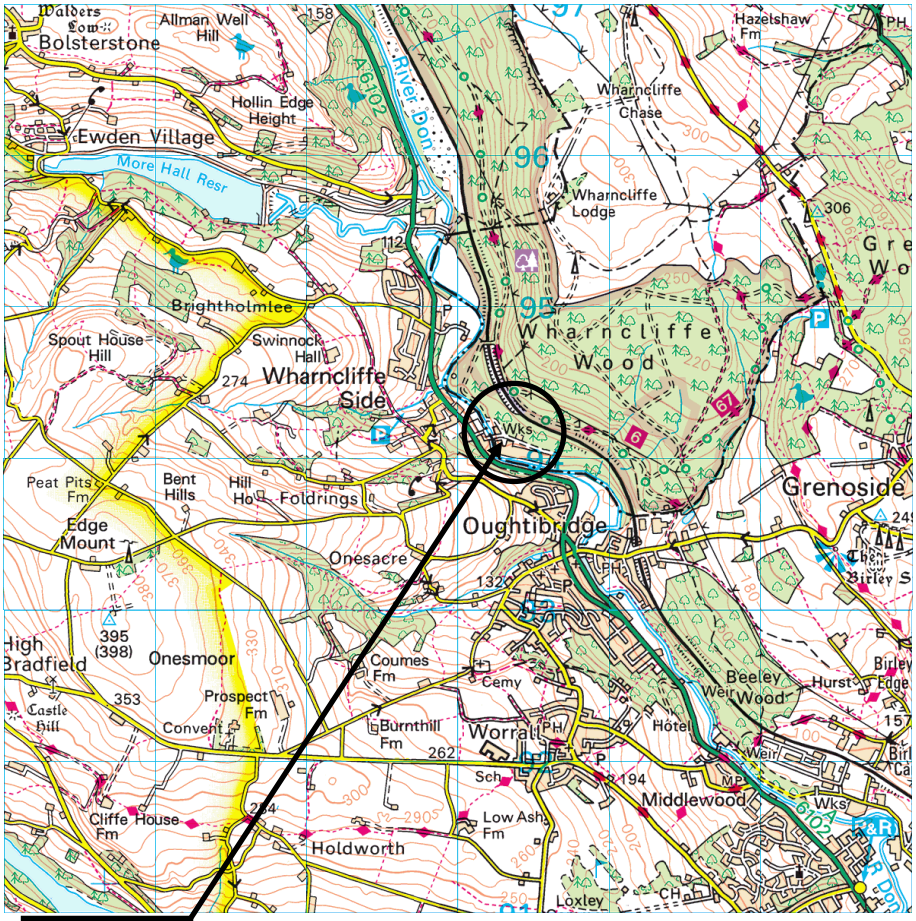
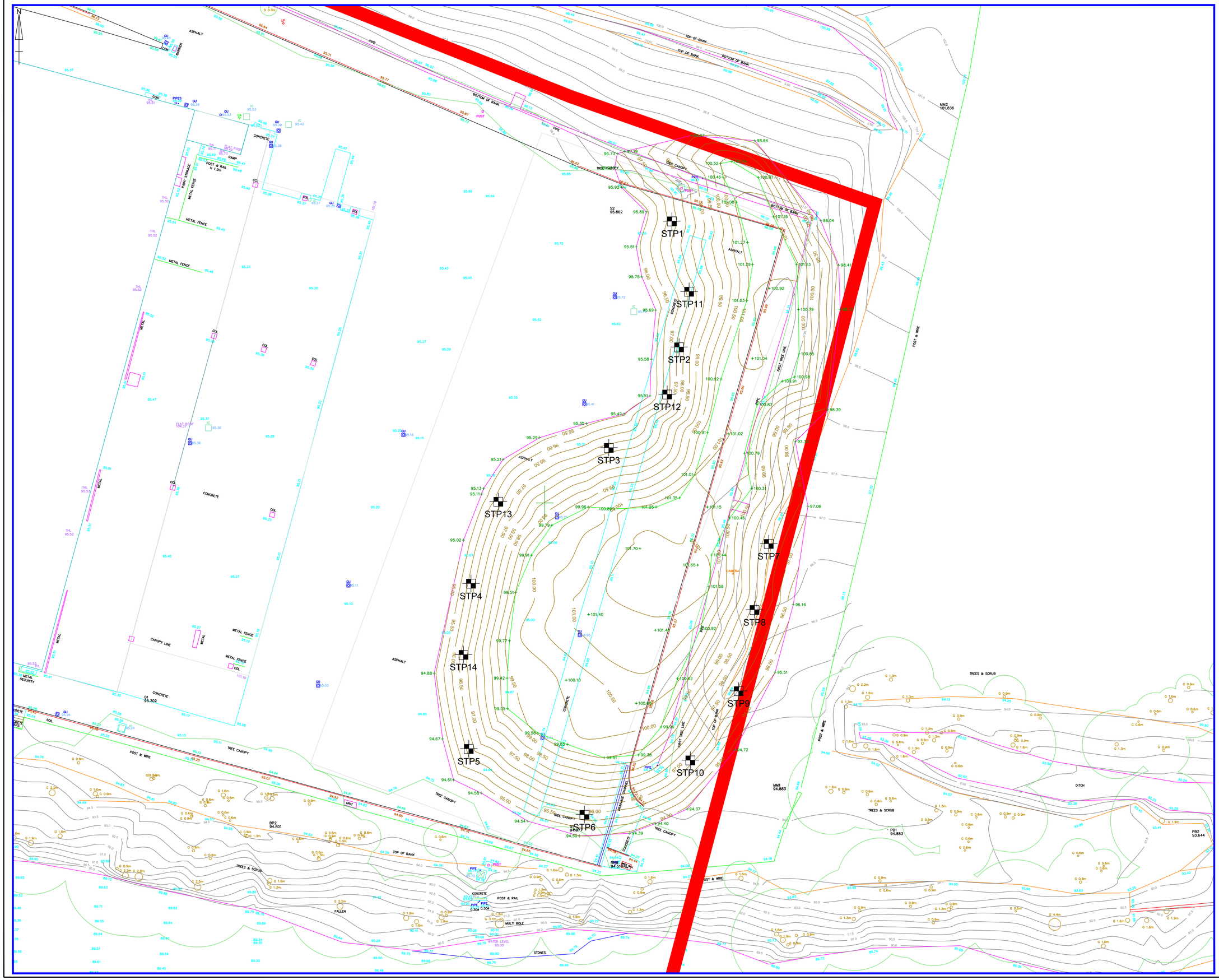
Site Location Plan

Contract Number	**C6485E**
Contract	**Oughtibridge Mill**
Client	**CEG**



Scale	**1:50,000**		
Drawn by	**SH**	**Approved**	**JF**
Drawing Number	**C6485E/01**		



NOTES

Trial Pit Location

REVISION

0	For Information
A	>>
B	>>
C	>>
D	>>

SIRIUS GEOTECHNICAL
ENVIRONMENTAL
4245 Park Approach,
Thorpe Park,
Leeds
LS15 8GB
www.thesiriusgroup.com
TEL: 0113 264 9960
FAX: 0113 264 9962

CLIENT

CEG

SITE

Oughtibridge Mill

DRAWING TITLE

Approximate Area of Stockpile Investigation

DRAWING NO.	REVISION NO.
C6485E-02	0
DRAWN BY: SM	APPROVED BY: GH
DATE: March 2017	SCALE: 1:200
	PAPER SIZE: A1

APPENDIX B

EXPLORATORY HOLE RECORDS

TRIAL PIT RECORD

TP No. **STP01**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
				MADE GROUND - Firm light grey very sandy, gravelly CLAY with low cobble and boulder content of brick and concrete. High plasticity (field description). Gravel is sub-angular to sub-rounded fine to coarse of brick, sandstone, tile and plastic.	0.30			
B 0.70 D 0.70 ES 0.70				MADE GROUND - Stiff red, orangish brown sandy gravelly CLAY. High plasticity. Gravel is angular to sub-angular fine to coarse of sandstone, limestone, brick and wood.				
			1	MADE GROUND - Firm blueish grey sandy gravelly CLAY. High plasticity (field description). Gravel is angular to sub-rounded fine to coarse of sandstone, limestone, brick, rebar and ash.	1.00			
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit stable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP01

TRIAL PIT RECORD

TP No. **STP02**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS				STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light brown sandy gravelly CLAY with low cobble and boulder content of brick and concrete. Low plasticity (field description). Gravel is angular to sub-rounded of brick, concrete, tile, paint fragments, wood and metal. Various other anthropogenic material including plastic and carpet.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit stable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP02

TRIAL PIT RECORD

TP No. **STP03**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Stiff light grey mottled orange sandy gravelly CLAY with low cobble content of brick. High plasticity. Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, asphalt and brick. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP03

TRIAL PIT RECORD

TP No. **STP04**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble content of brick. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, glass, plastic, asphalt and brick. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP04

TRIAL PIT RECORD

TP No. **STP05**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble content of brick. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, plastic, and brick. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP05

TRIAL PIT RECORD

TP No. **STP06**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble and boulder content of brick and concrete. High plasticity. Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, plastic, glass, brick and rebar. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP06

TRIAL PIT RECORD

TP No. **STP07**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble and boulder content of brick and concrete. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, possible slag, wood, plastic, brick and rebar. Frequent roots and rootlets throughout.				
				End of trial pit at 1.50m	1.50			

1
2
3
4

Remarks and Groundwater Observations

1. Trial pit excavated 2m into the side of the stockpile.
2. Trial pit complete on topsoil.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit stable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP07

TRIAL PIT RECORD

TP No. **STP08**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS				STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Stiff light grey mottled orange sandy gravelly CLAY with low cobble and boulder content of brick and concrete. High plasticity. Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, plastic and brick. Frequent roots and rootlets throughout.				
				End of trial pit at 1.50m	1.50			

1
2
3
4

Remarks and Groundwater Observations

1. Trial pit excavated 2m into the side of the stockpile.
2. Trial pit complete on topsoil.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit stable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP08

TRIAL PIT RECORD

TP No. **STP09**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble boulder content of brick and concrete. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, plastic, tile and brick. Frequent roots and rootlets throughout.				
				End of trial pit at 1.50m	1.50			

1
2
3
4

Remarks and Groundwater Observations

1. Trial pit excavated 2m into the side of the stockpile.
2. Trial pit complete on topsoil.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit stable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP09

TRIAL PIT RECORD

TP No. **STP10**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS				STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble content of brick. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, glass, asphalt and brick. Frequent roots and rootlets throughout.				
				End of trial pit at 1.80m	1.80			

1
2
3
4

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit complete on topsoil.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit stable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP10

TRIAL PIT RECORD

TP No. **STP11**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm dark grey mottled yellow sandy gravelly CLAY with low cobble content of brick. High plasticity (field description). Gravel is sub-angular to sub-rounded fine to coarse of sandstone, mudstone and rebar.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion.
4. Walls of the pit unstable.

GL (m AOD)
Easting:
Northing:

Fig No.
STP11

TRIAL PIT RECORD

TP No. **STP12**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with moderate cobble content of brick. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, tile and brick. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP12

TRIAL PIT RECORD

TP No. **STP13**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS | STRATA RECORD

Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange (dark grey in parts) sandy gravelly CLAY with low cobble content of brick. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, tile and brick. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP13

TRIAL PIT RECORD

TP No. **STP14**
Sheet 1 of 1

Site: Oughtibridge Mill
Contract No: C6485E

Client: CEG
Date: 07/02/2017

Method: JCB 3CX with 0.60m wide toothed bucket.
Scale: 1:25

Logged By: AW
Checked By: GH

SAMPLE DETAILS				STRATA RECORD				
Type	Depth From - To(m)	Vane Results kN/m2 {}{PID}	Ground -water	Description	Depth (m)	Level (m AOD) PID (ppm)	Legend	Backfill
B D ES	0.50 0.50 0.50			MADE GROUND - Firm light grey mottled orange sandy gravelly CLAY with low cobble content of brick and concrete. High plasticity (field description). Gravel is angular to sub-angular fine to coarse of sandstone, mudstone, wood, tile and brick. Frequent roots and rootlets throughout.				
			1					
			2	End of trial pit at 2.00m	2.00			
			3					
			4					

Remarks and Groundwater Observations

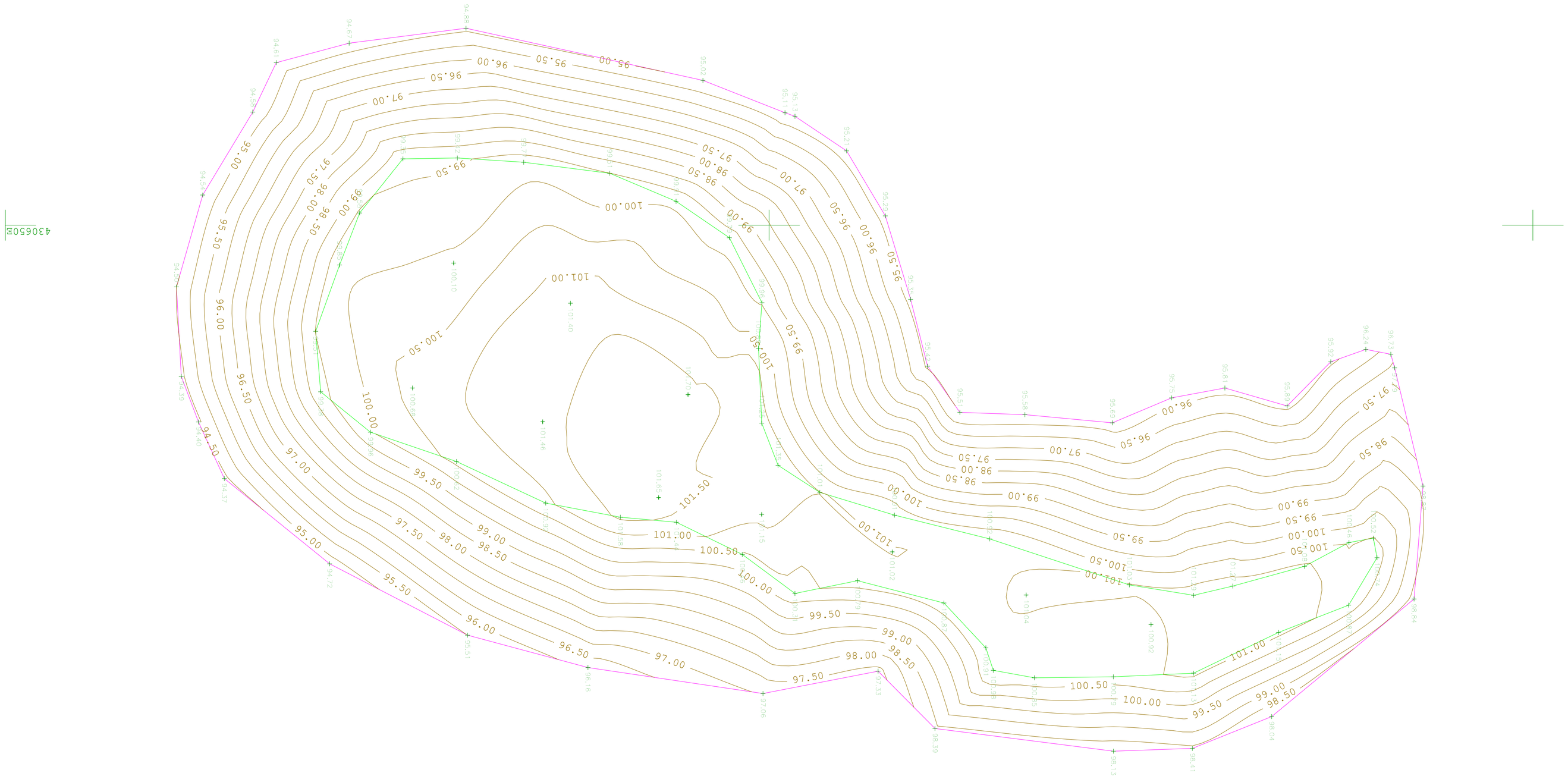
1. Trial pit excavated 3m into the side of the stockpile.
2. Trial pit terminated on asphalt hardstand.
3. Trial pit backfilled with arisings upon completion
4. Walls of the pit unstable and collapsing during excavation.

GL (m AOD)
Easting:
Northing:

Fig No.
STP14

APPENDIX C

STOCKPILE VOLUME CALCULATIONS


4306500E
4307000E
393900N
393950N
394000N

17_02_09 - 17_02_09

AREA AND VOLUME CALCULATION

Volume between current survey : 17_02_09 - 17_02_09
and other survey : EXISTING - EXISTING

Volumes by surface feature in the current survey :

Surface	Description	Cut area (m^2)	Cut volume (m^3)	Fill area (m^2)	Fill volume (m^3)	Total area (m^2)	Net volume (m^3)
None		9.884	-0.380	2354.393	8132.336	2364.278	8131.956
Grand total :		9.884	-0.380	2354.393	8132.336	2364.278	8131.956

Note : "FILL" when the CURRENT survey is above the OTHER. All areas are plan areas.

*** WARNING *** no volume determined for the following areas :

Other survey outside current : 166069.350

APPENDIX D

LABORATORY TEST RESULTS

Certificate of Analysis

Certificate Number	17-91410
	20-Feb-17
Client	Sirius Geotechnical & Environmental 4245 Park Approach Thorpe Park Leeds LS15 8GB
Our Reference	17-91410
Client Reference	C6485
Order No	C6485E/GH/14737
Contract Title	Oughtibridge Mill
Description	9 Soil samples.
Date Received	11-Feb-17
Date Started	11-Feb-17
Date Completed	20-Feb-17
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 17-91410
Client Ref C6485
Contract Title Oughtibridge Mill

Sample ID	Lab No	Completed	Matrix Description
STP-1	1125549	20/02/2017	Grey gravelly, sandy CLAY including odd rootlets
STP-2	1125550	20/02/2017	Dark brown gravelly, sandy CLAY including numerous rootlets (Made ground - brick, tile)
STP-5	1125551	20/02/2017	Brown gravelly, sandy CLAY (Made ground - brick)
STP-8	1125552	20/02/2017	Brown gravelly, sandy CLAY
STP-12	1125553	20/02/2017	Grey gravelly, sandy CLAY including odd rootlets (Made ground - brick)

Summary of Chemical Analysis
Soil Samples

Our Ref 17-91410
Client Ref C6485
Contract Title Oughtibridge Mill

			Lab No	1125549	1125550	1125551	1125552	1125553	1125554	1125555
			Sample ID	STP-1	STP-2	STP-5	STP-8	STP-12	STP-3	STP-7
			Depth							
			Other ID							
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	07/02/17	07/02/17	07/02/17	07/02/17	07/02/17	07/02/17	07/02/17
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	6.7	10	6.8	6.6	11		
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.5	0.5	4.1	0.6		
Chromium	DETSC 2301#	0.15	mg/kg	28	21	23	27	20		
Copper	DETSC 2301#	0.2	mg/kg	63	31	72	43	70		
Lead	DETSC 2301#	0.3	mg/kg	67	56	41	37	98		
Mercury	DETSC 2325#	0.05	mg/kg	0.06	0.09	0.06	0.06	0.14		
Nickel	DETSC 2301#	1	mg/kg	31	16	28	34	32		
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	< 0.5	0.6	0.7		
Zinc	DETSC 2301#	1	mg/kg	180	100	140	510	93		
Inorganics										
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.3	6.6	5.4	5.9	5.7		
pH	DETSC 2008#			9.8	8.9	8.6	8.7	9.8	8.7	8.7
Total Organic Carbon	DETSC 2002	0.1	%	1.1	1.8	1.1	1.1	1.7		
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	410	1600	160	190	120	110	750
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.2	1.2	0.09	0.06	0.13		
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5		
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2		
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5		
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4		
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10		
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9		
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	0.7		
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	3.3	< 0.6	< 0.6	< 0.6		
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	2.7	< 1.4	< 1.4	< 1.4		
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10		
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10		
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1	< 0.1		
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 17-91410
Client Ref C6485
Contract Title Oughtibridge Mill

			Lab No	1125549	1125550	1125551	1125552	1125553	1125554	1125555
			Sample ID	STP-1	STP-2	STP-5	STP-8	STP-12	STP-3	STP-7
			Depth							
			Other ID							
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	07/02/17	07/02/17	07/02/17	07/02/17	07/02/17	07/02/17	07/02/17
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	0.8	< 0.1	< 0.1	< 0.1		
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	0.9	< 0.1	< 0.1	< 0.1		
Phenanthrene	DETSC 3301	0.1	mg/kg	0.5	5.3	< 0.1	< 0.1	< 0.1		
Anthracene	DETSC 3301	0.1	mg/kg	0.1	1.3	< 0.1	< 0.1	< 0.1		
Fluoranthene	DETSC 3301	0.1	mg/kg	1	6.1	0.2	0.3	< 0.1		
Pyrene	DETSC 3301	0.1	mg/kg	1	5.2	0.3	0.2	< 0.1		
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.5	2.3	< 0.1	< 0.1	< 0.1		
Chrysene	DETSC 3301	0.1	mg/kg	0.3	2.5	< 0.1	< 0.1	< 0.1		
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.4	1.5	< 0.1	< 0.1	< 0.1		
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.5	1.1	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.6	2.2	< 0.1	< 0.1	< 0.1		
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.4	1.2	< 0.1	< 0.1	< 0.1		
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.3	1.3	< 0.1	< 0.1	< 0.1		
PAH Total	DETSC 3301	1.6	mg/kg	5.9	32	< 1.6	< 1.6	< 1.6		
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3		

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 17-91410
Client Ref C6485
Contract Title Oughtibridge Mill

			Lab No	1125556	1125557
			Sample ID	STP-10	STP-14
			Depth		
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	07/02/17	07/02/17
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg		
Cadmium	DETSC 2301#	0.1	mg/kg		
Chromium	DETSC 2301#	0.15	mg/kg		
Copper	DETSC 2301#	0.2	mg/kg		
Lead	DETSC 2301#	0.3	mg/kg		
Mercury	DETSC 2325#	0.05	mg/kg		
Nickel	DETSC 2301#	1	mg/kg		
Selenium	DETSC 2301#	0.5	mg/kg		
Zinc	DETSC 2301#	1	mg/kg		
Inorganics					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%		
pH	DETSC 2008#			8.6	6.9
Total Organic Carbon	DETSC 2002	0.1	%		
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	130	77
Sulphate as SO4, Total	DETSC 2321#	0.01	%		
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		
Aliphatic C5-C35	DETSC 3072*	10	mg/kg		
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		
Aromatic C5-C35	DETSC 3072*	10	mg/kg		
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg		
Benzene	DETSC 3321#	0.01	mg/kg		
Ethylbenzene	DETSC 3321#	0.01	mg/kg		
Toluene	DETSC 3321#	0.01	mg/kg		
Xylene	DETSC 3321#	0.01	mg/kg		
MTBE	DETSC 3321	0.01	mg/kg		
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg		
Acenaphthylene	DETSC 3301	0.1	mg/kg		

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 17-91410
Client Ref C6485
Contract Title Oughtibridge Mill

			Lab No	1125556	1125557
			Sample ID	STP-10	STP-14
			Depth		
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	07/02/17	07/02/17
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Acenaphthene	DETSC 3301	0.1	mg/kg		
Fluorene	DETSC 3301	0.1	mg/kg		
Phenanthrene	DETSC 3301	0.1	mg/kg		
Anthracene	DETSC 3301	0.1	mg/kg		
Fluoranthene	DETSC 3301	0.1	mg/kg		
Pyrene	DETSC 3301	0.1	mg/kg		
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg		
Chrysene	DETSC 3301	0.1	mg/kg		
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg		
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg		
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg		
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg		
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg		
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg		
PAH Total	DETSC 3301	1.6	mg/kg		
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg		

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 17-91410
Client Ref C6485
Contract Title Oughtibridge Mill

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1125549	STP-1	SOIL	NAD	none	Jeff Cruddas
1125550	STP-2	SOIL	NAD	none	Jeff Cruddas
1125551	STP-5	SOIL	NAD	none	Jeff Cruddas
1125552	STP-8	SOIL	NAD	none	Jeff Cruddas
1125553	STP-12	SOIL	NAD	none	Jeff Cruddas

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 17-91410
Client Ref C6485
Contract Oughtibridge Mill

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1125549	STP-1 SOIL	07/02/17	GJ 250ml, PT 1L		
1125550	STP-2 SOIL	07/02/17	GJ 250ml, PT 1L		
1125551	STP-5 SOIL	07/02/17	GJ 250ml, PT 1L		
1125552	STP-8 SOIL	07/02/17	GJ 250ml, PT 1L		
1125553	STP-12 SOIL	07/02/17	GJ 250ml, PT 1L		
1125554	STP-3 SOIL	07/02/17	GJ 250ml, PT 1L		
1125555	STP-7 SOIL	07/02/17	PT 1L		
1125556	STP-10 SOIL	07/02/17	PT 1L		
1125557	STP-14 SOIL	07/02/17	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

LABORATORY REPORT

4043

Contract Number: PSL17/0640

Report Date: 07 March 2017

Client's Reference: C6485E

Client Name: Sirius Leeds
4245 Park Approach
Century Way
Thorpe Park
Leeds
LS15 8GB

For the attention of: Gemma Halliday

Contract Title: Oughtibridge Mill, Sheffield

Date Received: 13/2/2017
Date Commenced: 13/2/2017
Date Completed: 7/3/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Royle (Senior Technician)	A Fry (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
STP-1		D/B	0.70		MADE GROUND brown mottled grey very gravelly sandy clay.
STP-3		D/B	0.50		MADE GROUND brown mottled grey very gravelly sandy clay.
STP-6		D/B	0.50		MADE GROUND brown mottled grey very gravelly sandy clay.
STP-8		D/B	0.50		MADE GROUND brown mottled grey very gravelly sandy clay.
STP-2		D/B	0.50		MADE GROUND brown very gravelly very sandy clay with some cobbles.
STP-13		D/B	0.50		MADE GROUND brown very gravelly very sandy CLAY.
STP-12		D/B	0.50		MADE GROUND brown very gravelly very sandy clay with some cobbles.
SPT-14		D/B	0.50		MADE GROUND brown very gravelly sandy CLAY.

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
STP-1		D/B	0.70		19			50	24	26	50	High plasticity CH.
STP-3		D/B	0.50		27			51	25	26	48	High plasticity CH.
STP-6		D/B	0.50		33			52	25	27	70	High plasticity CH.
STP-8		D/B	0.50		25			53	25	28	57	High plasticity CH.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:

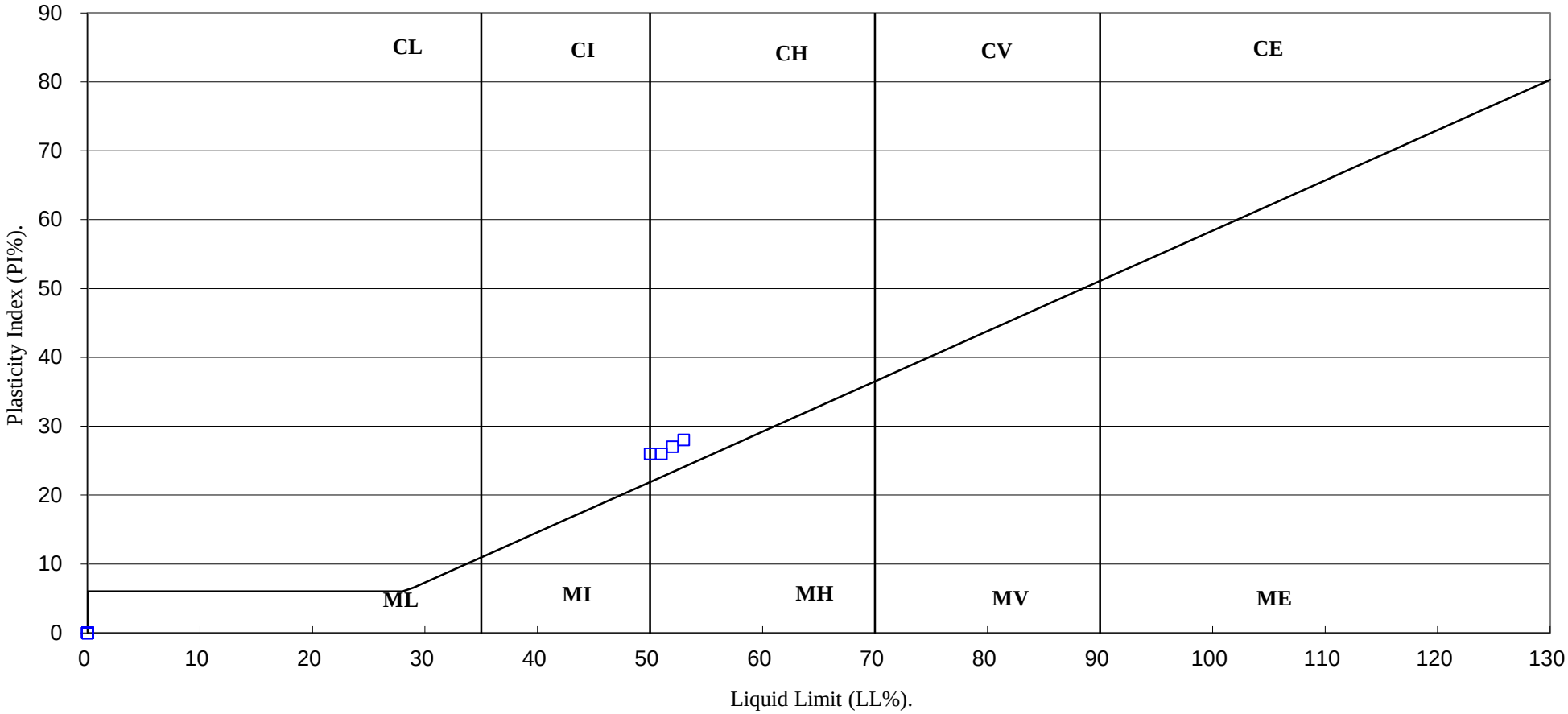
PSL17/0640

Client Ref:

C6485E

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Oughtibridge Mill, Sheffield**	**Contract No:**
			PSL17/0640
			Client Ref:
			C6485E

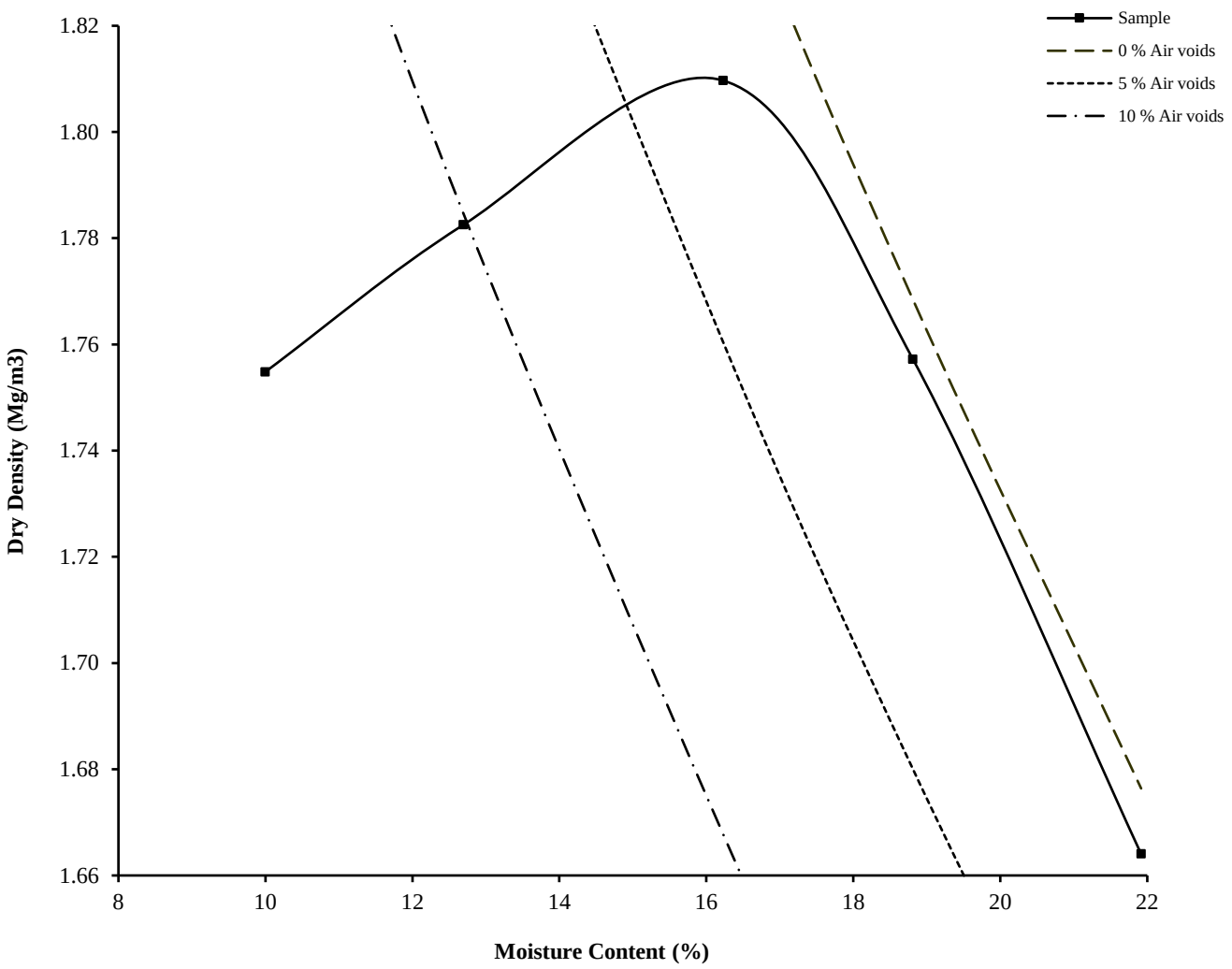
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: STP-1 **Top Depth (m) :** 0.70

Sample Number: **Base Depth (m) :**

Sample Type: D/B



Initial Moisture Content:		19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		8
Maximum Dry Density (Mg/m3):		1.81	Material Retained on 20.0 mm Test Sieve (%):		5
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Oughtibridge Mill, Sheffield**	**Contract** **PSL17/0640** **Client Ref** **C6485E**

PARTICLE SIZE DISTRIBUTION TEST

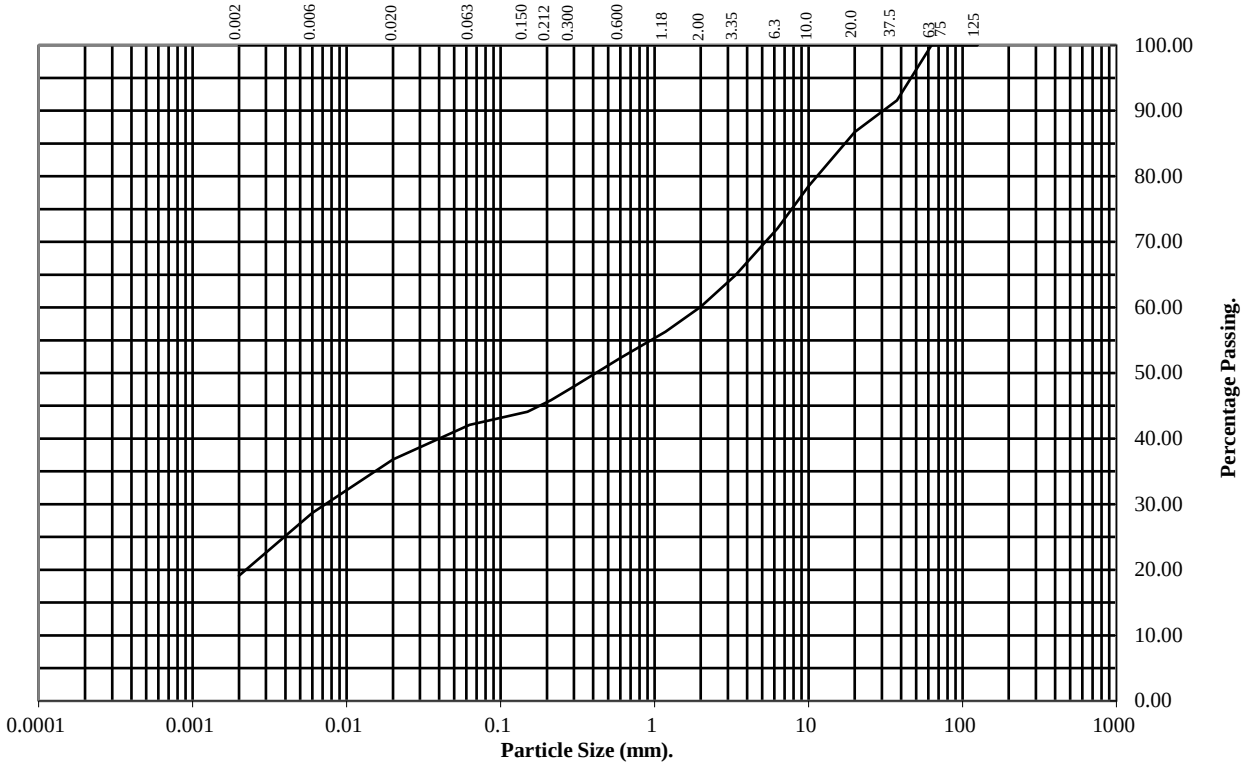
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **STP-1** **Top Depth (m):** **0.70**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	92
20	87
10	78
6.3	72
3.35	65
2	60
1.18	56
0.6	52
0.3	48
0.212	46
0.15	44
0.063	42

Particle Diameter	Percentage Passing
0.02	37
0.006	29
0.002	19

Soil Fraction	Total Percentage
Cobbles	0
Gravel	40
Sand	18
Silt	23
Clay	19

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

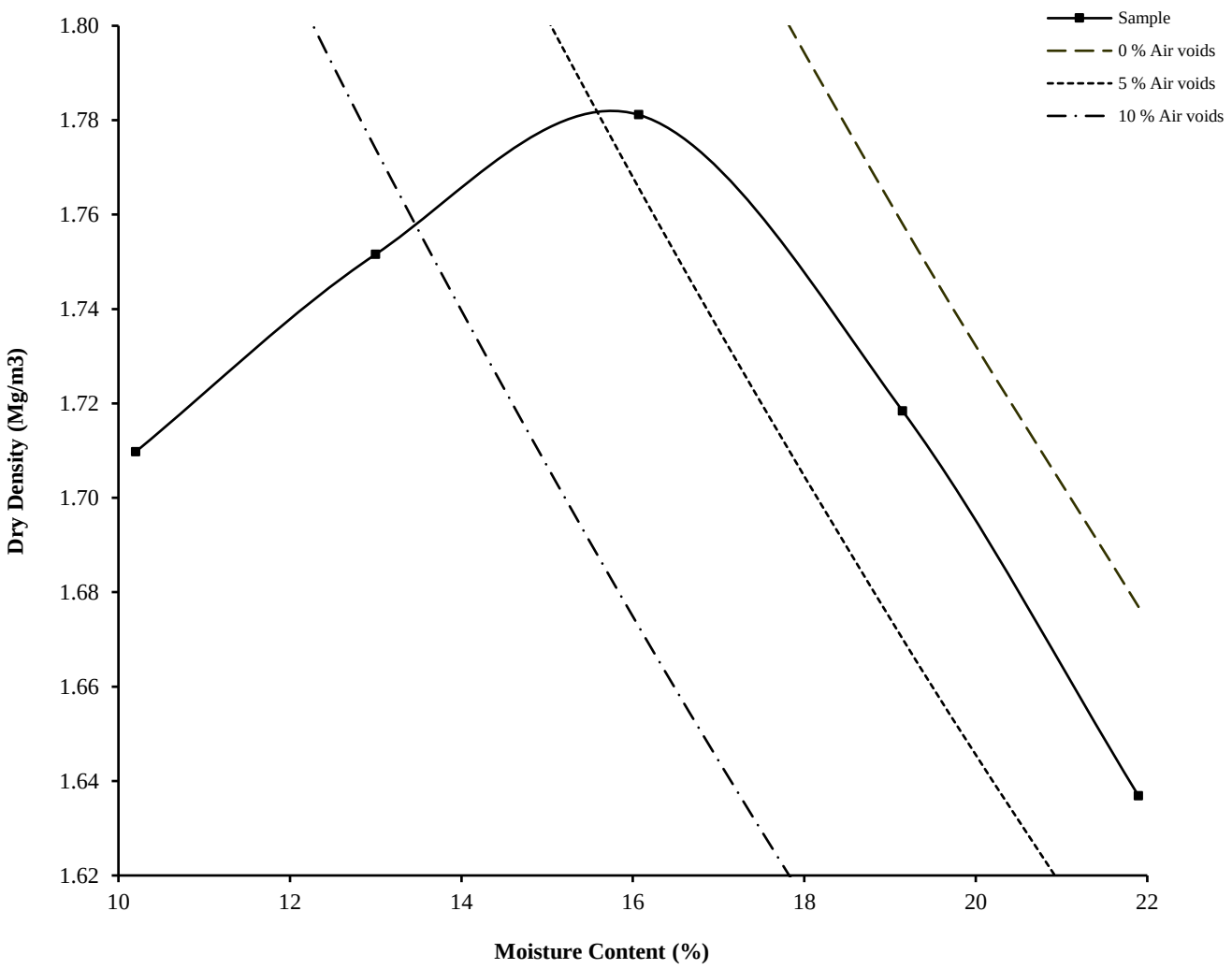
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: STP-2 **Top Depth (m) :** 0.50

Sample Number: **Base Depth (m) :**

Sample Type: D/B



Initial Moisture Content:		19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		9
Maximum Dry Density (Mg/m3):		1.78	Material Retained on 20.0 mm Test Sieve (%):		6
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions					

PARTICLE SIZE DISTRIBUTION TEST

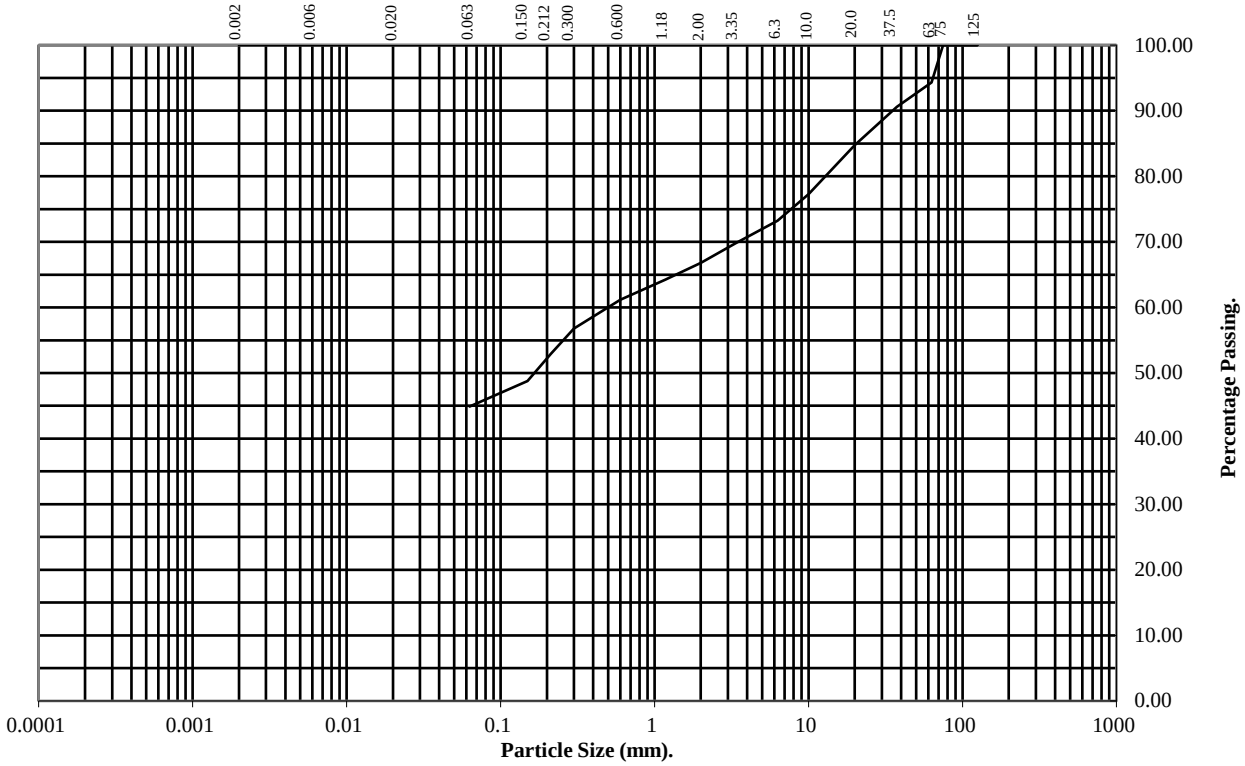
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **STP-2** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	94
37.5	91
20	85
10	77
6.3	73
3.35	70
2	67
1.18	64
0.6	61
0.3	57
0.212	53
0.15	49
0.063	45

Soil Fraction	Total Percentage
Cobbles	6
Gravel	27
Sand	22
Silt/Clay	45

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

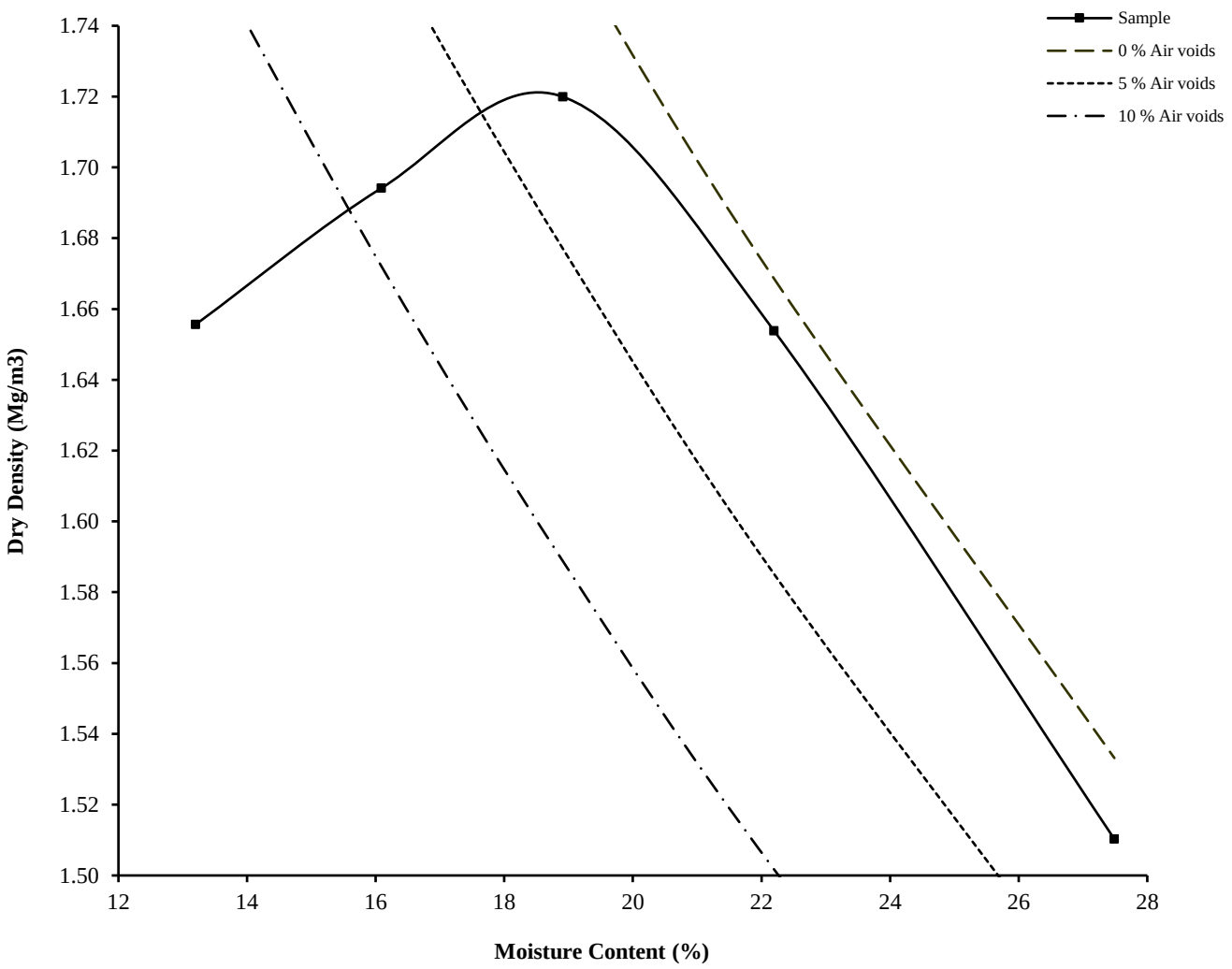
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: STP-3 **Top Depth (m) :** 0.50

Sample Number: **Base Depth (m) :**

Sample Type: D/B



Initial Moisture Content:		27	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		9
Maximum Dry Density (Mg/m3):		1.72	Material Retained on 20.0 mm Test Sieve (%):		8
Optimum Moisture Content (%):		19			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Oughtibridge Mill, Sheffield**	**Contract** **PSL17/0640** **Client Ref** **C6485E**

PARTICLE SIZE DISTRIBUTION TEST

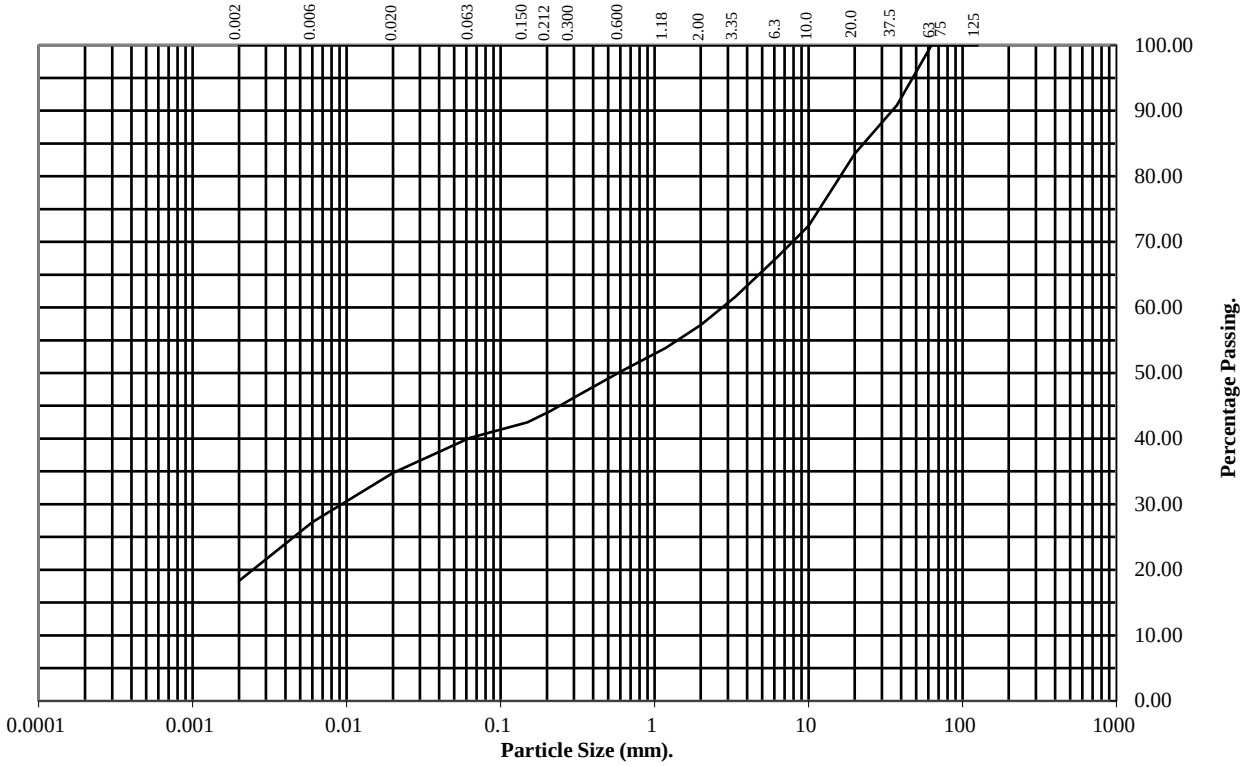
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **STP-3** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	91
20	83
10	72
6.3	68
3.35	62
2	57
1.18	54
0.6	50
0.3	46
0.212	44
0.15	42
0.063	40

Particle Diameter	Percentage Passing
0.02	35
0.006	27
0.002	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	43
Sand	17
Silt	22
Clay	18

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

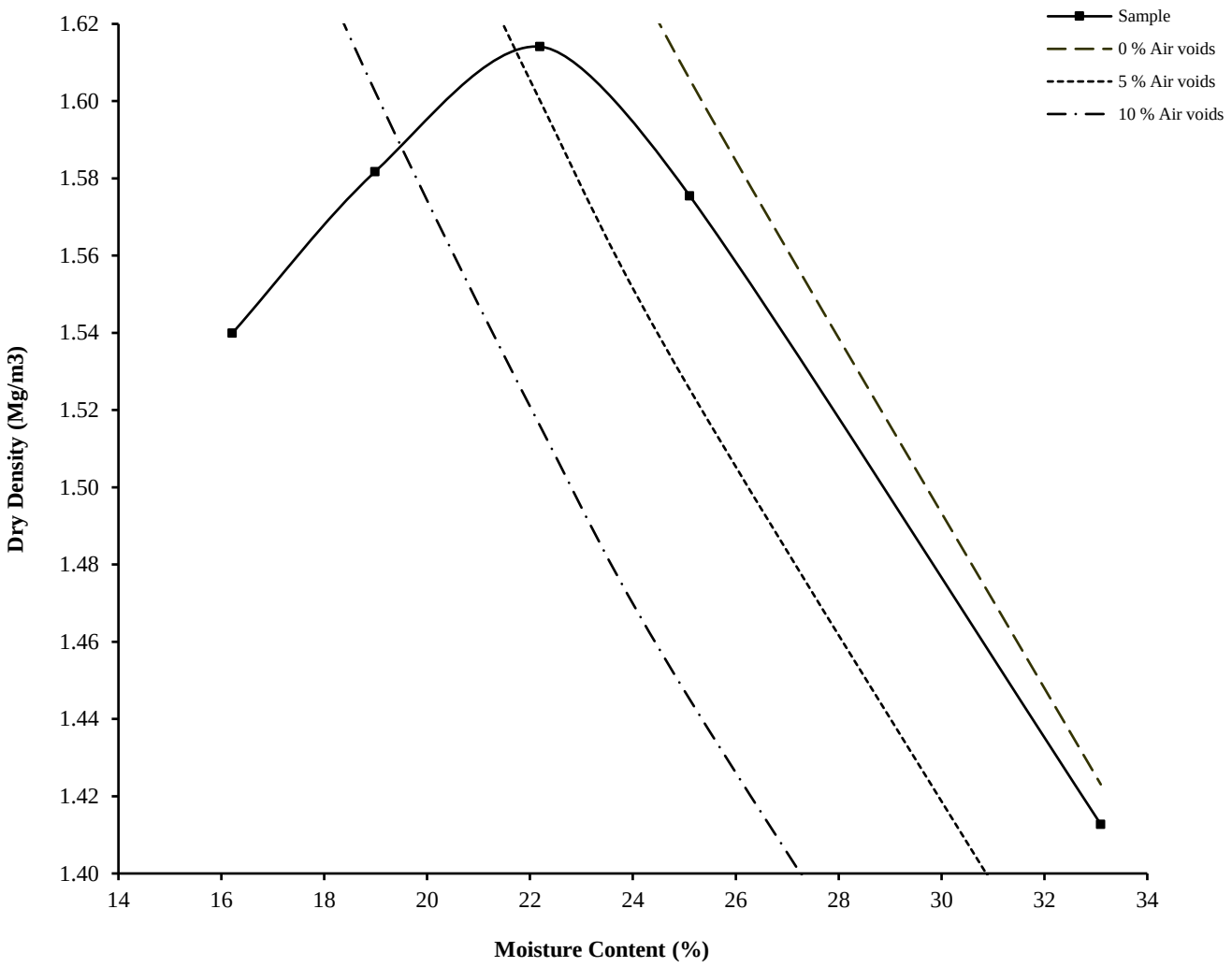
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: STP-6 **Top Depth (m) :** 0.50

Sample Number: **Base Depth (m) :**

Sample Type: D/B



Initial Moisture Content:		33	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.69	Assumed	Material Retained on 37.5 mm Test Sieve (%):		3
Maximum Dry Density (Mg/m3):		1.61	Material Retained on 20.0 mm Test Sieve (%):		6
Optimum Moisture Content (%):		22			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Oughtibridge Mill, Sheffield**	**Contract** **PSL17/0640** **Client Ref** **C6485E**

PARTICLE SIZE DISTRIBUTION TEST

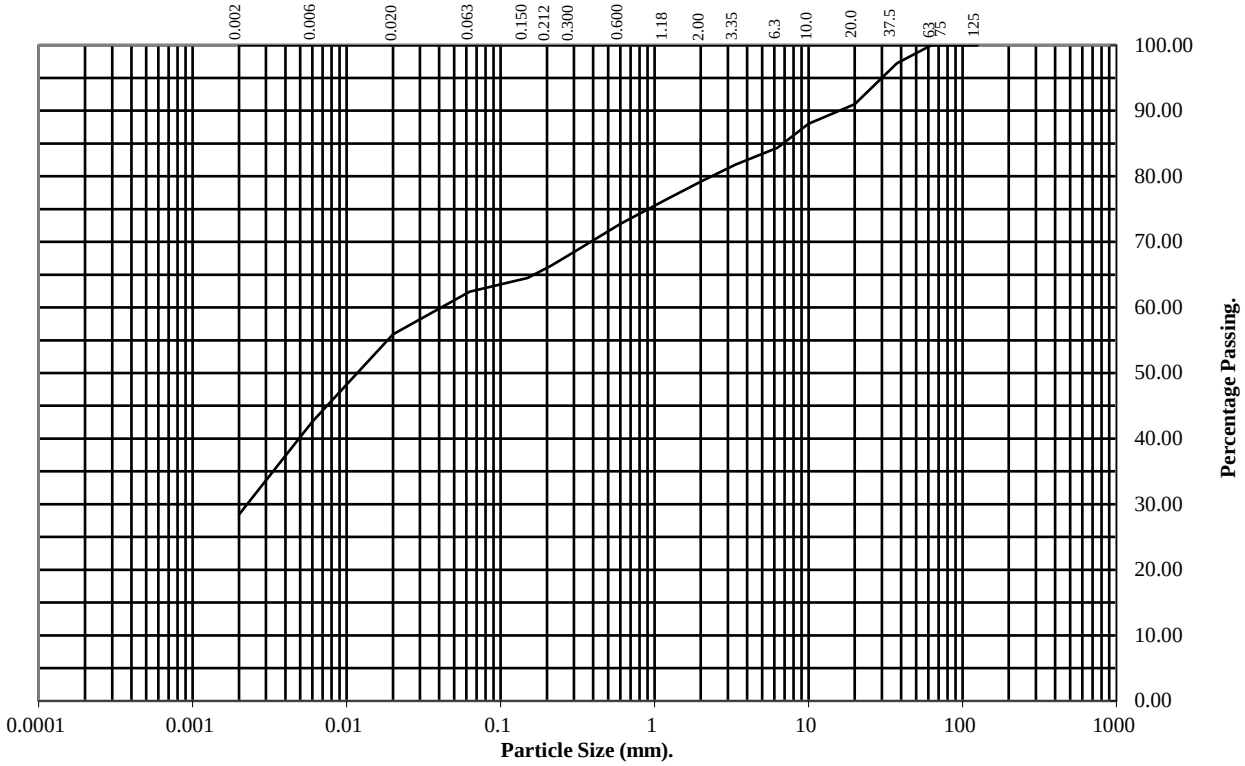
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **STP-6** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	97
20	91
10	88
6.3	84
3.35	82
2	79
1.18	76
0.6	73
0.3	68
0.212	66
0.15	64
0.063	62

Particle Diameter	Percentage Passing
0.02	56
0.006	43
0.002	28

Soil Fraction	Total Percentage
Cobbles	0
Gravel	21
Sand	17
Silt	34
Clay	28

Remarks:
See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

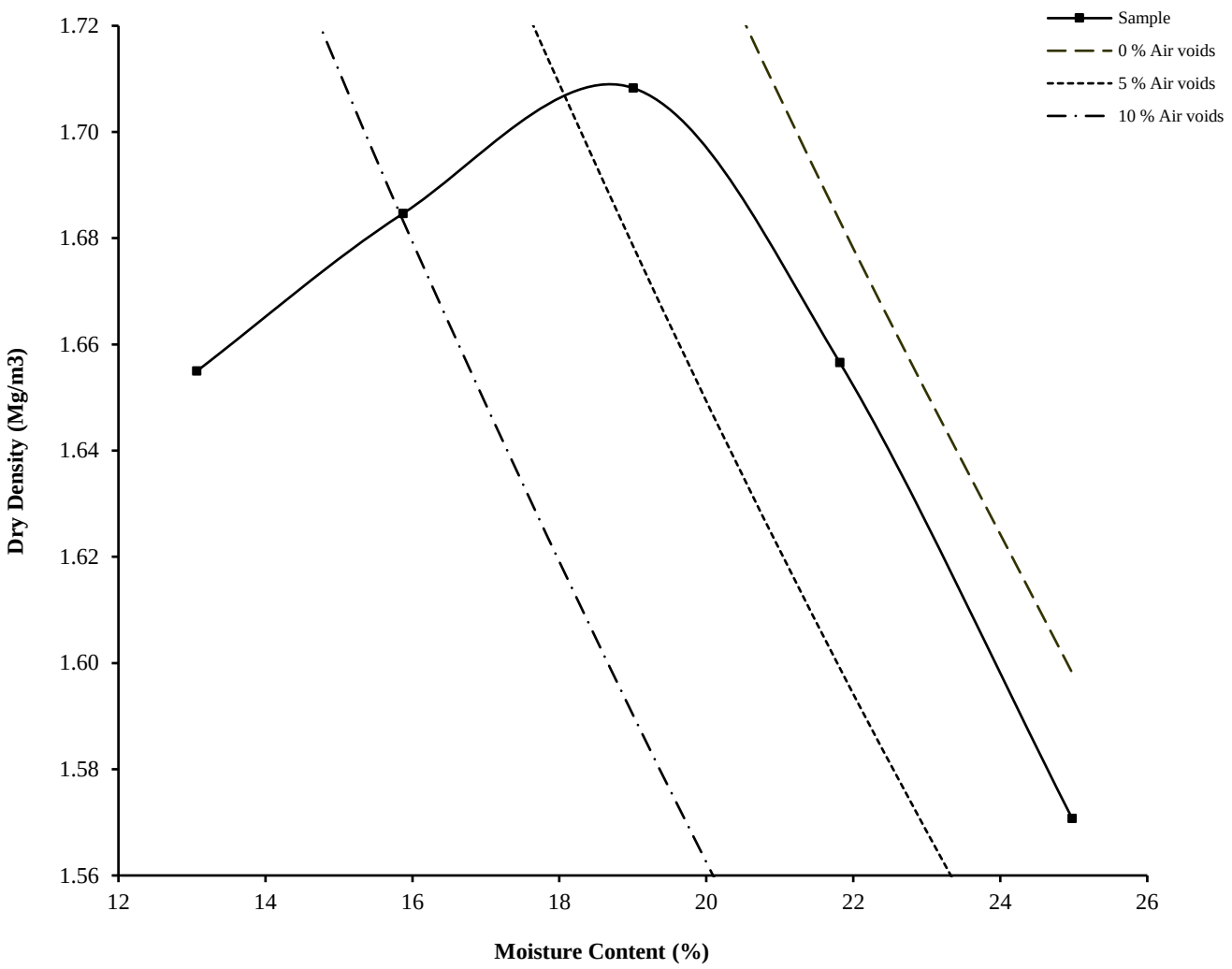
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: STP-8 **Top Depth (m) :** 0.50

Sample Number: **Base Depth (m) :**

Sample Type: D/B



Initial Moisture Content:		25	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.66	Assumed	Material Retained on 37.5 mm Test Sieve (%):		1
Maximum Dry Density (Mg/m3):		1.71	Material Retained on 20.0 mm Test Sieve (%):		5
Optimum Moisture Content (%):		19			
Remarks See summary of soil descriptions					

PARTICLE SIZE DISTRIBUTION TEST

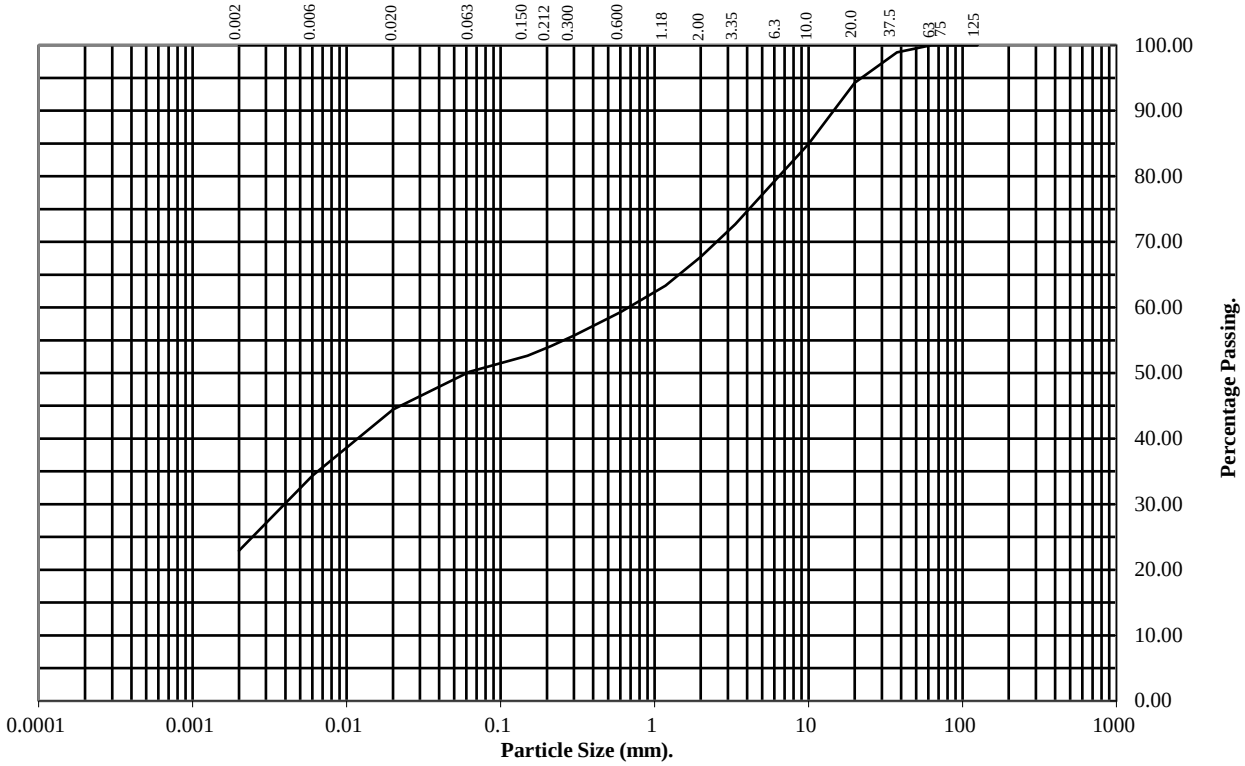
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **STP-8** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	99
20	94
10	85
6.3	80
3.35	73
2	68
1.18	63
0.6	59
0.3	56
0.212	54
0.15	53
0.063	50

Particle Diameter	Percentage Passing
0.02	44
0.006	34
0.002	23

Soil Fraction	Total Percentage
Cobbles	0
Gravel	32
Sand	18
Silt	27
Clay	23

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

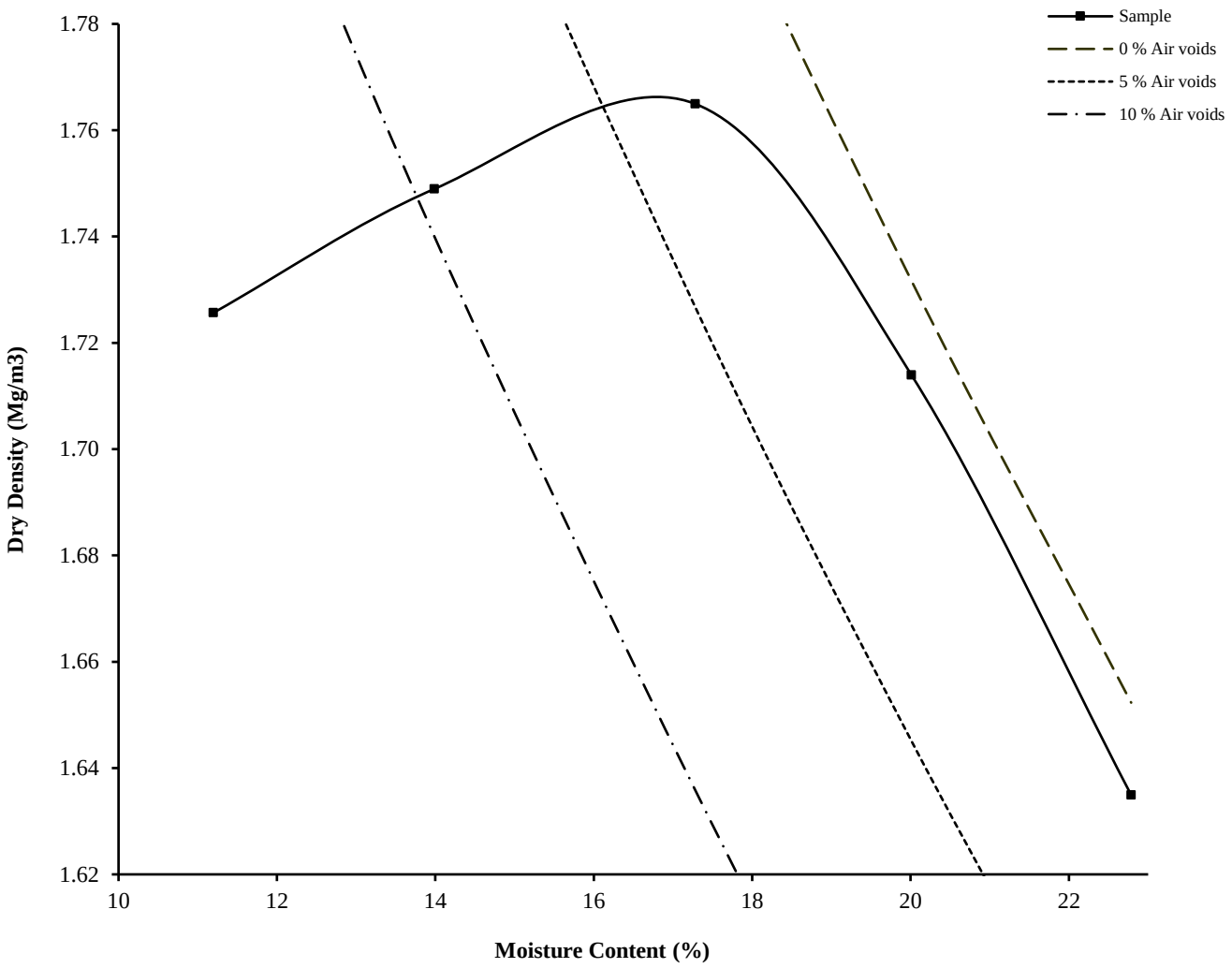
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : 1990

Hole Number: STP-12 **Top Depth (m) :** 0.50

Sample Number: **Base Depth (m) :**

Sample Type: D/B



Initial Moisture Content:		23	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		15
Maximum Dry Density (Mg/m3):		1.76	Material Retained on 20.0 mm Test Sieve (%):		6
Optimum Moisture Content (%):		17			
Remarks See summary of soil descriptions					

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Oughtibridge Mill, Sheffield**	**Contract** **PSL17/0640** **Client Ref** **C6485E**

PARTICLE SIZE DISTRIBUTION TEST

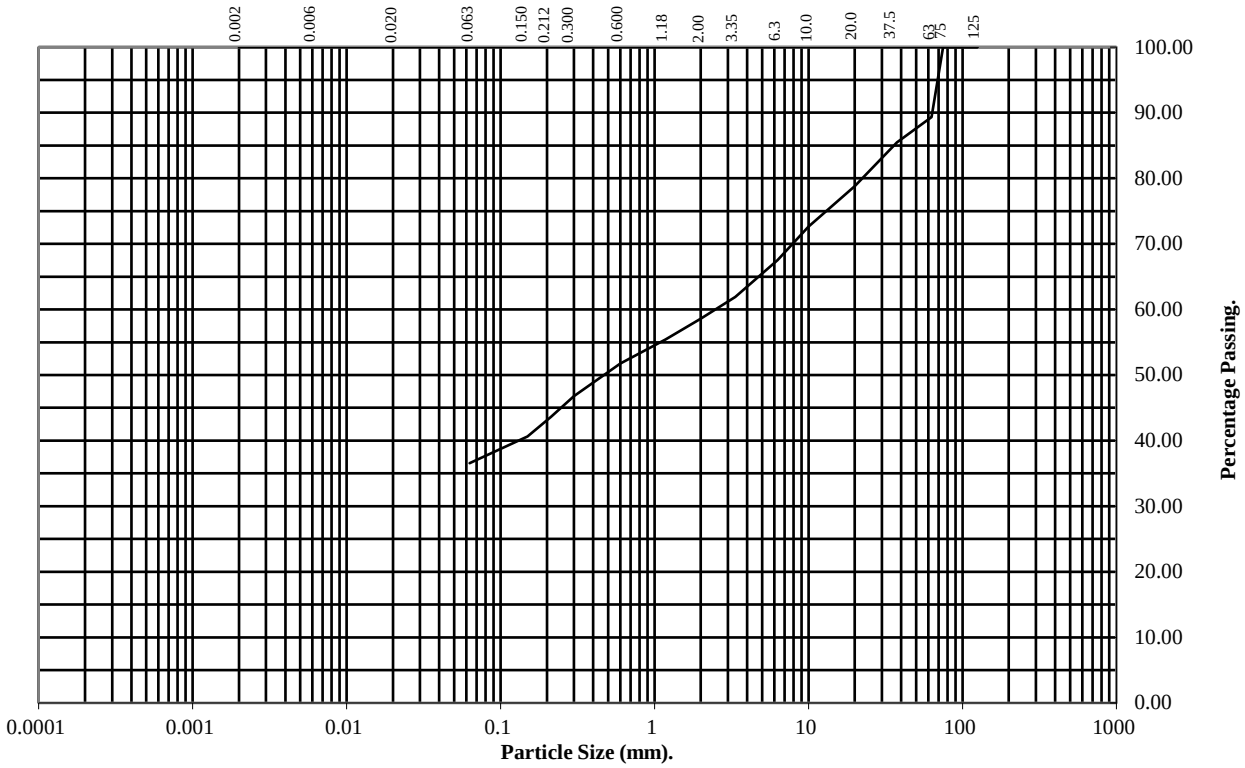
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **STP-12** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	89
37.5	85
20	79
10	73
6.3	68
3.35	62
2	59
1.18	55
0.6	52
0.3	47
0.212	44
0.15	41
0.063	37

Soil Fraction	Total Percentage
Cobbles	11
Gravel	30
Sand	22
Silt/Clay	37

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No: **PSL17/0640**

Client Ref: **C6485E**

PARTICLE SIZE DISTRIBUTION TEST

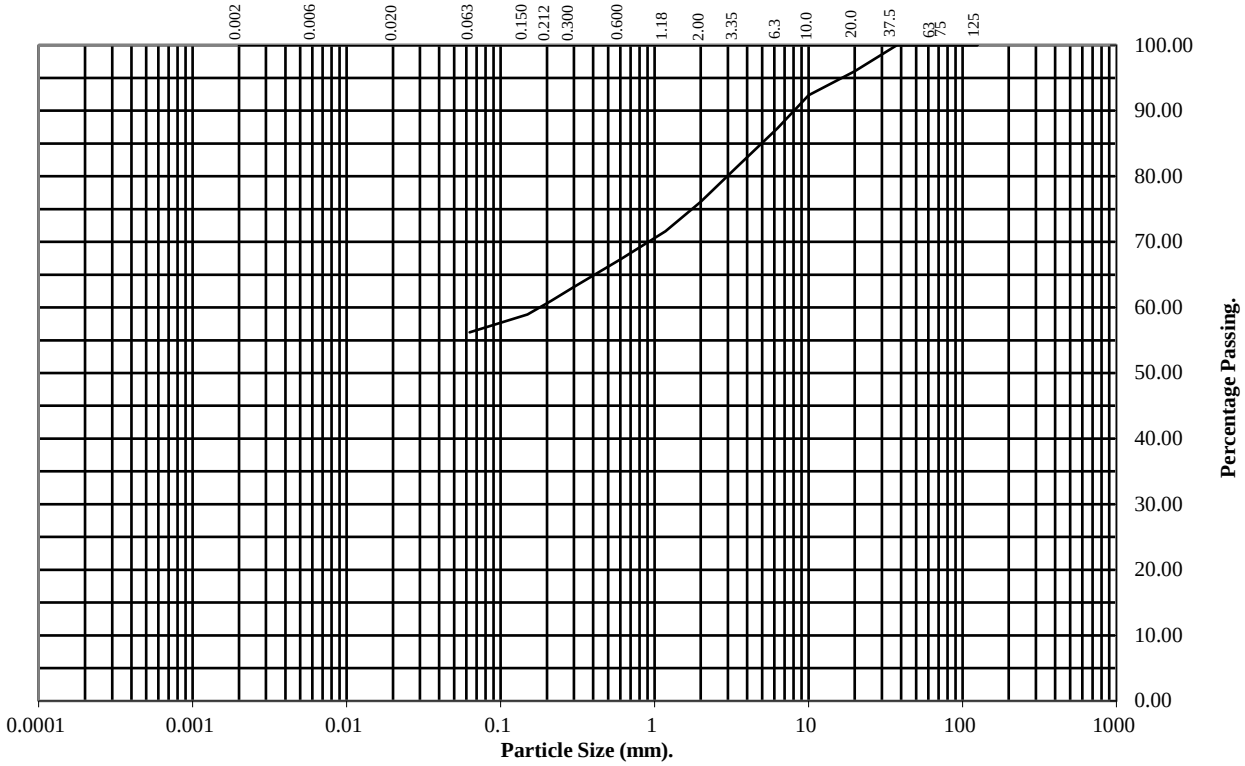
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **STP-13** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	92
6.3	87
3.35	81
2	76
1.18	72
0.6	67
0.3	63
0.212	61
0.15	59
0.063	56

Soil Fraction	Total Percentage
Cobbles	0
Gravel	24
Sand	20
Silt/Clay	56

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

PARTICLE SIZE DISTRIBUTION TEST

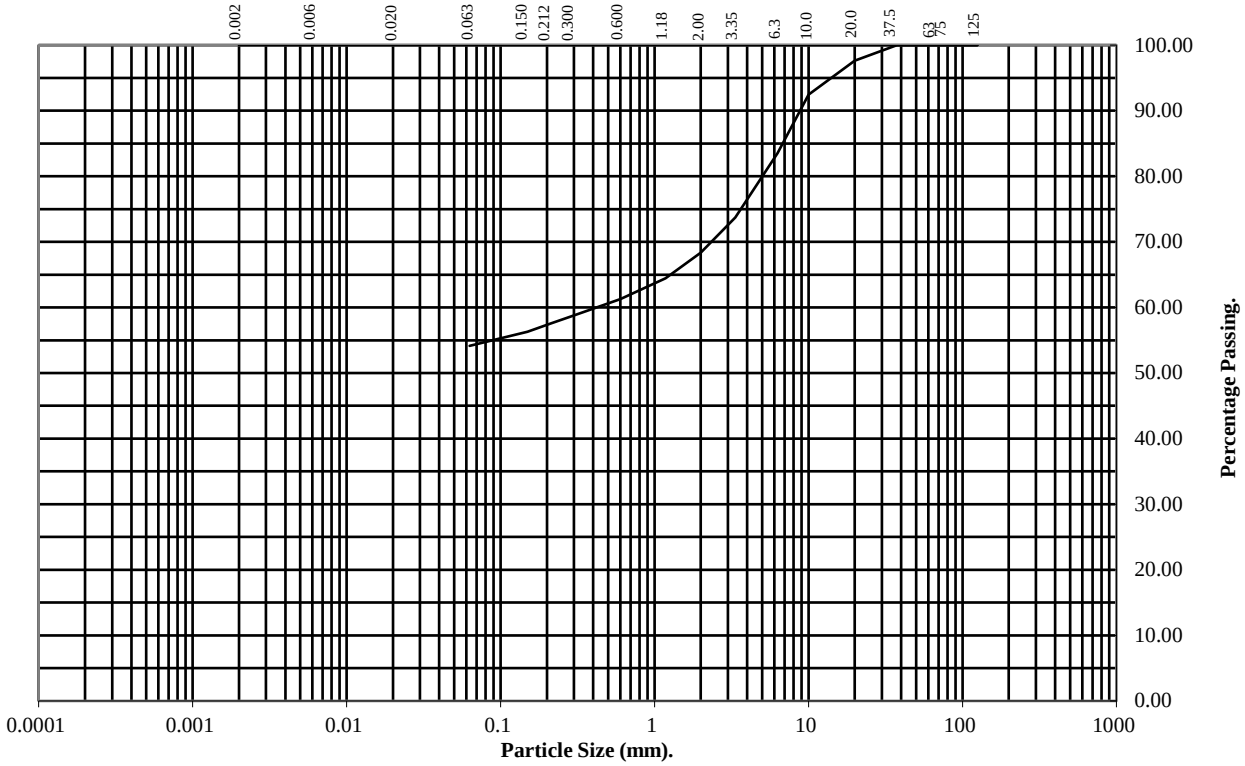
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **STP-14** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):**

Sample Type: **D/B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	92
6.3	84
3.35	74
2	68
1.18	64
0.6	61
0.3	59
0.212	58
0.15	56
0.063	54

Soil Fraction	Total Percentage
Cobbles	0
Gravel	32
Sand	14
Silt/Clay	54

Remarks:

See summary of soil descriptions.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Oughtibridge Mill, Sheffield

Contract No:
PSL17/0640
Client Ref:
C6485E

APPENDIX E

SIRIUS GENERIC ASSESSMENT CRITERIA

SIRIUS GENERIC ASSESSMENT CRITERIA

Context

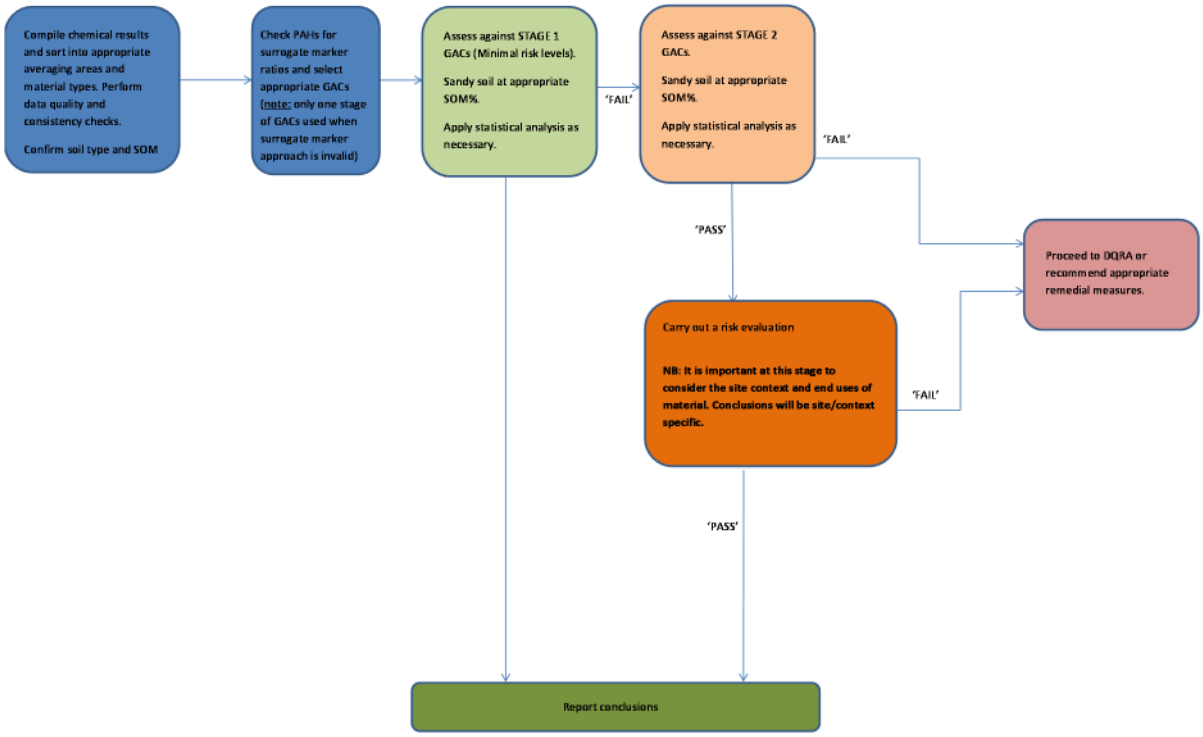
The framework for conducting site investigations, risk assessments and undertaking any necessary remedial works in the UK is provided by Environment Agency report CLR11 "Model Procedures for the Management of Contaminated Land". This presents a phased approach to risk assessment, involving: identification and qualitative assessment of potential pollutant linkages (source-pathway-receptor relationships) by means of a Conceptual Site Model; Generic Quantitative Risk Assessment (GQRA) of potentially significant pollutant links by comparing contaminant concentrations with appropriate Generic Assessment Criteria (GAC) values; and, if required, a Detailed Quantitative Risk Assessment (DQRA) based on site-specific conditions.

Assessment of Risk to Human Health

Introduction

A staged approach to GQRA has been adopted by Sirius for the evaluation of soil concentration data, as shown schematically in Figure 1.

Figure 1. GQRA Process.



The first stage of GQRA comprises assessment of the data against GAC values derived using toxicological parameter values based on "minimum risk". Any contaminants exceeding their GACs at this stage are further assessed against Stage 2 GACs, which have been derived using Low Level of Toxicological Concern (LLTC) criteria, where these are available.

With appropriate justification, a contaminant concentration that does not exceed the relevant Stage 2 GAC value may be considered to indicate that the land is "suitable for use". The appropriate use of LLTC-based criteria within the planning regime is considered reasonable by government agencies, as most recently highlighted in the letter (dated 3rd September 2014) to all local authorities from Lord de Mauley, Parliamentary Under Secretary at DEFRA.

A narrative "risk evaluation" must therefore accompany any Stage 2 assessment to justify the conclusions drawn. Where appropriate, this may provide a basis for eliminating from further consideration those contaminants whose concentrations do not exceed the applicable Stage 2 GAC value.

For the specific case of lead, the Category 4 Screening Level criteria given in CL:AIRE (2014)[1] have been adopted directly as GACs, as these are considered to be based on expert interpretation of current toxicological evidence.

In some areas, background concentrations of lead, other metals and metalloids, and/or individual PAHs may exceed their respective GACs and it may be appropriate to consider relative site and background concentration data as part of a more detailed assessment of the data.

Derivation of GACs

Except where otherwise stated, GACs have been derived by Sirius using CLEA version 1.071.

The GAC values have been derived for a sandy soil type, which will be conservative for the majority of soils (including made ground) encountered on historically contaminated sites. For organic contaminants of concern, criteria have been derived for a number of Soil Organic Matter (SOM) contents.

Genotoxic PAHs are assessed by the "Surrogate Method" using benzo(a)pyrene. Further information on this approach is given below.

Unless specifically stated, chemical properties and Health Criteria Values (HCVs) were obtained from:

- Environment Agency Science Report SC050021 series;
- Nathanail *et al*. (2009) "The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment", 2nd edition, Land Quality Press, Nottingham;
- CL:AIRE - AGS - EIC (2010) "Soil Generic Assessment Criteria for Human Health Risk Assessment". CL:AIRE, London.

GACs for arsenic, benzene, benzo(a)pyrene, cadmium and chromium (VI) have been derived using the

[1] CL:AIRE (2014) "Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination", Report SP1010, rev. 2.

Low Level of Toxicological Concern (LLTC) criteria given in CL:AIRE (2013). These criteria are considered a reasonable basis for assessment as they are still highly precautionary and definitely do not approach an intake level that could be defined as approaching Significant Possibility of Significant Harm to human health in the context of Part 2A of the Environmental Protection Act 1990. It must be further understood that the GACs derived will still incorporate a residual level of conservatism resulting from the exposure parameters used and the assumptions inherent in the model algorithms.

GACs for Genotoxic PAHs

Our approach to the assessment of genotoxic PAHs retains the use of benzo(a)pyrene as a surrogate marker. This approach for genotoxic PAHs is recommended by the HPA (2010)[2], which we consider to be the authoritative current guidance produced by a UK expert body and note that it was retained in the DEFRA Category 4 Screening Levels project (CL:AIRE, 2014).

The surrogate marker approach allows the assessment of the combined carcinogenic risk associated with all genotoxic PAHs[3] present as a mixture within soil, even though detailed toxicological information for many of the individual compounds may be lacking. The approach is based on determining the risk posed by the genotoxic PAH mixture using the concentration of benzo(a)pyrene present as an indicator.

To use the GAC for benzo(a)pyrene as a surrogate marker, a number of requirements must be met (HPA, 2010):

- Benzo(a)pyrene must be present in all soil samples containing genotoxic PAHs for which this method of assessment is being used;
- A similar profile of the genotoxic PAHs relative to benzo(a)pyrene should be present in all of the samples being assessed;
- The PAH profile of PAHs in the soil samples should be similar to that present in the pivotal toxicity study on which toxicological criterion for benzo(a)pyrene was based (Culp et al., 1998[4]). Table 1 provides the basis for defining the acceptable range.

Data indicate that contaminated soils in the UK generally meet these criteria[5] but the assessor must review their dataset before adopting this approach. If the above criteria are not met, then the surrogate marker approach must not be adopted and individual GAC or SSAC values are to be applied.

[2] HPA (2010) "Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)", version 5.

[3] The genotoxic PAHs included in the USEPA PAH 16 analysis reported by analytical labs are: benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo(a)pyrene, chrysene, dibenz[a,h]anthracene and indeno[1,2,3-c,d]pyrene.

[4] Culp, S. *et al*. (1998) Carcinogenesis, 19, 117-124.

[5] Bull, S. & Collins, C. (2013) Environ. Geochem. Health, 31, 101-109.

Table 1. Profile of Genotoxic PAHs Relative to Benzo(a)pyrene that are Considered Acceptable for Application of Benzo(a)pyrene as a Surrogate Marker.

PAH	Acceptable Ratio of PAH Concentration to Benzo(a)pyrene for Application of Surrogate Marker Assessment	
	Lower Limit	Upper Limit
Benz[a]anthracene	0.12	12.43
Benzo[b]fluoranthene	0.11	10.85
Benzo[k]fluoranthene	0.04	3.72
Benzo[g,h,i]perylene	0.08	8.22
Chrysene	0.12	11.61
Dibenz[a,h]anthracene	0.01	1.38
Indeno[1,2,3-c,d]pyrene	0.07	7.27

For further information see: HPA (2010).

Soil Criteria Set for Purposes Other Than Human Health Protection

The Sirius GACs for sulphate, total organic carbon (TOC) and calorific value are set on basis of risks other than human health and their exceedance does not indicate a potential risk to future site users:

- The GAC for sulphate content is based on potential detrimental effects on buried concrete[6] and must be assessed with reference to the soil pH;
- The GAC for TOC content is provided for indicative assessment of disposal options if off-site landfill of soil were to be considered. This GAC is set at the 'Inert' waste threshold and should be considered as being applied for information purposes only;
- The GAC for calorific value is set to assist in an initial assessment of the potential fire risk posed by made ground or natural soils containing elevated concentrations of potentially combustible organic matter.

Assessment criteria more stringent than those for human health may be set for specific purposes, for example, elimination of nuisance odours or ensuring that potentially mobile free-phase organic products are not present.

Controlled Waters

The Environment Agency's "Remedial Targets Methodology" (2006) provides a framework for assessing the potential for pollution of controlled waters and for deriving remedial target concentrations in soil and groundwater.

There are no generic groundwater or surface water quality standards that are applicable to all sites. Drinking Water Standards and Environmental Quality Standards (EQS) are used by Sirius as assessment criteria where they are appropriate to the contaminant linkages under consideration. Given that these standards apply at the receptor point, this is a conservative approach for samples collected at a source or along a transport pathway.

[6] BRE (2005) "Concrete in Aggressive Ground", Special Digest No. 1; 3rd Edition.

The Sirius Group
Stage 1 Generic Assessment Criteria for Soils

Revision: 17th February 2015

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	
Metals/Metalloids										
Arsenic (inorganic)	37			40			630			[1]
Cadmium	11			85			190			[2]
Chromium (III)	910			4000			8600			
Chromium (VI)	6.0			6.1			33			[3]
Copper	200			7100			68000			[4]
Lead	200			310			2300			[5]
Mercury (inorganic)	40			56			1100			[6]
Nickel	180			180			980			[7]
Selenium	250			430			12000			
Vanadium	410			1200			9000			
Zinc	450			40000			750000			[4]
Other Inorganics										
pH	<5 or >9			<5 or >9			<5 or >9			
Total Sulphate	2400			2400			2400			[8]
Water-Soluble Sulphate	0.5 g/l			0.5 g/l			0.5 g/l			[8]
Free Cyanide	34			34			1400			[9]
Organics										
PAHs										
Acenaphthene	200	490	920	2000	3600	4900	75000	92000	100000	
Acenaphthylene	170	400	760	2000	3600	4900	76000	93000	100000	
Anthracene	2300	5300	9400	30000	34000	36000	520000	540000	540000	[10]
Benzo(a)anthracene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(a)pyrene	2.1	2.1	2.2	2.3	2.3	2.3	27	27	27	[11]
Benzo(b)fluoranthene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(k)fluoranthene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(g,h,i)perylene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Chrysene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Dibenzo(a,h)anthracene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Fluoranthene	280	560	820	1500	1600	1600	23000	23000	23000	
Fluorene	170	390	730	2200	3400	4000	60000	67000	70000	
Indeno(1,2,3-c,d)pyrene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Naphthalene	1.0	2.3	4.6	1.0	2.4	4.7	110	260	510	
Phenanthrene	95	220	380	1300	1400	1500	22000	22000	23000	
Pyrene	620	1200	1900	3700	3800	3800	54000	54000	54000	
BTEX and related										
Benzene	0.063	0.13	0.24	0.16	0.30	0.38	15	28	49	
Toluene	100	240	460	370	830	1100	33000	68000	110000	
Ethylbenzene	26	62	120	34	81	110	3200	7400	14000	
Xylenes (total)	28	67	130	33	78	110	3200	7700	15000	[12]
1,2,4-trimethylbenzene	0.22	0.53	1.1	0.24	0.58	1.2	39	93	170	
Iso-propylbenzene	6.6	16	32	6.8	17	33	1300	3100	6100	
Propylbenzene	21	51	100	23	57	110	3800	9100	17000	
Styrene	6.9	16	32	21	49	93	3100	6100	9500	
TPH										
Aliphatic EC 5-6	24	41	68	24	41	48	2400	4100	6900	
Aliphatic EC >6-8	53	110	210	53	110	150	5300	11000	21000	
Aliphatic EC >8-10	13	31	61	13	31	43	1300	3100	6000	
Aliphatic EC >10-12	62	150	300	62	150	220	6100	15000	28000	
Aliphatic EC >12-16	510	1200	2300	510	1200	1700	43000	72000	85000	
Aliphatic EC >16-35	41000	70000	90000	42000	70000	80000	>1E6	>1E6	>1E6	[13]
Aromatic EC >5-7	53	110	200	150	300	380	15000	28000	48000	
Aromatic EC >7-8	100	240	460	370	820	1100	33000	68000	110000	
Aromatic EC >8-10	20	48	94	22	54	75	2200	5200	9800	
Aromatic EC >10-12	63	150	290	120	290	400	11000	22000	30000	
Aromatic EC >12-16	140	320	570	1100	1900	2100	35000	37000	37000	
Aromatic EC >16-21	260	540	840	1800	1900	1900	28000	28000	28000	
Aromatic EC >21-35	1100	1500	1700	1900	1900	1900	28000	28000	28000	

The Sirius Group
Stage 1 Generic Assessment Criteria for Soils

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	
Chlorinated Organics										
Chlorobenzene	0.19	0.44	0.86	0.19	0.45	0.87	31	71	140	
Dichloromethane (DCM)	0.47	0.78	1.2	1.2	1.7	2.4	250	340	470	
1,1-dichloroethane (DCA)	1.4	2.4	4.0	1.4	2.4	4.1	260	420	690	
1,2-dichloroethane (DCA)	0.0031	0.0048	0.0076	0.0035	0.0053	0.0084	0.34	0.51	0.81	
1,1-dichloroethene (DCE)	0.15	0.26	0.45	0.15	0.26	0.46	24	43	74	
cis -1,2-dichloroethene (DCE)	0.066	0.12	0.20	0.069	0.12	0.21	14	23	38	
trans -1,2-dichloroethene (DCE)	0.11	0.21	0.38	0.12	0.22	0.39	21	37	65	
Pentachlorophenol	0.21	0.52	1.0	27	30	31	400	400	400	
1,1,1,2-tetrachloroethane	0.56	1.3	2.6	0.63	1.5	2.9	59	140	270	
1,1,2,2-tetrachloroethane	0.98	2.1	4.0	1.6	3.4	6.3	150	310	570	
Tetrachloroethene (PCE)	0.074	0.17	0.32	0.07	0.17	0.33	10	23	45	
Tetrachloromethane (CT)	0.011	0.024	0.046	0.011	0.024	0.046	1.6	3.6	6.9	
1,1,1-trichloroethane (TCA)	3.7	7.8	15	3.8	7.9	15	370	770	1400	
1,1,2-trichloroethane (TCA)	0.39	0.85	1.6	0.51	1.1	2.0	89	180	320	
Trichloroethene (TCE)	0.0070	0.015	0.028	0.0071	0.015	0.68	1.5	2.8	44	
Trichloromethane (CF)	0.43	0.80	1.4	0.48	0.89	53	98	170	300	
Vinyl Chloride	0.00034	0.00045	0.00062	0.00037	0.00048	0.00066	0.038	0.049	0.068	
Miscellaneous Organics										
Carbon disulphide	0.066	0.13	0.25	0.066	0.13	0.25	6.7	14	25	
Di-(2-ethylhexyl)-phthalate	290	660	1100	3900	4000	4100	85000	85000	8600	
MTBE	31	55	94	39	68	120	7400	12000	19000	
Phenol	110	190	330	420	440	440		440		[14]
Methylphenols (cresols), total	78	170	330	5600	8200	9900	160000	170000	18000	[15]
2,4-dimethylphenol (m-xylenol)	18	43	82	200	430	720	15000	23000	28000	
Other Parameters										
TOC	3% w/w			3% w/w			3% w/w			[16]
Calorific Value	2 MJ/kg			2 MJ/kg			2 MJ/kg			[17]
Asbestos	Fibres present			Fibres present			Fibres present			

All concentration-based criteria are rounded to 2 significant figures.

The criteria assume a sandy soil type, which will be conservative for the great majority of soils (including made ground) encountered on historically contaminated sites.

Except where otherwise stated, criteria have been derived by Sirius using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al., (2015). No correction has been made for the "Top Two" crop types in the Residential with Homegrown Produce land use and the criteria will therefore be conservative in this regard.

Health Criteria Values (HCVs) and (except where specifically noted) chemical property data were obtained from:
- Environment Agency Science Report SC050021 Series;
- Nathanail et al. (2015);
- CL:AIRE-AGS-EIC (2010).

Footnotes

[1] Based on oral GAC as this is the lower GAC and reflects a cancer risk many orders of magnitude greater than for inhalation.

[2] Determined for lifetime exposure. Plant uptake concentration factors applied were as given in CL:AIRE (2014). The GAC values are based on data for soils having a pH value in the range 6-8; caution should be applied in applying them at pH values outside this range, especially at pH values <5.

[3] Both oral and inhalation HCVs are based on local toxicological effects and therefore the lowest (oral) GAC value is adopted.

[4] For the Residential with Homegrown Produce land use, the GAC values for Cu and Zn are based on potential phytotoxic effects and have been set at the maximum allowable concentrations for sewage sludge-amended soils presented in the "Sludge (Use in Agriculture) Regulations" (SI 1263/1989); these criteria may also be applied in any land use where plants are to be grown. The equivalent GAC values for human health protection in the Residential with Homegrown Produce land use are around an order of magnitude greater.

[5] The Category 4 Screening Levels for lead defined in CL:AIRE (2013) have been adopted directly to provide an acceptable basis for initial assessment of data. Where background concentrations of lead exceed the GAC value, then site-specific evaluation will be required.

[6] The SGV for mercury is based on inorganic mercury which represents the most common form encountered within the environment. This is considered appropriate for most sites as: "…the SGV for inorganic mercury can normally be compared with chemical analysis for total mercury content because the equilibrium concentrations of elemental and methylmercury compounds are likely to be very low" (Environment Agency report SC050021/Mercury SGV). Analysis and specific assessment for elemental or methylated forms of mercury will need to be considered if historical land use or site-specific factors indicate that these forms of mercury are likely to be present.

[7] Toxicological effects by inhalation are localised, therefore the lower of the GAC values for oral and inhalation HCVs have been adopted.

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	

[8] BRE (2005). Sulphate is not considered to pose a potential risk to human health under normal circumstances – this GAC applies to construction cases only and is set at the upper limit for DS-1 Design Sulphate Class concrete.

[9] GAC calculated for acute risk. Further information can be provided upon request.

[10] The genotoxic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene) are routinely assessed using benzo(a)pyrene as a surrogate (HPA (2010) "Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)", version 5). Separate information on this approach is provided.

[11] Calculated using a 'minimum risk' oral index dose derived from the application of a 10,000x safety factor to the BMD10 presented in CL:AIRE (2014) for benzo(a)pyrene as a surrogate marker and the inhalation index dose specified in CL:ARE (2014) and Nathanail *et al*. (2015). As a conservative measure, the GAC is based on combined exposure pathways to account for systemic carcinogenic effects. Further information on the derivation can be provided upon request.

[12] For screening purposes, a single GAC has been set for total xylene. This is the lowest of the values calculated for the three individual xylene isomers.

[13] "No GAC" indicates that no value has been specified for this land use as the TDSI cannot be exceeded at achievable soil concentrations.

[14] 440mg/kg is the minimum concentration that is protective for direct skin contact with phenol (See Environment Agency SR050021/Phenol SGV) and is adopted where GACs for chronic exposure are higher.

[15] For screening purposes, a single GAC has been set for total methylphenol. This is the lowest of the values calculated for the three individual methylphenol isomers.

[16] The Hazardous Waste (England and Wales) Regulations 2005. TOC content in itself does not represent a potential risk to human health. This GAC is provided for indicative assessment of disposal options, in the case that off-site landfill of soil is undertaken. This GAC is specified at the 'Inert' waste threshold and should be considered as for information purposes only.

[17] ICRCL (1986) Guidance Note 61/84, 2nd Edition, Notes on the Fire Hazards of Contaminated Land. Calorific value is not an indication of direct human health risk but may be useful in assessment of the potential fire risk posed by made ground or natural soils containing elevated concentrations of potentially combustible organic matter.

Soil Leachability

Sirius specifies that the analytical laboratory undertakes leachate preparation by BS EN 12475-2:2002. Where specific circumstances require a different method to be used, then this will be explained and justified within the report body text.

The results of leachate analysis are compared to the relevant GAC values for controlled waters.

The Sirius Group
Stage 2 Generic Assessment Criteria for Soils

Revision: 17th February 2015

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	
Metals/Metalloids										
Arsenic (inorganic)	37			40			630			[1]
Cadmium	18			150			410			[2]
Chromium (III)	910			4000			8600			
Chromium (VI)	21			21			49			[3]
Copper	200			7100			68000			[4]
Lead	200			310			2300			[5]
Mercury (inorganic)	40			56			1100			[6]
Nickel	180			180			980			[7]
Selenium	250			430			12000			
Vanadium	410			1200			9000			
Zinc	450			40000			750000			[4]
Other Inorganics										
pH	<5 or >9			<5 or >9			<5 or >9			
Total Sulphate	2400			2400			2400			[8]
Water-Soluble Sulphate	0.5 g/l			0.5 g/l			0.5 g/l			[8]
Free Cyanide	34			34			1400			[9]
Organics										
PAHs										
Acenaphthene	200	490	920	2000	3600	4900	75000	92000	100000	
Acenaphthylene	170	400	760	2000	3600	4900	76000	93000	100000	
Anthracene	2300	5300	9400	30000	34000	36000	520000	540000	540000	[10]
Benzo(a)anthracene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(a)pyrene	4.9	4.9	4.9	5.3	5.3	5.3	76	76	76	[11]
Benzo(b)fluoranthene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(k)fluoranthene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Benzo(g,h,i)perylene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Chrysene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Dibenzo(a,h)anthracene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Fluoranthene	280	560	820	1500	1600	1600	23000	23000	23000	
Fluorene	170	390	730	2200	3400	4000	60000	67000	70000	
Indeno(1,2,3-c,d)pyrene	Assessed using benzo(a)pyrene as a surrogate marker									[10]
Naphthalene	1.0	2.3	4.6	1.0	2.4	4.7	110	260	510	
Phenanthrene	95	220	380	1300	1400	1500	22000	22000	23000	
Pyrene	620	1200	1900	3700	3800	3800	54000	54000	54000	
BTEX and related										
Benzene	0.13	0.27	0.50	0.37	0.71	1.30	15	29	51	[12]
Toluene	100	240	460	370	830	1100	33000	68000	110000	
Ethylbenzene	26	62	120	34	81	110	3200	7400	14000	
Xylenes (total)	28	67	130	33	78	110	3200	7700	15000	[13]
1,2,4-trimethylbenzene	0.22	0.53	1.1	0.24	0.58	1.2	39	93	170	
Iso-propylbenzene	6.6	16	32	6.8	17	33	1300	3100	6100	
Propylbenzene	21	51	100	23	57	110	3800	9100	17000	
Styrene	6.9	16	32	21	49	93	3100	6100	9500	
TPH										
Aliphatic EC 5-6	24	41	68	24	41	48	2400	4100	6900	
Aliphatic EC >6-8	53	110	210	53	110	150	5300	11000	21000	
Aliphatic EC >8-10	13	31	61	13	31	43	1300	3100	6000	
Aliphatic EC >10-12	62	150	300	62	150	220	6100	15000	28000	
Aliphatic EC >12-16	510	1200	2300	510	1200	1700	43000	72000	85000	
Aliphatic EC >16-35	41000	70000	90000	42000	70000	80000	>1E6	>1E6	>1E6	[14]
Aromatic EC >5-7	53	110	200	150	300	380	15000	28000	48000	
Aromatic EC >7-8	100	240	460	370	820	1100	33000	68000	110000	
Aromatic EC >8-10	20	48	94	22	54	75	2200	5200	9800	
Aromatic EC >10-12	63	150	290	120	290	400	11000	22000	30000	
Aromatic EC >12-16	140	320	570	1100	1900	2100	35000	37000	37000	
Aromatic EC >16-21	260	540	840	1800	1900	1900	28000	28000	28000	
Aromatic EC >21-35	1100	1500	1700	1900	1900	1900	28000	28000	28000	

The Sirius Group
Stage 2 Generic Assessment Criteria for Soils

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	
Chlorinated Organics										
Chlorobenzene	0.19	0.44	0.86	0.19	0.45	0.87	31	71	140	
Dichloromethane (DCM)	0.47	0.78	1.2	1.2	1.7	2.4	250	340	470	
1,1-dichloroethane (DCA)	1.4	2.4	4.0	1.4	2.4	4.1	260	420	690	
1,2-dichloroethane (DCA)	0.0031	0.0048	0.0076	0.0035	0.0053	0.0084	0.34	0.51	0.81	
1,1-dichloroethene (DCE)	0.15	0.26	0.45	0.15	0.26	0.46	24	43	74	
cis -1,2-dichloroethene (DCE)	0.066	0.12	0.20	0.069	0.12	0.21	14	23	38	
trans -1,2-dichloroethene (DCE)	0.11	0.21	0.38	0.12	0.22	0.39	21	37	65	
Pentachlorophenol	0.21	0.52	1.0	27	30	31	400	400	400	
1,1,1,2-tetrachloroethane	0.56	1.3	2.6	0.63	1.5	2.9	59	140	270	
1,1,2,2-tetrachloroethane	1.0	2.1	4.0	1.6	3.4	6.3	150	310	570	
Tetrachloroethene (PCE)	0.074	0.17	0.32	0.074	0.17	0.33	10	23	45	
Tetrachloromethane (CT)	0.011	0.024	0.046	0.011	0.024	0.046	1.6	3.6	7	
1,1,1-trichloroethane (TCA)	3.7	7.8	15	3.8	7.9	15	370	770	1400	
1,1,2-trichloroethane (TCA)	0.39	0.85	1.6	0.51	1.1	2.0	89	180	320	
Trichloroethene (TCE)	0.0070	0.015	0.028	0.0071	0.015	0.68	1.5	2.8	44	
Trichloromethane (CF)	0.43	0.80	1.4	0.48	0.89	53	98	170	300	
Vinyl Chloride	0.00034	0.00045	0.00062	0.00037	0.00048	0.00066	0.038	0.049	0.07	
Miscellaneous Organics										
Carbon disulphide	0.066	0.13	0.25	0.066	0.13	0.25	6.7	14	25	
Di-(2-ethylhexyl)-phthalate	290	660	1100	3900	4000	4100	85000	85000	8600	
MTBE	31	55	94	39	68	120	7400	12000	19000	
Phenol	110	190	330	420	440	440		440		[15]
Methylphenols (cresols), total	78	170	330	5600	8200	9900	160000	170000	18000	[16]
2,4-dimethylphenol (m-xylenol)	18	43	82	200	430	720	15000	23000	28000	
Other Parameters										
TOC	3% w/w			3% w/w			3% w/w			[17]
Calorific Value	2 MJ/kg			2 MJ/kg			2 MJ/kg			[18]
Asbestos	Fibres present			Fibres present			Fibres present			

All concentration-based criteria are rounded to 2 significant figures.

The criteria assume a sandy soil type, which will be conservative for the great majority of soils (including made ground) encountered on historically contaminated sites.

Except where otherwise stated, criteria have been derived by Sirius using CLEA version 1.06. Parameters for the land use cases are consistent with those given in Environment Agency (2009) "Updated Technical Background to the CLEA Model", report SC050021/SR3 but updated (where relevant) for respiration rate, exposure frequency for dermal contact outdoors, soil adherence factors for children, and plant uptake concentration factors given in CL:AIRE (2014) and Nathanail et al. (2015). No correction has been made for the "Top Two" crop types in the Residential with Homegrown Produce land use and the criteria will therefore be conservative in this regard.

Health Criteria Values (HCVs) and (except where specifically noted) chemical property data were obtained from:
- Environment Agency Science Report SC050021 Series;
- CL:AIRE (2014)
- Nathanail et al. (2015);
- CL:AIRE-AGS-EIC (2010).

Footnotes

[1] Determined using LLTC value and plant uptake concentration factors given in CL:AIRE (2014). The oral GAC is adopted as this is the lower value and reflects a cancer risk many orders of magnitude greater than for inhalation.

[2] Determined for lifetime exposure using the LLTC value and plant uptake concentration factors given in CL:AIRE (2014). The GAC values are based on data for soils having a pH value in the range 6-8; caution should be applied in applying them at pH values outside this range, especially at pH values <5.

[3] Determined using LLTC value and plant uptake concentration factors given in CL:AIRE (2014). Both oral and inhalation LLTCs are based on local toxicological effects and therefore the lowest (oral) GAC value is adopted.

[4] For the Residential with Homegrown Produce land use, the GAC values for Cu and Zn are based on potential phytotoxic effects and have been set at the maximum allowable concentrations for sewage sludge-amended soils presented in the "Sludge (Use in Agriculture) Regulations" (SI 1263/1989); these criteria may also be applied in any land use where plants are to be grown. The equivalent GAC values for human health protection in the Residential with Homegrown Produce land use are around an order of magnitude greater.

[5] The Category 4 Screening Levels for lead defined in CL:AIRE (2013) have been adopted directly to provide an acceptable basis for initial assessment of data. Where background concentrations of lead exceed the GAC value, then site-specific evaluation will be required.

[6] The SGV for mercury is based on inorganic mercury which represents the most common form encountered within the environment. This is considered appropriate for most sites as: "…the SGV for inorganic mercury can normally be compared with chemical analysis for total mercury content because the equilibrium concentrations of elemental and methylmercury compounds are likely to be very low" (SC050021/Mercury SGV). Analysis and specific assessment for elemental or methylated forms of mercury will need to be considered if historical land use or site-specific factors indicate that these forms of mercury are likely to be present.

Parameter	Residential (mg/kg, unless otherwise stated)						Commercial / Industrial (mg/kg, unless otherwise stated)			Note
	With Homegrown Produce			Without Homegrown Produce						
	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	1% SOM	2.5% SOM	5% SOM	

[7] Toxicological effects by inhalation are localised, therefore the lower of the GAC values for oral and inhalation HCVs have been adopted.

[8] BRE (2005). Sulphate is not considered to pose a potential risk to human health under normal circumstances – this GAC applies to construction cases only and is set at the upper limit for DS-1 Design Sulphate Class concrete.

[9] GAC calculated for acute risk. Further information can be provided upon request.

[10] The genotoxic PAHs (benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene) are routinely assessed using benzo(a)pyrene as a surrogate (HPA (2010) "Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)", version 5). Separate information on this approach is provided.

[11] Determined using oral LLTC value (CL:AIRE, 2014) for assessment of all pathways to determine systemic carcinogenic effect; inhalation HCV and LLTC values are based on local pulmonary effects only and result in a less conservative GAC.

[12] Calculated using LLTC value (CL:AIRE, 2014).

[13] For screening purposes, a single GAC has been set for total xylene. This is the lowest of the values calculated for the three individual xylene isomers.

[14] "No GAC" indicates that no value has been specified for this land use as the TDSI cannot be exceeded at achievable soil concentrations.

[15] 440mg/kg is the minimum concentration that is protective for direct skin contact with phenol (See Environment Agency SR050021/Phenol SGV) and is adopted where GACs for chronic exposure are higher.

[16] For screening purposes, a single GAC has been set for total methylphenol. This is the lowest of the values calculated for the three individual methylphenol isomers.

[17] The Hazardous Waste (England and Wales) Regulations 2005. TOC content in itself does not represent a potential risk to human health. This GAC is provided for indicative assessment of disposal options, in the case that off-site landfill of soil is undertaken. This GAC is specified at the 'Inert' waste threshold and should be considered as for information purposes only.

[18] ICRCL (1986) Guidance Note 61/84, 2nd Edition, Notes on the Fire Hazards of Contaminated Land. Calorific value is not an indication of direct human health risk but may be useful in assessment of the potential fire risk posed by made ground or natural soils containing elevated concentrations of potentially combustible organic matter.

GAC VALUES FOR CONTROLLED WATERS IN ENGLAND AND WALES

Parameter	GAC (µg/l, unless stated)			Notes
	Inland waters		Coastal and transition waters	
	EQS	DWS	EQS	
Metals and metalloids (dissolved)				
Arsenic	50	10	25	1
Cadmium	See separate table	5	0.2	1, 2
Chromium (total)	4.7	50	N.A.	1, 3
Copper	1.0 (bioavailable)	2000	3.76	1, 4
Lead	1.2 (bioavailable)	10	1.3	1, 4
Mercury	0.07	1.0	0.07	1, 4, 5
Nickel	4.0 (bioavailable)	20	8.6	1, 4
Zinc	10.9 (bioavailable) + background	5000	6.8 + background	1, 4, 6
Misc. inorganics				
Ammonia (total, as N)	See separate table	N.A.	N.A.	7
Ammonia (total, as $NH4^+$)	N.A.	500	N.A.	
Ammonia (un-ionised (NH3), as N)	N.A.	N.A.	21	7
Cyanide (free)	10	50	10	
Sulphate	N.A.	250 mg/l	N.A.	8
Petroleum hydrocarbons and related				
TPH (speciated analysis) *per fraction*	10	10	10	9, 10
Benzene	10	1.0	8	
Toluene	74	700	74	11
Xylenes (sum)	N.A.	500	N.A.	11
MTBE	2600	200	2600	12, 13
PAHs				
Anthracene	0.1	N.A.	0.1	
Benzo(b)fluoranthene + Benzo(k)fluoranthene (sum)	N.A.	Sum of 4 = 0.1	N.A.	
Benzo(g,h,i)perylene + indeno(1,2,3-c,d)pyrene (sum)	N.A.		N.A.	
Benzo(a)pyrene	1.7E-04	0.01	1.7E-04	
Fluoranthene	0.0063	N.A.	0.0063	
Naphthalene	2.0	N.A.	2.0	
Phenol				
Phenol	7.7	N.A.	7.7	
Chlorinated organics				
Dichloromethane	20	N.A.	20	
Trichloromethane (chloroform)	2.5	100	2.5	14
Tetrachloromethane (carbon tetrachloride)	12	3.0	12	
1,2-dichloroethane (1,2-DCA)	10	3.0	10	

Cadmium - inland waters EQS	
Hardness (as mg/l CaCO3)	EQS (µg/l)
<40	0.08
40-50	0.08
50-100	0.09
100-200	0.15
>=200	0.25

Ammonia - inland waters EQS		
Alkalinity (as mg/l CaCO3)	Altitude	EQS (µg/l)
<10	Any	300
10-50	Any	300
50-100	<80m	600
50-100	>80m	300
100-200	<80m	600
100-200	>80m	300
>200	Any	600

Parameter	GAC (µg/l, unless stated)			Notes
	Inland waters		Coastal and transition waters	
	EQS	DWS	EQS	
1,1,1-trichloroethane (1,1,1-TCA)	100	N.A.	100	
1,1,2-trichloroethane (1,1,2-TCA)	400	N.A.	300	
Trichloroethene (TCE)	10	Sum of 2 = 10	10	
Tetrachloroethene (PCE)	10		10	
Vinyl chloride	N.A.	0.5	N.A.	

Notes referenced in table:

1. Metals and metalloid EQS relate to dissolved contamination only (i.e. analysis of filtered samples).
2. Inland waters EQS for cadmium is dependent upon hardness or alkalinity of the receiving surface water. See separate table.
3. Separate EQS standards exist for Cr III and CrVI in fresh water. The fresh water Cr III has been value adopted as the screening value for total Cr analysis as it is normally the predominant form in solution. Specific EQS for Cr VI (3.4µg/l in freshwater; 0.6µg/l in transition and coastal waters) must be applied where relevant.
4. The bioavailable concentration of copper, nickel and zinc in fresh water is dependent upon the pH, DOC and calcium data for the receiving surface water. These data should be collected whenever possible to calculate an equivalent GAC for total metal concentration using the UKTAG m-BAT spreadsheet model. Although the standard indicates that lead should be assessed on a bioavilable basis, no tool is currently avaiable and this criterion should be applied as-is for screening purposes.
5. The value for mercury is the Maximum Acceptable Concentration (MAC) as no annual average EQS is specified in the legislation.
6. The EQS for zinc may be adjusted for the ambient uncontaminated background concentration in the receiving surface water where data are available.
7. EQS for ammonia in inland waters depends on the hardness and altitude of the receiving water body - see separate table. The criteria given here are based on the attainment of "good" chemical quality in the water body.
8. No EQS for sulphate appears in the referenced legislation.
9. No concentration-based EQS values currently exist for TPH. In the absence of specific criteria, our recent discussions with the Environment Agency have led us to adopt 10µg/l *for each individual fraction* determined by speciated TPH (TPHCWG) analysis.
10. No concentration-based DWS exists for TPH. A sum TPH concentration of 200µg/l defines the DW2 Class threshold limit in the Surface Water (Abstraction for Drinking Water) (Classification) Regulations 1996; DW2 waters are generally suitable for abstraction as drinking water supplies, subject to standard filtration and chemical treatment. We therefore consider that the 10µg/l criterion *for each fraction* provides a reasonable and proportionate basis for the initial assessment of risk posed to off-site groundwater and/or surface water potable abstractions that may be impacted at a downgradient abstraction point by TPH contamination originating from the site.
11. The drinking water-based criteria are from World Health Organisation (WHO) Guidelines for Drinking Water Quality, 2008. Taint may result at lower concentrations.
12. The "EQS" given here for MTBE is the PNEC value for fresh and sea water life given in: EU Risk Assessment Report (2002) MTBE, 3rd Priority List, volume 19.
13. DWS for MTBE is a 5-fold dilution of the USEPA (1997) Drinking Water Advisory value for taint, EPA-822-F-97-009. Toxicological thresholds are significantly higher.
14. Sum trihalomethanes limit for drinking water is 100µg/l but chloroform is only compound of this class normally encountered at contaminated sites.

Sources and general comments

Unless otherwise stated, EQS-based GACs are annual average surface water quality criteria given in Table 1 within Part 3 (Priority Substances) or long-term average criteria given in Table 1 within Part 2 (Specific Pollutants) of The Water Framework Directive (Standards and Classification) Directions (England and Wales), 2015.

Unless otherwise stated, drinking water standard-based GACs are taken from the Water Supply (Water Quality) Regulations 2016, and relate to concentration at the supply point and/or consumers' taps.

This list presents recommended GAC values for commonly monitored analytes but is not exhaustive. See the above-referenced legislation for the full lists of criteria.

APPENDIX F

PHOTOGRAPHS

	
General view of stockpile, facing eastwards	**General view of stockpile, facing westwards**
	
View of top of stockpile	**View of stockpile, facing southwards**
	
Trial pit reference STP01	**Trial pit reference STP02**