: Sigma Homes

Depth
0.70

0.5

Scale
1:25

Logged
SSC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	D	HVP=85	0.30	119.24		Brown sandy TOPSOIL with many rootlets.
							Stiff orange brown silty CLAY.
				0.70	118.84		Hand Pen UCS at 0.5m = 130kPa
							End of pit at 0.70 m

1

2

3

4

5

Remarks: Trial pit remained dry and stable. Backfilled with gravel to 0.3m and topped with arisings to ground level. Installed 1m of slotted pipe with 0.3m above ground level.

Stability: Stable

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Trial Pit Log

Trialpit No

TP4

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531106 - 125643
Level: 121.90

Date
24/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m): 1.9

Client: Sigma Homes

Depth
2.20

0.5

Scale
1:25

Logged
SSC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.30	121.60		Brown sandy TOPSOIL with many rootlets.	
	0.50	B	HVP=80				Stiff orange brown mottled sandy silty CLAY with much gravel of ironstone. <u>Hand Pen UCS at 0.5m = 125kPa</u>	
	1.00	D	HVP=108				Becoming silty below 1.0m.	1
	2.00	B		1.50	120.40		Grey mottled orange very sandy SILT with some coarse gravel of extremely weak thinly laminated siltstone.	2
				2.20	119.70		End of pit at 2.20 m	3
								4
								5

Remarks: Trial pit remained dry and stable. Backfilled with gravel to 0.3m and topped with arisings to ground level. Installed 3m of slotted pipe with 1m above ground level.

Stability: Stable

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Trial Pit Log

Trialpit No

TP5

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531148 - 125532

Level: 115.14

Date

25/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m):

1.8

Depth
2.00

0.5

Scale

1:25

Logged
SSC

Client: Sigma Homes

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES	HVP=71	0.20	114.94		Brown sandy silty TOPSOIL with rootlets.	
	0.40	B					Firm to stiff orange brown grey mottled silty CLAY with gravel of ironstone. Gravel is fine.	
	1.30	D		1.20	113.94		Firm blue grey silty CLAY with much fine to coarse gravel of ironstone and occasional shear faces in the clay	1
	1.90	B		1.50	113.64		Extremely weak pale yellow grey SILTSTONE recovered as pale grey fine to coarse gravel.	
				2.00	113.14		End of pit at 2.00 m	2
								3
								4
								5

Remarks: Trial pit remained dry and stable. Backfilled with arisings. No further progress below 2.0m as too dense.

Stability: Stable

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Trial Pit Log

Trialpit No

TP6

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531142 - 125590

Level: 118.21

Date

25/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m):

2

Depth
3.00

0.5

Scale

1:25

Logged
SSC

Client: Sigma Homes

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	117.91		Brown sandy silty TOPSOIL.	
	0.50	D	HVP=93				Stiff orange brown silty CLAY with occasional rootlets.	
	0.60	B						
			HVP=88					
				1.20	117.01		Stiff greenish grey / purple grey mottled slightly sandy silty CLAY with several shear faces.	
	1.40	D					With much fine to coarse gravel of siltstone below 1.4m.	1
	1.70	D		1.60	116.61		Pale grey extremely weak to weak thinly laminated SILTSTONE with bands of ironstone recovered as fine to coarse gravel of siltstone and ironstone.	
	2.00	ES					With iron stone bands below 2.5m.	2
				3.00	115.21		End of pit at 3.00 m	3
								4
								5

Remarks: Trial pit remained dry and stable. Backfilled with arisings. No further progress below 3.0m as too dense.

Stability: Stable

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Trial Pit Log

Trialpit No

TP7

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531156 - 125637
Level: 121.90

Date
25/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m):

2

Depth
2.30

0.5

Scale
1:25

Logged
SSC

Client: Sigma Homes

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.25	121.65		Brown sandy TOPSOIL with many rootlets.	
	0.50	D					Stiff to very stiff light brown orange mottled sandy silty CLAY with occasional gravel of fine ironstone.	
							<u>Hand Pen UCS at 0.5m = 150kPa</u>	
							<u>Hand Pen UCS at 1.0m = 170kPa</u>	1
	1.90	D		1.60	120.30		Light grey mottled orange brown very sandy clayey SILT with some coarse gravel of ironstone and occasional gravel of extremely weak thinly laminated siltstone.	
							<u>Becoming more gravelly at 1.9m. Gravel of mudstone and ironstone.</u>	2
	2.20	D		2.10	119.80		Light grey with some brown mottling very clayey GRAVEL of silt with occasional gravel of coarse ironstone.	
	2.30	D		2.30	119.60		<u>Bands of ironstone at 2.2m.</u> End of pit at 2.30 m	
								3
								4
								5

Remarks: Trial pit remained stable. Groundwater seepage at 2.1m. No further progress below 2.3m as too dense. Backfilled with gravel to 0.25m and topped with arisings to ground level. Installed 3m of slotted pipe, with 0.7m above ground level.

Stability: Stable

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Trial Pit Log

Trialpit No

TP10

Sheet 1 of 1

Project Name: Land South of Hanlye Lane, Cuckfield

Project No.
LP3210

Co-ords: 531091 - 125588
Level: 117.70

Date
24/01/2023

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN

Dimensions (m):

2.3

Scale
1:25

Client: Sigma Homes

Depth
2.20

0.5

Logged
SSC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES	HVP=108	0.30	117.40		Brown sandy TOPSOIL with many rootlets.	
	0.50	D					Very stiff orange brown silty CLAY with occasional gravel of ironstone.	
	1.00	D		1.10	116.60		Stiff light grey with some light brown mottling very silty CLAY with occasional bands of ironstone recovered as ironstone gravel.	1
	1.20	D					Hand Pen UCS at 1.5m = 210kPa	
							Becoming darker in colour from 1.6m.	
				2.20	115.50		End of pit at 2.20 m	2
								3
								4
								5

Remarks: Trial pit remained dry and stable. Backfilled with gravel to 0.3m and topped with arisings to ground level. Installed 3m of slotted pipe.

Stability: Stable

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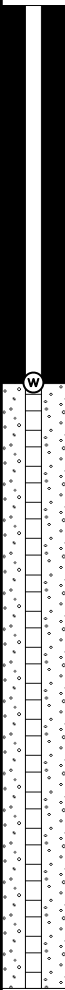
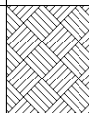
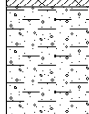
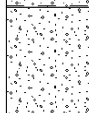
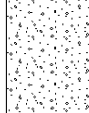
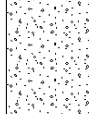
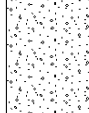
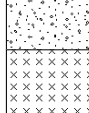
Borehole Log

Borehole No.

WS1

Sheet 1 of 1

Project Name:	Land South of Hanlye Lane, Cuckfield	Project No.	LP3210	Co-ords:	531101 - 125496	Hole Type	WS
Location:	Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN	Level:	114.24	Scale	1:20	Logged By	KM
Client:	Sigma Homes	Dates:	24/01/2023 - 24/01/2023				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30	113.94		Grass over brown slightly gravelly slightly sandy clay TOPSOIL with roots. Gravel is black ironstone.	
		0.50	ES		0.60	113.64		Firm grey mottled brown slightly gravelly sandy CLAY. Gravel is fine to medium ironstone and fine to medium sandstone. <i>Organic odour noted at 0.4m bgl.</i> <i>Hand Pen UCS at 0.5m = 60kPa</i>	
		0.70	B					Very dense to dense light grey and orange mottled slightly gravelly SAND. Gravel is subrounded fine to medium sandstone.	
		1.00		N=59 (3,6/14,15,15,15)				<i>Refusal noted on SPT result at 1m bgl.</i>	1
		1.50		N=33 (10,12/12,7,7,7)				<i>Fine to coarse ironstone gravel noted from 1.6m bgl.</i>	
		2.20	D		1.90	112.34		Grey mottled orange gravelly SILTSTONE. Gravel is fine to medium ironstone, siltstone and sandstone.	2
		2.50		0 (66 for 75mm/0 for 0mm)	2.50	111.74		End of borehole at 2.50 m	3
									4

Remarks
Borehole remained stable. Groundwater encountered at 1.4m bgl. Borehole refused at 2.5m bgl. Monitoring well installed to 2.6m bgl, comprising 1m plain pipe with bentonite surround over 1.6m slotted pipe with gravel surround.

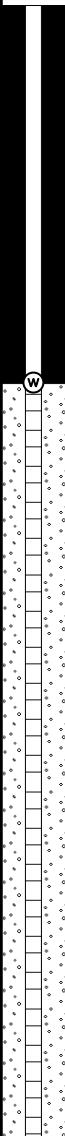
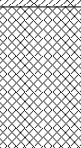
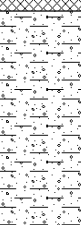
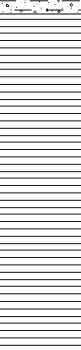
Borehole Log

Borehole No.

WS2

Sheet 1 of 1

Project Name:	Land South of Hanlye Lane, Cuckfield	Project No.	LP3210	Co-ords:	531049 - 125584	Hole Type	WS
Location:	Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN	Level:	117.13	Scale	1:20	Logged By	KM
Client:	Sigma Homes	Dates:	24/01/2023 - 24/01/2023				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30			0.30	116.83		Grass over brown slightly sandy TOPSOIL with roots.	
		0.50	ES					Brown gravelly slightly sandy REWORKED CLAY with fine brick fragments. Gravel is fine to medium subangular flint.	
		0.60	D		0.70	116.43		Stiff orange mottled grey gravelly sandy CLAY.	
		1.00		N=9 (1,1/1,2,3,3)	1.30	115.83		Laminated dark grey MUDSTONE recovered as silty gravel. Gravel is extremely weak mudstone.	1
		1.60	D		2.00				2
		2.00		N=32 (2,2/5,10,9,8)	2.20	114.93		Stiff to hard grey and orange mottled gravelly sandy CLAY. Sand is fine. Gravel is coarse very weak sandstone.	
		2.50	D		2.70	114.43		End of borehole at 2.70 m	3
		2.70		59 (11,15/59 for 225mm)					4

Remarks
Borehole remained dry and stable. Borehole refused at 2.7m bgl. Monitoring well installed to 2.7m bgl comprising 1m plain pipe with bentonite surround over 1.7m slotted pipe with gravel surround.

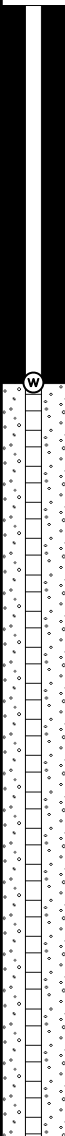
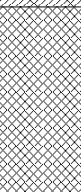
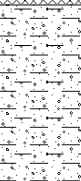
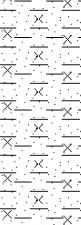
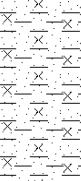
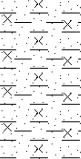
Borehole Log

Borehole No.

WS3

Sheet 1 of 1

Project Name:	Land South of Hanlye Lane, Cuckfield	Project No.	LP3210	Co-ords:	531059 - 125646	Hole Type	WS
Location:	Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN	Level:	121.50	Scale	1:20	Logged By	KM
Client:	Sigma Homes	Dates:	24/01/2023 - 24/01/2023				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30	121.20		Grass over brown slightly sandy clayey TOPSOIL with roots.	
								Brown slightly sandy gravelly REWORKED CLAY with fine brick fragments and roots. Gravel is fine sandstone.	
		0.90	D		0.80	120.70		Stiff orange mottled grey gravelly sandy CLAY with roots. Sand is fine. Gravel is fine sandstone.	1
		1.00		N=6 (1,0/1,1,2,2)				Hand Pen UCS at 1.1m = 170kPa	
					1.30	120.20		Very stiff to hard grey mottled reddish purple sandy silty CLAY. Sand is fine.	
		1.50	D					Hand Pen UCS at 1.5m = 390kPa	
		2.00		N=36 (4,6/7,7,12,10)				Hand Pen UCS measurement exceeds 600kPa at 2.6m bgl	2
		2.70	D					Hand Pen UCS measurement exceeds 600kPa at 2.6m bgl	
		3.00		N=54 (7,10/10,12,16,16)	3.00	118.50		End of borehole at 3.00 m	3
									4

Remarks
Borehole remained dry and stable. Borehole refused at 3.0m bgl. Monitoring well installed to 3.0m bgl comprising 1m plain pipe with bentonite surround over 2m slotted pipe with gravel surround.

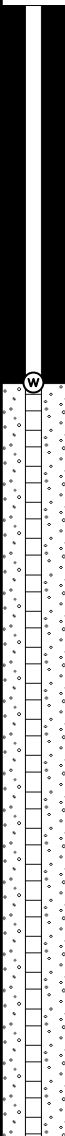
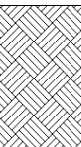
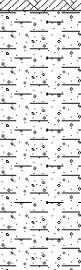
Borehole Log

Borehole No.

WS4

Sheet 1 of 1

Project Name:	Land South of Hanlye Lane, Cuckfield	Project No.	LP3210	Co-ords:	531164 - 125657	Hole Type	WS
Location:	Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN	Level:	122.46	Scale	1:20	Logged By	KM
Client:	Sigma Homes	Dates:	24/01/2023 - 24/01/2023				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.40	122.06		Grass over brown slightly sandy clayey REWORKED TOPSOIL with roots and rare glass fragments.	
		0.70	D					Hard orange mottled grey gravelly sandy CLAY with very sandy pockets and with roots. Sand is fine. Gravel is fine to coarse sandstone. <i>Hand Pen UCS at 0.6m = 440kPa</i> <i>No roots noted below 0.8m bgl.</i>	
		1.00		N=12 (1,1/2,4,3,3)	1.10	121.36		Dense grey mottled orange gravelly clayey SANDSTONE. Sand is fine to medium. Gravel is fine to coarse very weak sandstone. <i>Becomes very silty below 1.6m bgl.</i>	1
		1.70	D						
		2.00		N=46 (5,7/8,7,10,21)					2
		3.00		N=74 (10,13/15,19,19,21)	2.80	119.66		Weak to moderately weak greyish yellow mottled orange slightly gravelly fine SAND. Gravel is fine sandstone.	
					3.00	119.46		End of borehole at 3.00 m	3
									4

Remarks
Borehole remained dry and stable. Borehole refused at 3.0m bgl. Monitoring well installed to 3.0m bgl comprising 1m plain pipe with bentonite surround over 2m slotted pipe with gravel surround.



Leap Environmental Ltd
The Atrium, Curtis Road
Dorking, Surrey RH4 1XA
Tel: 01306 646510
www.leapenvironmental.com

Borehole Log

Borehole No.

WS5

Sheet 1 of 1

Project Name: Land South of Hanlye Lane,
Cuckfield

Project No.
LP3210

Co-ords: 531117 - 125552

Hole Type
WS

Location: Land south of Hanlye Lane, Cuckfield, Haywards Heath,
RH17 5HN

Level: 115.14

Scale
1:20

Client: Sigma Homes

Dates: 24/01/2023 - 24/01/2023

Logged By
KM

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES	N=7 (1,1/1,2,2,2)	0.70	114.44		Grass over brown gravelly slightly sandy TOPSOIL with roots and with fine brick fragments. Gravel is rounded medium flint and fine sandstone.	1
		0.80	ES					Firm becoming stiff and very stiff orange and grey mottled gravelly sandy CLAY with roots. Sand is fine. Gravel is fine sandstone.	
		0.90	D					Hand Pen UCS at 1m = 120kPa	
		1.00						Becomes sandier below 1.4m bgl.	
		1.60	D	61 (12,14/61 for 225mm)	1.80	113.34		Dense to very dense grey gravelly fine SAND. Gravel is angular coarse sandstone.	
		2.00						End of borehole at 2.00 m	2
									3
									4

Remarks

Borehole remained dry and stable. Borehole refused at 3.0m bgl. Monitoring well installed to 2.0m bgl comprising 1m plain pipe with bentonite surround over 1m slotted pipe with gravel surround.



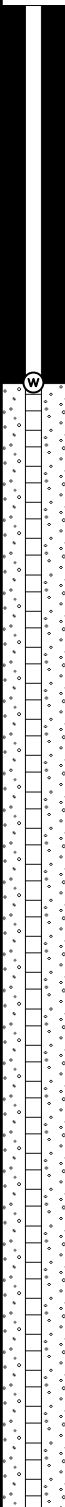
Borehole Log

Borehole No.

WS6

Sheet 1 of 1

Project Name:	Land South of Hanlye Lane, Cuckfield	Project No.	LP3210	Co-ords:	531180 - 125522	Hole Type	WS
Location:	Land south of Hanlye Lane, Cuckfield, Haywards Heath, RH17 5HN	Level:	113.44	Scale	1:20	Logged By	KM
Client:	Sigma Homes	Dates:	24/01/2023 - 24/01/2023				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.20	113.24		Grass over brown sandy clayey TOPSOIL with roots.	
		0.40	ES					Brown mottled grey slightly gravelly slightly sandy REWORKED CLAY with roots and with fine brick fragments and glass fragments. Gravel is fine sandstone.	
		0.80			0.80	112.64		Brown mottled grey gravelly slightly clayey fine SAND with roots. Gravel is coarse weak sandstone.	
		1.00		N=4 (1,0/1,1,1,1)				Hand Pen UCS at 1m =260kPa	1
		1.10	D						
		1.20			1.20	112.24		Very soft to soft becoming very stiff greyish blue slightly sandy gravelly silty CLAY with an organic odour.	
								No roots noted below 1.5m bgl.	
		2.00		N=3 (1,0/1,0,1,1)					2
		2.90						Hand Pen UCS at 2.8m =50kPa	
		3.00	D	N=6 (2,1/1,2,2,1)					3
		3.50			3.50	109.94		Very stiff greyish blue sandy silty CLAY.	
								Hand Pen UCS at 3.5m =470kPa	
		3.90		N=74 (6,11/15,18,20,21)					
		4.00			4.00	109.44		End of borehole at 4.00 m	4

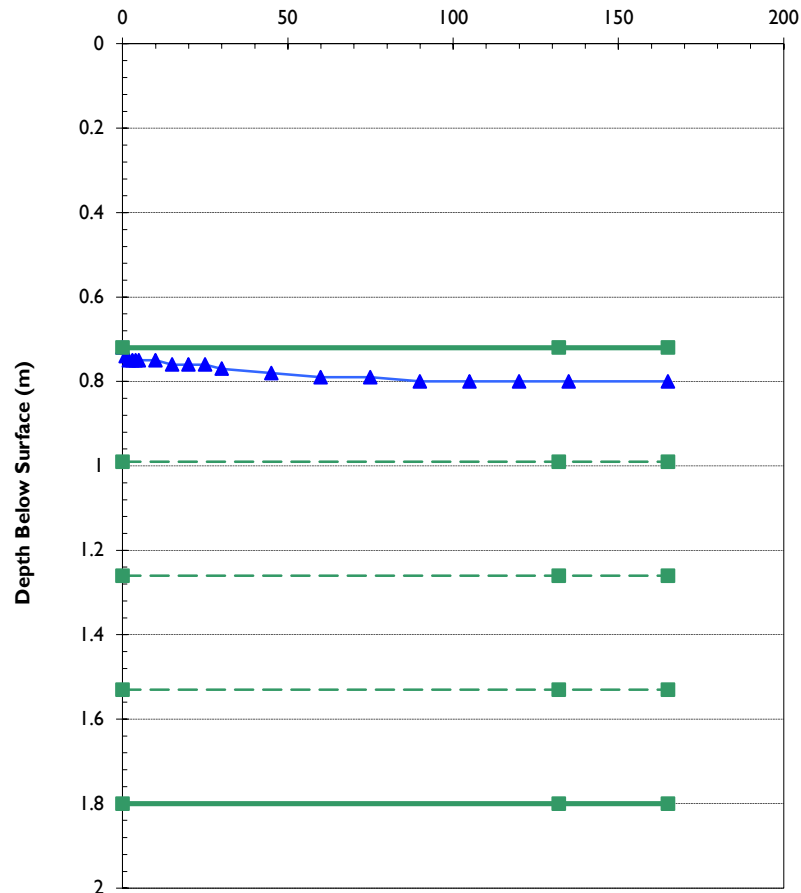
Remarks
Borehole remained dry and stable. Groundwater encountered at 0.8m bgl. Borehole refused at 4.0m bgl. Monitoring well installed to 4.0m bgl comprising 1m plain pipe with bentonite surround over 3m slotted pipe with gravel surround.

APPENDIX G – Geotechnical Field Test Results

Geotechnical Field Test Results

BRE Digest 365 - Soakage Test

Filling to Max Water Depth (min)



initial)

Test Hole No: TP9
Test No: Test No 1



Pit Length (m)	1.8
Pit Width (m)	0.5
Depth to Pit Base (m)	1.8
Depth to Top of Permeable Soils (m)	
Depth to Groundwater Surface (m)	3
Depth to Top of Granular Fill (m)	0.3
Voids Assumed for Granular Fill (%)	35%

Depth of Water at Start of Test (m)	0.72
Max Water Dropdown during Test (m)	0.08
Total Soakage Test Time (min)	165
Mean Internal Discharge Area (m ²)	5.546
Discharge Rate (litre/min)	0.0525
Soakage Rate (litre/m ² /min)	0.009466282

BRE Soil Infiltration Rate (m/sec) 1.57771E-07

Comments:

Water level did not fall to 75% max water depth, calculations were based on Result not compliant with BRE365 requirement since water did not fall to 25%

Client:

Site: Land to the south of Hanlye Land Cuckfield

Tested By:

Test Date:

APPENDIX H – Groundwater Monitoring Records

Groundwater Monitoring Records
--

LP3210 Land South of Hanley Lane Cuckfield

Date

Borehole Location	25/01/2023		27/01/2023		20/01/2023		10/03/2023	
	BH	WL	BH	WL	BH	WL	BH	WL
TP3	0.68	0.67 (DRY)	0.68	0.68 (DRY)	0.68	DRY		
TP4	2.2	1.97	2.2	1.81	2.2	1.16		
TP7	2.05	1.37	2.05	0.97	2.05	1.04		
TP9	1.8		1.8	0.5	1.8	0.91		
TP10	1.85	1.85 (DRY)	1.85	1.85 (DRY)	1.85	DRY		
WS1	2.15	0.67	2.15	0.63	2.15	1.09	2.13	0.15
WS2	2.7	2.7 (DRY)	2.7	2.7 (DRY)	2.7	DRY	2.7	1.46
WS3	2.6		2.6	2.6 (DRY)	2.6	DRY	2.6	1.69
WS4	2.45	1	2.45	0.99	2.45	1.26	2.45	0.99
WS5	1.8	1.8 (Dry)	1.8	1.8 (DRY)	1.8	DRY	1.8	DRY
WS6	3.45		3.45	0.44	3.45	0.89	3.45	-0.05

APPENDIX I – Geotechnical Laboratory Test Results

Geotechnical Laboratory Test Results
--

GEOLABS Limited
 Bucknalls Lane
 Garston
 Watford
 Hertfordshire
 WD25 9XX

Tel: +44(0) 1923 892 190
 Fax: +44(0) 1923 892 191
 email: admin@geolabs.co.uk
 web: www.geolabs.co.uk

Leap Environmental Limited
 Southern Coast Regional Office
 Victoria Road
 Burgess Hill
 West Sussex
 RH15 9LR

06 March 2023

Report No : GEO/37433/01

Page 1 of 1

For the attention of Ms S Shafi-Cooke

Our ref **GEO / 37433**
 Your Ref **LP3210**

Date samples received 01/02/2023
 Date written instructions received 15/02/2023
 Date testing commenced 16/02/2023
Date of sample disposal 03/04/2023

Project **LAND OFF HANLYE LANE, CUCKFIELD**

Further to your instructions we have pleasure in enclosing the results of the tests you requested in the attached figures.

LABORATORY TEST REPORT

Item No	Test Quantity	Description
1	~	Geotechnical Test Summary
~	9	Water Content
~	9	Liquid & Plastic Limits
2	~	Geochemical Test Summary
~	5	BRE SD1 Suite B - Natural ground + pyrite
3	3	Particle Size Distribution
4	3	California Bearing Ratio

Any opinions or interpretations expressed herein are outside the scope of UKAS accreditation. All results contained in this report are provisional unless signed by an approved signatory. The results contained in this report relate only to samples received in the laboratory and are tested 'as received' unless otherwise stated. This report should not be reproduced, except in full, without the written approval of the laboratory. The results reported are applicable only to the test items received by the laboratory.

All the necessary data required by the documented test procedures has been recorded and will be stored for a period of not less than 6 years. This data will be issued to yourselves at your request. All samples will be disposed of after the date shown above. Written confirmation will be required to retain the samples beyond this period and a storage charge may be applied.

We trust that the above meets your requirements and should you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully
 on behalf of **GEOLABS Limited**

S Burke

S Burke
 Senior Technician

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Location	Depth (m)	Sample Ref	Type	Description	WC	LL	PL	PI	<425 µm	Bulk	Dry	Condition	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg	
					%	%	%	%	%	Mg/m³	Mg/m³		kPa	kPa	kPa		g/L	mg/L	
TP1	1.00		B	Multicolour slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to medium.	17.2	42	14	28	98										Chemical
TP1	1.50		B	Light brown clayey silty fine SAND.															Particle Size Distribution
TP3	0.50		D	Greyish brown and brownish grey mottled CLAY with rare fine gravel and rootlets.	24.4	62	23	39	99										Chemical
TP4	0.50		B	Brown mottled orangish brown silty CLAY with roots.															California Bearing Ratio
TP4	1.00		D	Orangish brown and brownish grey mottled CLAY with rare fine gravel and rootlets.	31.9	61	24	37	99										
TP5	0.40		B	Brown light brown and yellowish brown mottled silty CLAY with rare roots.															California Bearing Ratio
TP5	1.30		D	Grey and yellowish brown mottled CLAY with rare fine gravel.	26.7	61	21	40	99										
TP6	0.50		D	Grey and yellowish brown mottled CLAY with rare fine gravel and rootlets.	23.5	43	21	22	99										
TP6	0.60		B	Orangish brown mottled brown very slightly gravelly silty CLAY with rare roots.															California Bearing Ratio
TP6	1.40		D	Greyish brown, dark brown and yellowish brown mottled silty CLAY.	26.6	53	21	32	100										Chemical

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by  S Burke - Senior Technician 06/03/2023	Project Number: Project Name: GEO / 37433 LAND OFF HANLYE LANE, CUCKFIELD LP3210	
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SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression				Chemical Tests			Other tests and comments
Location	Depth (m)	Sample Ref	Type	Description	WC	LL	PL	PI	<425 µm	Bulk	Dry	Condition	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg	
					%	%	%	%	%	Mg/m³	Mg/m³		kPa	kPa	kPa		g/L	mg/L	
TP7	0.50		D	Yellowish brown, brown and light grey mottled slightly sandy silty CLAY with rare fine to medium gravel.	18.0	33	17	16	99										
TP7	1.90		D	Yellowish brown clayey silty SAND and GRAVEL.															Particle Size Distribution
TP9	0.50		D	Yellowish brown, brown and brownish grey mottled CLAY with rare fine gravel.	25.0	40	20	20	99										
TP10	1.00		D	Brown mottled grey CLAY.	31.6	68	23	45	100										
TP10	1.20		D	Brownish grey slightly sandy silty CLAY with rare fine to medium gravel.															Particle Size Distribution
WS4	0.70		D																Chemical
WS6	1.10		D																Chemical

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by



S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**



SUMMARY OF CHEMICAL TESTS ON SOIL

Location	Depth m	Sample Ref	Sample Type	pH Value	Total Acid Soluble Sulphate as SO ₄ %	Water Soluble Sulphate as SO ₄ 2:1 Water:Soil Extract g/l	Total Sulphur %	Water Soluble Chloride g/l	Water Soluble Nitrate g/l	Magnesium g/l	Organic Content %	Mass Loss on Ignition %	Carbonate Content %
TP1	1.00		B	7.3	0.015	< 0.010	< 0.010	-	-	-	-	-	-
TP3	0.50		D	7.7	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-
TP6	1.40		D	8.4	0.025	< 0.010	< 0.010	-	-	-	-	-	-
WS4	0.70		D	8.0	0.010	< 0.010	< 0.010	-	-	-	-	-	-
WS6	1.10		D	8.4	< 0.010	< 0.010	< 0.010	-	-	-	-	-	-

Tested by Chemtest Ltd : MCERTS / UKAS No 2183

Checked and Approved by:


S Burke - Senior Technician
08/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**


PARTICLE SIZE DISTRIBUTION

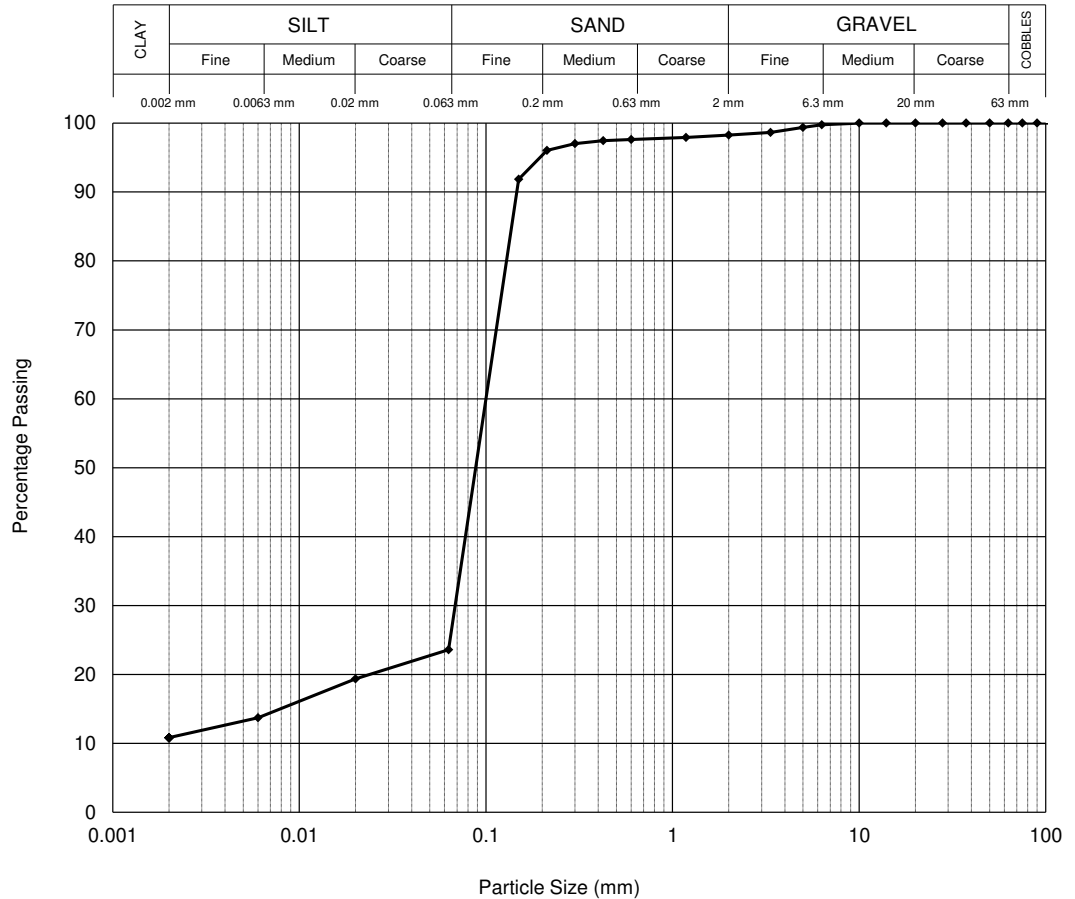
Location TP1
Depth (m) 1.50
Sample Type B

Description

Light brown clayey silty fine SAND.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	100
6.30 mm	100
5.00 mm	99
3.35 mm	99
2.00 mm	98
1.18 mm	98
600 µm	98
425 µm	97
300 µm	97
212 µm	96
150 µm	92
63 µm	24



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.0
Size	% Pass
20 µm	19
6 µm	14
2 µm	11

Particle Density 2.70(A) Mg/m³

Tested by AW
Checked and Approved by

S Burke

S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**



PARTICLE SIZE DISTRIBUTION

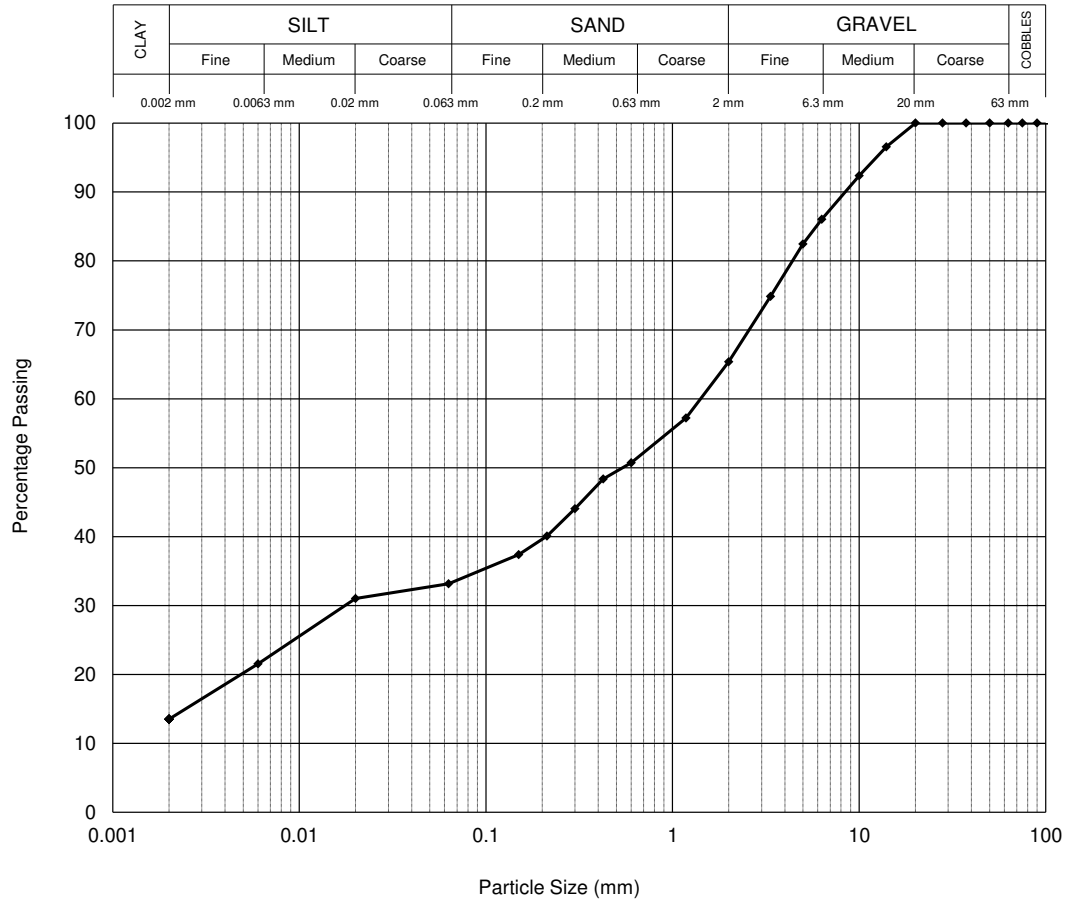
Location TP7
Depth (m) 1.90
Sample Type D

Description

Yellowish brown clayey silty SAND and GRAVEL.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve
BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	97
10.0 mm	92
6.30 mm	86
5.00 mm	82
3.35 mm	75
2.00 mm	65
1.18 mm	57
600 µm	51
425 µm	48
300 µm	44
212 µm	40
150 µm	37
63 µm	33



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.0
Size	% Pass
20 µm	31
6 µm	22
2 µm	14

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	34.6
Sand	32.2
Silt	19.7
Clay	13.5

Tested by AW
Checked and Approved by

S Burke

S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**



PARTICLE SIZE DISTRIBUTION

Location
Depth (m)
Sample Type

TP10
1.20
D

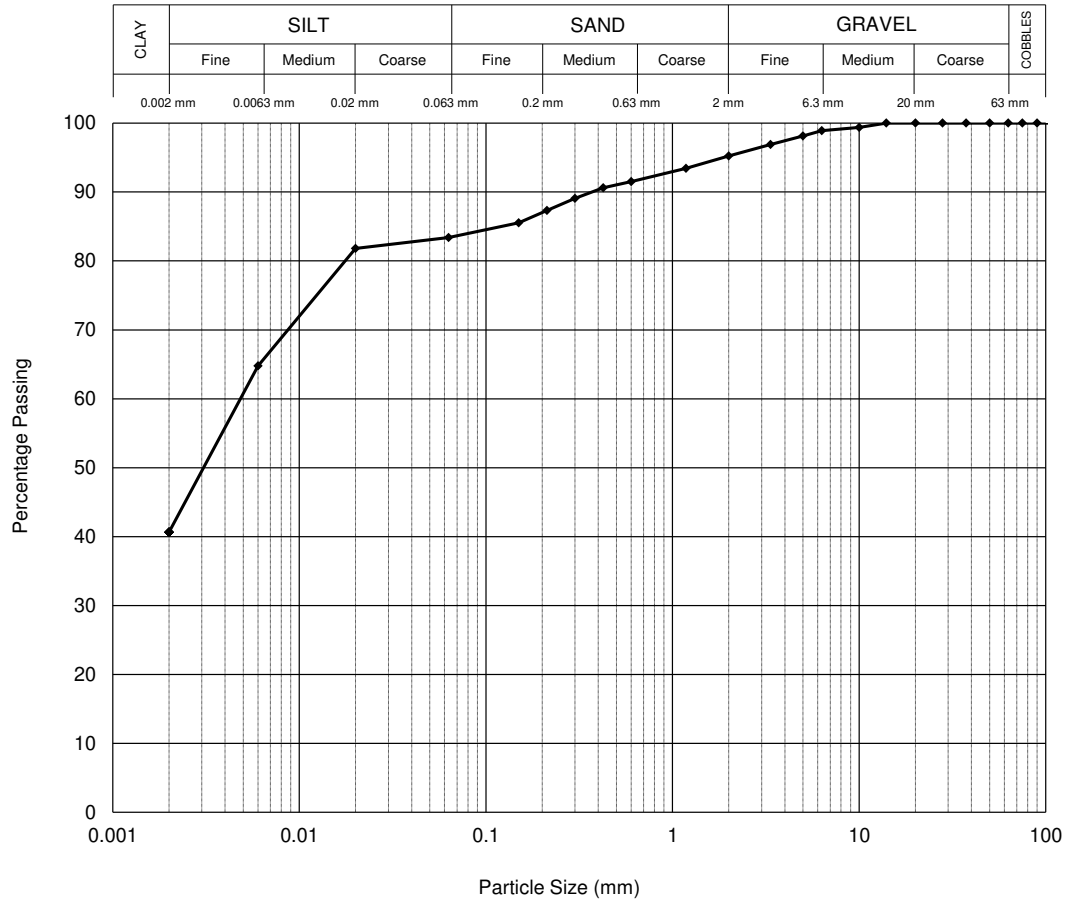
Description

Brownish grey slightly sandy silty CLAY with rare fine to medium gravel.

BS EN ISO 17892-4 : 2016 : Clause 5.2 - Wet Sieve

BS EN ISO 17892-4 : 2016 : Clause 5.4 - Sedimentation by Pipette

Sieve	
Size	% Pass
200.0 mm	100
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	100
28.0 mm	100
20.0 mm	100
14.0 mm	100
10.0 mm	99
6.30 mm	99
5.00 mm	98
3.35 mm	97
2.00 mm	95
1.18 mm	93
600 µm	92
425 µm	91
300 µm	89
212 µm	87
150 µm	86
63 µm	83



Sedimentation	
No Pre-treatment used	
Temp (°C)	25.0
Size	% Pass
20 µm	82
6 µm	65
2 µm	41

Particle Density 2.70(A) Mg/m³

Particle Proportions	
Cobbles	0.0
Gravel	4.8
Sand	11.8
Silt	42.7
Clay	40.7

Tested by AW
Checked and Approved by

S Burke

S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**



CALIFORNIA BEARING RATIO

Location TP4
Depth (m) 0.50
Sample Type B

Description:

Brown mottled orangish brown silty CLAY with rare roots.

PREPARATION DETAILS

The specimen was soaked for 4 days, after which swelling equilibrium had been reached with 0.2 % vertical swell.
The specimen was prepared at the as received water content of 28%
The specimen was prepared by dynamic compaction using a 2.5 kg rammer
Soaked specimen bulk density 1.94 Mg/m³ (1.94 Mg/m³ before soaking)
Soaked specimen dry density 1.51 Mg/m³ (1.51 Mg/m³ before soaking)
0.0 % of the sample was retained on a 20mm sieve

Test Details

Surcharge
Seating load
Water content

Top

9.0 kg
10 N
29 %

Base

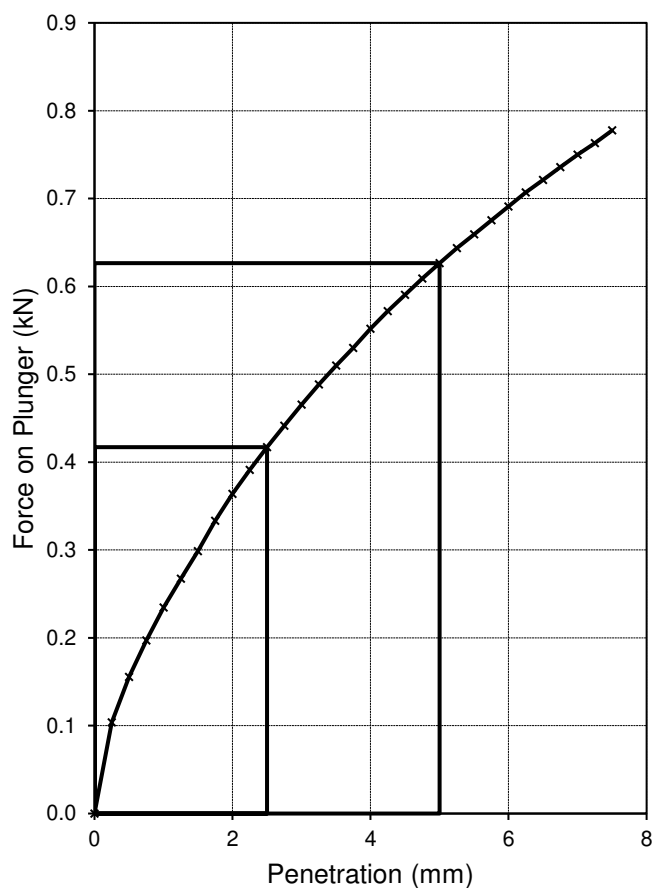
9.0 kg
10 N
28 %

CBR Value

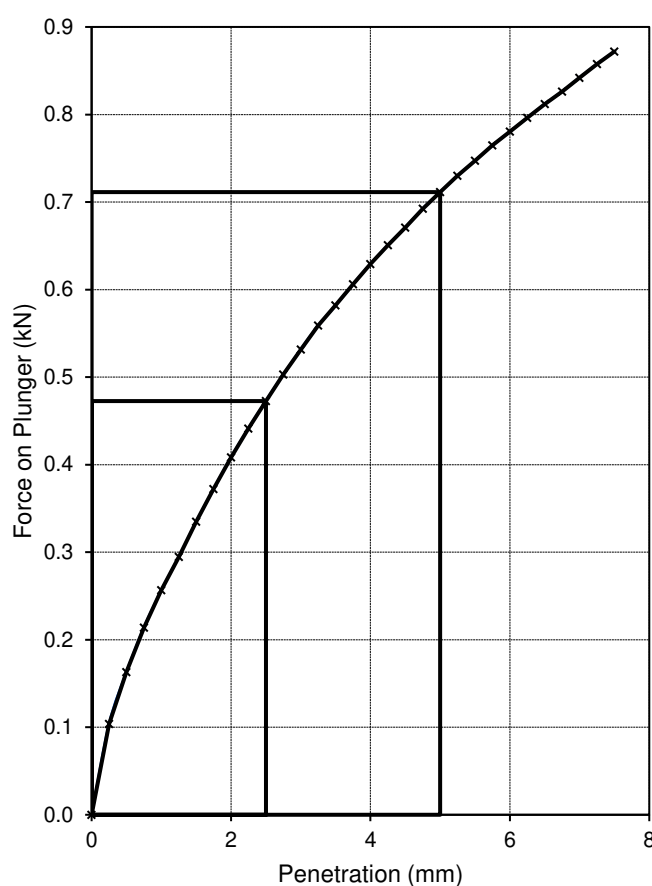
3.2 %

3.6 %

Top of Specimen



Base of Specimen



Tested by ME
Checked and Approved by

S Burke

S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**



CALIFORNIA BEARING RATIO

Location TP5
Depth (m) 0.40
Sample Type B

Description:

Brown light brown and yellowish brown mottled silty CLAY with rare roots.

PREPARATION DETAILS

The specimen was soaked for 4 days, after which swelling equilibrium had been reached with 0.3 % vertical swell.

The specimen was prepared at the as received water content of 29%

The specimen was prepared by dynamic compaction using a 2.5 kg rammer

Soaked specimen bulk density 1.92 Mg/m³ (1.92 Mg/m³ before soaking)

Soaked specimen dry density 1.48 Mg/m³ (1.48 Mg/m³ before soaking)

0.0 % of the sample was retained on a 20mm sieve

Test Details

Surcharge
Seating load
Water content

Top

9.0 kg
10 N
30 %

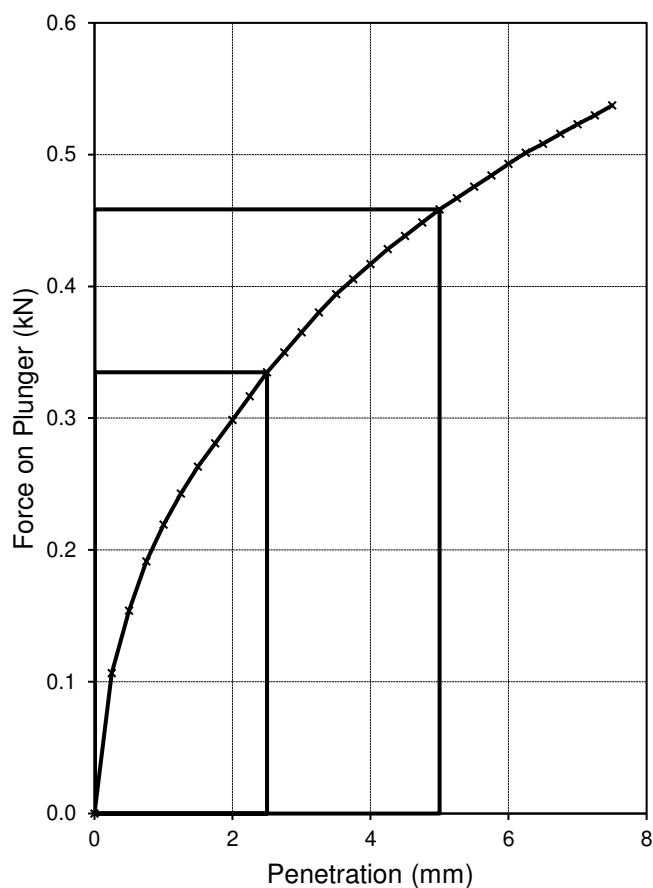
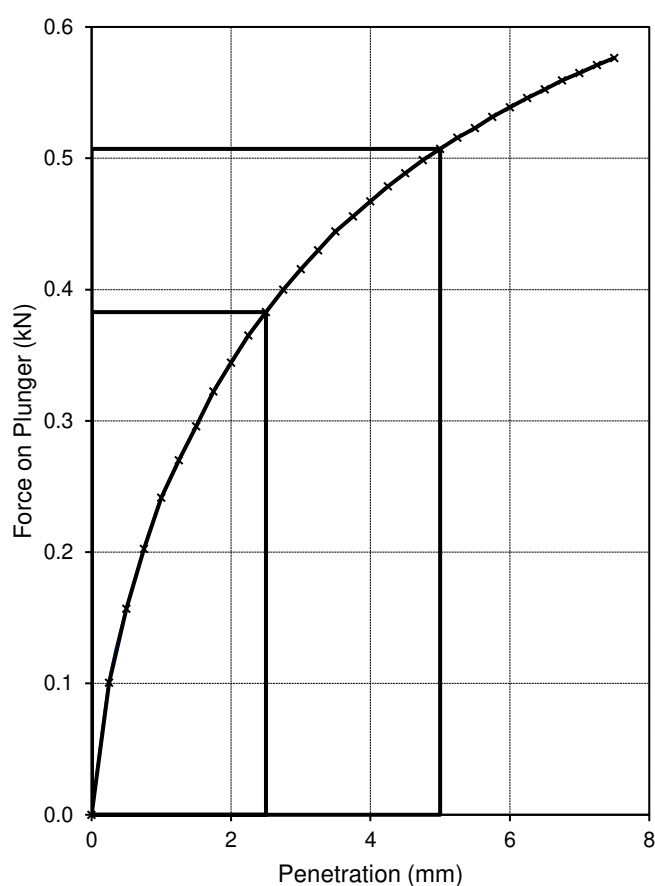
Base

9.0 kg
10 N
30 %

CBR Value

2.5 %

2.9 %

Top of Specimen**Base of Specimen**

Tested by ME
Checked and Approved by

S Burke

S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**

GEOLABS



CALIFORNIA BEARING RATIO

Location TP6
Depth (m) 0.60
Sample Type B

Description:

Orangish brown mottled brown very slightly gravelly silty CLAY with rare roots.

PREPARATION DETAILS

The specimen was soaked for 4 days, after which swelling equilibrium had been reached with 0.2 % vertical swell.

The specimen was prepared at the as received water content of 27%

The specimen was prepared by dynamic compaction using a 2.5 kg rammer

Soaked specimen bulk density 1.95 Mg/m³ (1.95 Mg/m³ before soaking)

Soaked specimen dry density 1.53 Mg/m³ (1.53 Mg/m³ before soaking)

0.3 % of the sample was retained on a 20mm sieve

Test Details

Surcharge
Seating load
Water content

Top

9.0 kg
10 N
28 %

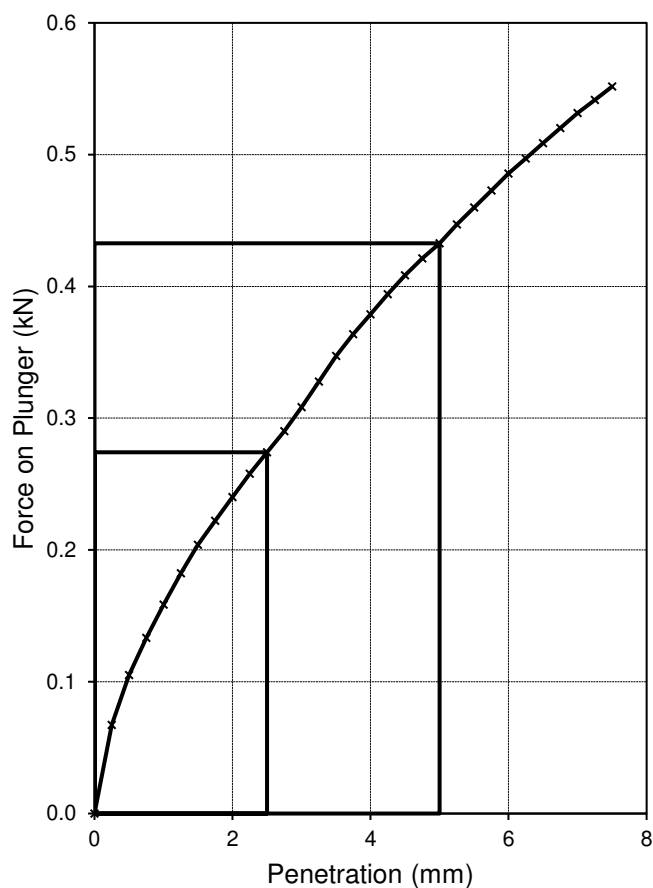
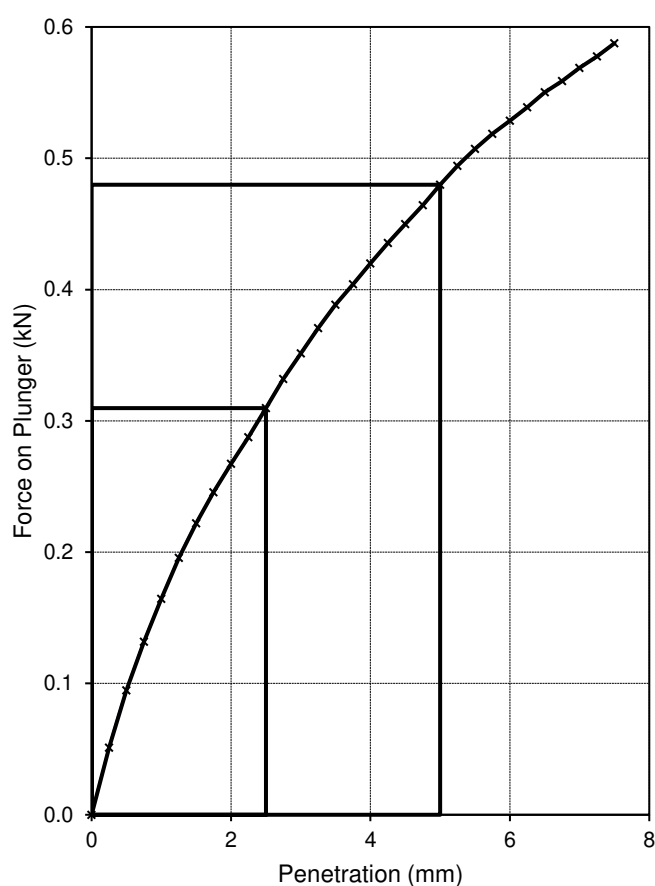
Base

9.0 kg
10 N
27 %

CBR Value

2.2 %

2.4 %

Top of Specimen**Base of Specimen**

Tested by ME
Checked and Approved by

S Burke

S Burke - Senior Technician
06/03/2023

Project Number:

GEO / 37433

Project Name:

**LAND OFF HANLYE LANE, CUCKFIELD
LP3210**

GEOLABS



APPENDIX K – Geoenvironmental Analytical Laboratory Certificates

Geoenvironmental
Analytical Laboratory
Certificates



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info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 23-46242

Issue: 1

Date of Issue: 10/02/2023

Contact: Sophie Shafi-Cooke

Customer Details: Leap Environmental Ltd
Book House
Glebelands Centre
Dorking
Surrey RH4 3HW

Quotation No: Q22-03403

Order No: LPO7077

Customer Reference: LP2310

Date Received: 26/01/2023

Date Approved: 10/02/2023

Details: Hanlye Lane, Cuckfield

Approved by:

Tim Reeve, Quality Officer

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

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Sample Summary

Report No.: 23-46242, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
309619	TP1	24/01/2023	27/01/2023	Silty loam	
309620	TP3 0.20	24/01/2023	27/01/2023	Silty loam	
309621	TP4 0.20	24/01/2023	27/01/2023	Silty loam	
309622	TP5 0.20	25/01/2023	27/01/2023	Silty loam	
309623	TP6 0.20	25/01/2023	27/01/2023	Silty loam	
309624	TP7 0.20	25/01/2023	27/01/2023	Silty loam	
309625	TP9 0.20	24/01/2023	27/01/2023		
309626	TP10 0.20	24/01/2023	27/01/2023	Silty loam	
309627	WS2 0.50	24/01/2023	27/01/2023	Silty loam	
309628	WS6 0.40	24/01/2023	27/01/2023	Silty loam	
309629	WS1 0.50	24/01/2023	27/01/2023	Silty loam	
309630	WS1 0.20	24/01/2023	27/01/2023		
309631	WS3 0.20	24/01/2023	27/01/2023		
309632	WS4 0.10	24/01/2023	27/01/2023		
309633	WS5 0.20	24/01/2023	27/01/2023		
309634	WS5 0.50	24/01/2023	27/01/2023		
309635	? 0.50	Not Provided	27/01/2023		a
309636	TP 0.20	24/01/2023	27/01/2023		

Results Summary

Report No.: 23-46242, issue number 1

ELAB Reference				309619	309620	309621	309622	309623
Customer Reference								
Sample ID								
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				TP1	TP3	TP4	TP5	TP6
Sample Depth (m)					0.20	0.20	0.20	0.20
Sampling Date				24/01/2023	24/01/2023	24/01/2023	25/01/2023	25/01/2023
Determinand	Codes	Units	LOD					
Soil sample preparation parameters								
Moisture Content	N	%	0.1	n/t	16.7	18.6	23.3	26.1
Material removed	N	%	0.1	n/t	< 0.1	7.5	6.0	9.1
Description of Inert material removed	N		0	n/t	None	Stones	Stones	Stones/Brick
Metals								
Arsenic	M	mg/kg	1	n/t	5.8	6.8	8.0	7.0
Cadmium	M	mg/kg	0.5	n/t	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	n/t	12.1	16.8	20.6	20.5
Copper	M	mg/kg	5	n/t	30.4	17.4	17.6	21.1
Lead	M	mg/kg	5	n/t	44.7	28.6	33.8	74.3
Mercury	M	mg/kg	0.5	n/t	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	n/t	7.4	10.4	12.3	10.5
Selenium	M	mg/kg	1	n/t	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	n/t	62.7	39.6	45.8	44.9
Inorganics								
Hexavalent Chromium	N	mg/kg	0.8	n/t	< 0.8	< 0.8	< 0.8	< 0.8
Miscellaneous								
pH	M	pH units	0.1	n/t	7.0	6.2	6.1	6.1
Total Organic Carbon	N	%	0.01	n/t	2.4	1.5	2.4	2.0
Polyaromatic hydrocarbons								
Naphthalene	MS	mg/kg	0.02	n/t	0.06	< 0.02	< 0.02	< 0.02
Acenaphthylene	MS	mg/kg	0.02	n/t	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	MS	mg/kg	0.02	n/t	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	US	mg/kg	0.02	n/t	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	MS	mg/kg	0.02	n/t	0.32	< 0.02	< 0.02	< 0.02
Anthracene	US	mg/kg	0.02	n/t	0.05	< 0.02	< 0.02	< 0.02
Fluoranthene	MS	mg/kg	0.02	n/t	1.04	0.16	< 0.02	0.08
Pyrene	MS	mg/kg	0.02	n/t	0.77	0.13	< 0.02	0.07
Benzo(a)anthracene	US	mg/kg	0.02	n/t	0.46	0.08	< 0.02	0.05
Chrysene	MS	mg/kg	0.02	n/t	0.46	0.10	< 0.03	< 0.03
Benzo(b)fluoranthene	MS	mg/kg	0.02	n/t	0.41	0.07	< 0.02	< 0.02
Benzo(k)fluoranthene	MS	mg/kg	0.03	n/t	0.27	0.04	< 0.03	< 0.03
Benzo(a)pyrene	US	mg/kg	0.02	n/t	0.27	0.09	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	MS	mg/kg	0.02	n/t	0.22	0.06	< 0.02	< 0.02
Dibenzo(a,h)anthracene	MS	mg/kg	0.02	n/t	0.06	< 0.02	< 0.02	< 0.02
Benzo[g,h,i]perylene	MS	mg/kg	0.02	n/t	0.21	0.05	< 0.02	< 0.02
Total PAH(16)	NS	mg/kg	0.34	n/t	4.61	0.79	< 0.34	< 0.34

Results Summary

Report No.: 23-46242, issue number 1

ELAB Reference				309619	309620	309621	309622	309623
Customer Reference								
Sample ID								
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				TP1	TP3	TP4	TP5	TP6
Sample Depth (m)					0.20	0.20	0.20	0.20
Sampling Date				24/01/2023	24/01/2023	24/01/2023	25/01/2023	25/01/2023
Determinand	Codes	Units	LOD					
OrganoChlorine Pesticides								
alpha-HCH	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
beta_HCH	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
gamma-HCH	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
delta-HCH	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Heptachlor	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Aldrin	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Heptachlor expoxide	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
trans-Chlordane	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
alpha cis-Chlordane	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
p,p-DDE	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Dieldrin	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Endrin	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
p,p-DDD	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Endosulfan II	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Endrin aldehyde	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
p,p-DDT	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Endosulphan sulphate	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Methoxychlor	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
Endrin ketone	N	ug/kg	10	< 10	< 10	n/t	n/t	n/t
OrganoPhosphorus Pesticides								
Acephate	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Aziniphos-methyl	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Chlorpyrifos	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Demeton-s-methyl	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Dichlorvos	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Dimethoate	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Ethion	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Malathion	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Mathidathion	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Methamidophos	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Omethoate	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Pirimifos-methyl	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Profenofos	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Pyrazophos	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Tokuthion	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t
Tolclofos-methyl	N	ug/kg	100	< 100	< 100	n/t	n/t	n/t

Results Summary

Report No.: 23-46242, issue number 1

ELAB Reference				309624	309626	309627	309628	309629
Customer Reference								
Sample ID								
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				TP7	TP10	WS2	WS6	WS1
Sample Depth (m)				0.20	0.20	0.50	0.40	0.50
Sampling Date				25/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Determinand	Codes	Units	LOD					
Soil sample preparation parameters								
Moisture Content	N	%	0.1	17.2	19.6	20.9	16.1	14.7
Material removed	N	%	0.1	12.3	13.6	7.9	6.1	8.9
Description of Inert material removed	N		0	Stones	Stones	Stones	Stones	Stones
Metals								
Arsenic	M	mg/kg	1	8.0	7.5	7.0	9.7	2.5
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	12.8	16.8	18.8	16.7	7.3
Copper	M	mg/kg	5	34.4	18.0	19.5	16.9	7.1
Lead	M	mg/kg	5	43.2	84.2	29.2	26.4	6.4
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	8.7	11.7	12.5	10.4	< 5.0
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	50.8	42.8	38.8	43.2	14.5
Inorganics								
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Miscellaneous								
pH	M	pH units	0.1	6.6	6.8	6.6	7.1	6.7
Total Organic Carbon	N	%	0.01	2.4	1.3	1.4	0.45	0.51
Polyaromatic hydrocarbons								
Naphthalene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	US	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	MS	mg/kg	0.02	0.04	< 0.02	< 0.02	< 0.02	< 0.02
Anthracene	US	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	MS	mg/kg	0.02	0.13	0.07	< 0.02	< 0.02	< 0.02
Pyrene	MS	mg/kg	0.02	0.11	0.05	< 0.02	< 0.02	< 0.02
Benzo(a)anthracene	US	mg/kg	0.02	0.07	0.04	< 0.02	< 0.02	< 0.02
Chrysene	MS	mg/kg	0.02	0.06	0.04	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	MS	mg/kg	0.02	< 0.02	0.04	< 0.02	< 0.02	< 0.02
Benzo(k)fluoranthene	MS	mg/kg	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	US	mg/kg	0.02	< 0.02	0.04	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dibenzo(a,h)anthracene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo(g,h,i)perylene	MS	mg/kg	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total PAH(16)	NS	mg/kg	0.34	< 0.34	< 0.34	< 0.34	< 0.34	< 0.34

Results Summary

Report No.: 23-46242, issue number 1

ELAB Reference				309624	309626	309627	309628	309629
Customer Reference								
Sample ID								
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				TP7	TP10	WS2	WS6	WS1
Sample Depth (m)				0.20	0.20	0.50	0.40	0.50
Sampling Date				25/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Determinand	Codes	Units	LOD					
OrganoChlorine Pesticides								
alpha-HCH	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
beta_HCH	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
gamma-HCH	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
delta-HCH	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Heptachlor	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Aldrin	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Heptachlor expoxide	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
trans-Chlordane	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
alpha cis-Chlordane	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
p,p-DDE	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Dieldrin	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Endrin	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
p,p-DDD	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Endosulfan II	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Endrin aldehyde	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
p,p-DDT	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Endosulphan sulphate	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Methoxychlor	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
Endrin ketone	N	ug/kg	10	< 10	n/t	n/t	n/t	n/t
OrganoPhosphorus Pesticides								
Acephate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Aziniphos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Chlorpyrifos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Demeton-s-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Dichlorvos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Dimethoate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Ethion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Malathion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Mathidathion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Methamidophos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Omethoate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Pirimifos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Profenofos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Pyrazophos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Tokuthion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t
Tolclofos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t



Results Summary

Report No.: 23-46242, issue number 1

ELAB Reference	309619	309620	309624
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	TP1	TP3	TP7
Sample Depth (m)		0.20	0.20
Sampling Date	24/01/2023	24/01/2023	25/01/2023

Determinand	Codes	Units	LOD			
SVOCTIC						
Triazine herbicides	N	mg/kg	0.01	<0.01	<0.01	<0.01
TIC						



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 23-46242, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
309620	0.20	TP3	Brown Soil, Stones, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309621	0.20	TP4	Brown Soil, Stones, Clinker, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309622	0.20	TP5	Brown Soil, Stones, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309623	0.20	TP6	Brown Soil, Stones, Clinker, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309624	0.20	TP7	Brown Soil, Stones, Clinker, Plastic, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309626	0.20	TP10	Brown Soil, Stones, Clinker, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309627	0.50	WS2	Brown Soil, Stones, Clinker	No asbestos detected	n/t	n/t	n/t	n/t
309628	0.40	WS6	Brown Soil, Stones, Clinker, Organics	No asbestos detected	n/t	n/t	n/t	n/t
309629	0.50	WS1	Brown Soil, Stones, Clinker, Organics	No asbestos detected	n/t	n/t	n/t	n/t



Method Summary

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Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	31/01/2023	110	Colorimetry
pH	M	Air dried sample	01/02/2023	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	31/01/2023	118	ICPMS
SVOC in solids	N	As submitted sample	07/02/2023	167	GC-MS
Organochlorine Pesticides in solids	N	As submitted sample	07/02/2023	173	GC-MS
Organophosphorus Pesticides in solids	N	As submitted sample	07/02/2023	173	GC-MS
Total organic carbon/Total sulphur	N	Air dried sample	01/02/2023	210	IR
Asbestos identification	U	Air dried sample	02/02/2023	281	Microscopy

Tests marked N are not UKAS accredited

Report Information

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Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

LOD LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the sample received.
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request
Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

APPENDIX L – Approach to the Selection of Generic Assessment Criteria

Approach to the
Selection of Generic
Assessment Criteria

LEAP APPROACH TO THE SELECTION OF GENERIC ASSESSMENT CRITERIA

Chronic Risks to Human Health

Defra and the EA have published a limited number of Soil Guideline Values (SGVs)²⁰ that represent minimal chronic risk to human health. CL:AIRE has published a limited number of Category Four Screening Levels (C4SLs)²¹ which represent a low but still strongly precautionary level of chronic risk to human health. Both the SGVs and C4SLs have both been derived for a Soil Organic Matter (SOM) content of 6%, which is not always representative of the low SOM that are encountered within Made Ground on brownfield sites.

Land Quality Management Ltd. (LQM) responded to the demand for a more comprehensive set of screening values and for a wider range of SOM by producing Suitable for Use Levels (S4ULs)²² which are a hybrid of SGVs and C4SLs. The S4ULs have been endorsed by the Chartered Institute of Environmental Health (CIEH).

A smaller set of 35 GACs was published by CL:AIRE in association with AGS and EIC in 2010. These were based on the exposure scenarios that were used to derive the SGVs. These exposure scenarios have since been superseded, in part, by the publication of the C4SLs and the S4ULs. A second phase of C4SLs is currently under development.

LEAP uses C4SLs where they are available as generic assessment criteria to quantitatively assess the potential chronic risks to human health. Where C4SLs are not available, the S4ULs or CL:AIRE GACs are used. It is noted that S4ULs are not equivalent to C4SLs in all their exposure assumptions but are generally more conservative. To ensure the greatest possible consistency in LEAP's human health GQRAs, the physicochemical and toxicological input parameters that were used to derive the CL:AIRE GACs have been re-modelled using the exposure parameters selected by LQM to derive the S4ULs.

For the organic compounds benzene and benzo(a)pyrene for which C4SLs are available for a SOM of 6% only, LEAP has calculated equivalent C4SLs for 1% and 2.5% SOM. SOM does not affect the inorganic contaminants.

²⁰ Environment Agency Science Report SC050021 series.

²¹ CL:AIRE Final Project Report. 'SPI010 – Development of Category 4 Screening Levels for assessment of land affected by contamination'. CL:AIRE, December 2013

²² 'The LQM/CIEH S4ULs for Human Health Risk Assessment', Nathaniel P et al, 2015. Copyright Land Quality Management Ltd, reproduced with permission: Publication Number S4UL3509.

In accordance with current Public Health England (PHE) guidance²³, LEAP carries out the assessment of PAHs using a surrogate marker approach, whereby the assessment of risk from benzo(a)pyrene also captures potential risks from other carcinogenic PAHs that may be present. The alternative S4ULs for PAHs using the Toxic Equivalent Factor (TEF) approach are not used because this approach is likely to under predict the true carcinogenicity of PAHs and is not advocated by PHE. The threshold PAHs have been assessed similarly, by using naphthalene as a marker compound due to its high volatility relative to other PAHs.

Total phenols are assessed by LEAP against the S4UL for phenol and total chromium is assessed against the S4UL for trivalent chromium.

LEAP does not consider the theoretical soil saturations in the evaluation of organic compounds and as such, some of the S4ULs for the less sensitive exposure scenarios are lower than their more sensitive equivalents.

Risks to human health from inhalation of vapours derived from groundwater are evaluated by LEAP using the SoBRA groundwater GAC_{gwwap} ²⁴.

Acute Risks to Human Health

Cyanide has not been modelled using CLEA because it has high acute toxicity and CLEA is designed to evaluate chronic risks. Assuming an acute risk and based on a single dose of 3 g of soil, an assessment criterion of 33 mgkg⁻¹ free inorganic cyanide and 544 mgkg⁻¹ complex cyanide has been calculated by LEAP. At this stage LEAP has chosen to adopt a conservative screening value of 20 mgkg⁻¹ for total cyanide (essentially the sum of free and complex cyanides) to highlight any potential risks to human health.

Risks to Controlled Waters

RTM (2006)²⁵ requires receptor-specific Water Quality Standards (WQS) to be used to determine potentially unacceptable risks to water bodies in England and Wales. It requires appropriate criteria to be taken from a hierarchy of sources, where they are available as follows:

²³ HPA 'Contaminated Land Information Sheet. Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)'. Public Health England, 2017.

²⁴ Society of Brownfield Risk Assessment (SoBRA) 'Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater' Version 1.0. February 2017.

²⁵ EA 'Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination' 2006.

1. UK published values
2. EU published values
3. WHO published values

Drinking Water Resources

For groundwater and surface waters that are abstracted for potable supply LEAP uses:

- UK Drinking Water Quality Standards (DWS) from *The Water Supply (Water Quality) Regulations 2016* (England).
- *The Water Supply (Water Quality) Regulations 2010* (Wales) as amended in 2016.
- World Health Organisation *Guidelines for Drinking Water Quality*, Fourth Edition, Volume 1, (2011).

■ Where the groundwater is not abstracted for potable supply, this is a precautionary approach which protects the potential future exploitation of the groundwater.

Surface Water (Ecological) Receptors

For surface waters as ecological receptors, LEAP uses the Environmental Quality Standards (EQS) from *The Water Framework Directive (Standards and Classification) Directions* (England and Wales) 2015. There are no appropriate EU or WHO standards available.

Petroleum Hydrocarbons

■ There are no current UK standards available for petroleum hydrocarbons, either for groundwater or surface water receptors, so an initial assessment criterion of 10µg/l, based on the former target concentration for dissolved or emulsified hydrocarbons, is used to represent a conservative preliminary screening value for total petroleum hydrocarbons.

■ Where considered appropriate, LEAP then follows the guidance of CL:AIRE 2017²⁶ for the further assessment of the petroleum hydrocarbon fractions and derivatives. For a drinking water resource, the WHO guidelines are used. For surface waters as ecological receptors, proxy compounds are used to select appropriate EQS based on recommended indicator compounds, as follows:

- Aromatic EC5-EC7 – benzene
- Aromatic >EC7-EC8 – toluene

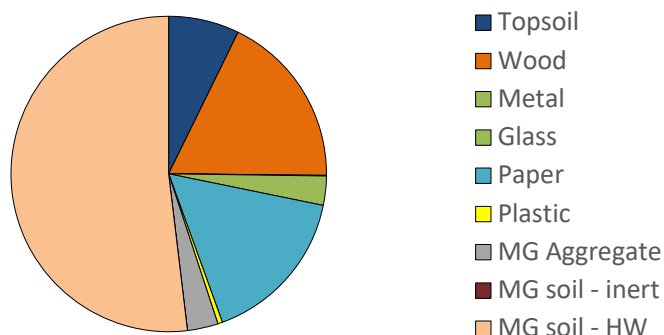
²⁶ CL:AIRE, 2017. 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies'. CL:AIRE, London. ISBN 978-1-905046-31-7.

- Aromatic >EC8-EC10 – ethylbenzene
- Aromatic >EC10-EC12 – naphthalene
- Aromatic >EC12-EC16 – no proxy
- Aromatic >EC16-EC21 – anthracene
- Aromatic >EC21-EC35 – benzo(a)pyrene

APPENDIX M – Carbon Assessment of Remediation

Remediation Option	1	2	3
Summary	1m cover on landfill area	Excavate 0.5m and 1m cover in landfill area	Excavate 1m with 1m cover in landfill area

The base option is for all excavated material to be sent to landfill. Based upon this – the relative carbon footprint of this landfilled material is:



The relative carbon footprint of the remediation options 1-3 are shown below. Reusing material onsite or processing leads to considerable savings in the carbon footprint of the remediation options as shown in options 2b and 3b. Maximum savings are made by focusing on preventing material with a high carbon footprint being sent to landfill. Carbon savings are made if the material is processed leading to a net reduction in carbon emitted.

