

## Hand Shear Vane Test Results

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
BH BB005	19/02/2021	0.60	45 (23)	47 (24)	44 (22)	45 (23)	
BH BB005	19/02/2021	1.20	44 (23)	48 (25)	40 (21)	44 (23)	
BH BB006	22/02/2021	0.70	38 (20)	38 (22)	36 (20)	37 (21)	
BH BB007	10/02/2021	0.60	34 (20)	38 (19)	42 (22)	38 (20)	
BH BB009	11/02/2021	0.50	36 (20)	38 (18)	40 (22)	38 (20)	
BH BB013	11/02/2021	0.60	34 (20)	38 (19)	42 (22)	38 (20)	
BH BB014	15/02/2021	0.60	34 (20)	38 (22)	38 (20)	37 (21)	
BH BB015	15/02/2021	0.60	34 (20)	38 (20)	40 (24)	37 (21)	
BH BB016	16/02/2021	0.60	34 (22)	38 (20)	40 (26)	37 (23)	
BH BB017	10/02/2021	0.50	51 (27)	45 (21)	51 (26)	49 (25)	
BH BB017	10/02/2021	1.00	48 (23)	48 (24)	56 (28)	51 (25)	
BH BB019	11/02/2021	0.50	42 (22)	44 (22)	48 (27)	45 (24)	

Residual results given in brackets.

<b>Contract Title :-</b> A66 North Trans Pennine Scheme D Section 7		<b>Client :-</b> AMEY OW Limited		<b>AEG Contract No :-</b> 4322C	
<b>Date of Issue :-</b> 01/09/2021		<b>Checked By :-</b> [REDACTED]		<b>Certificate No. :-</b> HSV/4322C/1	
<b>Page No. :-</b> 1 of 4		<b>Approved By :-</b> [REDACTED]			








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 Tel: 01772 735 300 Fax: 01772 735 959

## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
BH BB019	11/02/2021	1.00	51 (26)	44 (25)	46 (24)	47 (25)	
BH BB020	15/02/2021	0.60	28 (16)	26 (18)	28 (18)	27 (17)	
BH BB021	12/02/2021	0.60	28 (16)	26 (18)	28 (18)	27 (17)	
BH BB022	23/02/2021	0.50	36 (20)	38 (18)	40 (22)	38 (20)	
BH BB023	16/02/2021	0.60	28 (16)	26 (18)	31 (20)	28 (18)	
BH BB024	23/02/2021	0.60	38 (20)	36 (22)	38 (22)	37 (21)	
BH BB025	23/02/2021	0.50	36 (20)	36 (22)	40 (20)	37 (21)	
BH BB026	17/02/2021	0.60	34 (20)	38 (22)	34 (18)	35 (20)	
TP BB001	01/02/2021	0.40	42 (21)	37 (19)	41 (20)	40 (20)	
TP BB002	02/02/2021	0.45	41 (21)	36 (19)	38 (20)	38 (20)	
TP BB004	03/02/2021	0.50	45 (21)	39 (20)	44 (21)	43 (21)	
TP BB004	03/02/2021	1.50	46 (23)	48 (21)	40 (16)	45 (20)	

Residual results given in brackets.

	Contract Title :- A66 North Trans Pennine Scheme D Section 7		Client :- AMEY OW Limited		AEG Contract No :- 4322C	
	Date of Issue :- 01/09/2021		Checked By :- 		Certificate No. :- HSV/4322C/2	
Page No. :- 2 of 4			Approved By :- 			

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## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
TP BB005	18/02/2021	1.20	42 (18)	48 (20)	44 (18)	45 (19)	
TP BB005	18/02/2021	2.40	52 (26)	40 (16)	50 (18)	47 (20)	
TP BB006	03/02/2021	2.50	120 (34)	118 (42)	116 (43)	118 (40)	
TP BB006	03/02/2021	3.50	118 (46)	112 (44)	110 (43)	113 (44)	
TP BB007	03/02/2021	0.50	41 (21)	38 (15)	44 (21)	41 (19)	
TP BB007	03/02/2021	1.50	51 (23)	55 (28)	41 (18)	49 (23)	
TP BB008	05/02/2021	0.40	41 (23)	45 (26)	45 (22)	44 (24)	
TP BB009	05/02/2021	0.60	41 (20)	44 (21)	44 (22)	43 (21)	
TP BB009	05/02/2021	1.80	42 (19)	39 (18)	45 (24)	42 (20)	
TP BB010	04/02/2021	0.70	42 (18)	36 (21)	33 (20)	37 (20)	
TP BB010	04/02/2021	2.70	22 (8)	18 (8)	21 (9)	20 (9)	
TP BB011	08/02/2021	0.70	46 (21)	46 (23)	49 (24)	47 (23)	

Residual results given in brackets.

<b>Contract Title :-</b> A66 North Trans Pennine Scheme D Section 7		<b>Client :-</b> AMEY OW Limited		<b>AEG Contract No. :-</b> 4322C	
<b>Date of Issue :-</b> 01/09/2021		<b>Checked By :-</b> [REDACTED]		<b>Certificate No. :-</b> HSV/4322C/3	
<b>Page No. :-</b> 3 of 4		<b>Approved By :-</b> [REDACTED]			





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## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
TP BB614	18/02/2021	3.50	120	120	120	120	Results in excess of 120kPa - exceeds the device measuring range.

Residual results given in brackets.

	Contract Title :- A66 North Trans Pennine Scheme D Section 7		Client :- AMEY OW Limited		AEG Contract No :- 4322C	
	Date of Issue :- 01/09/2021		Checked By :- 		Certificate No. :- HSV/4322C/4	
Page No. :- 4 of 4			Approved By :-			

## Variable Head Permeability Test Results





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Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Falling Head      Test No: 1 of 1

**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C      Exploratory Hole: BH BB002      Depth (mBGL): 4.30

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	3.50	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	4.50	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	150.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	2.16	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Overcast		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	1.00	m	0	0	0	0.000	2.16	1.000	
Diameter, D:	0.15	m	0	0	0	0.000	2.16	1.000	
L/D:	6.67	Ratio	0	30	30	1.510	0.65	0.301	
Response Area, A:	0.0177	m <sup>2</sup>	1	0	60	1.780	0.38	0.176	
Intake Factor, F:	2.7329	Coefficient	1	30	90	1.920	0.24	0.111	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			2	0	120	2.010	0.15	0.069	
			2	30	150	2.040	0.12	0.056	
			3	0	180	2.060	0.10	0.046	

**Permeability Equations**

General Approach

$$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2) \quad \text{Eq.(i)}$$

**Lag Time Analysis**

$$K = \frac{A}{F \cdot T} \quad \text{Eq.(ii)}$$

Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H<sub>0</sub> of 0.37

**Permeability Variable Determination**

General Approach

Factor, T<sub>1</sub> : n/a      Seconds

Head, H<sub>1</sub> : n/a      m

Factor, T<sub>2</sub> : n/a      Seconds

Head, H<sub>2</sub> : n/a      m

**Permeability Graph**

Lag Time Analysis Approach

Lag Time, T : 27.04      Seconds

**Permeability Calculation**

General Approach      Eq.(i)

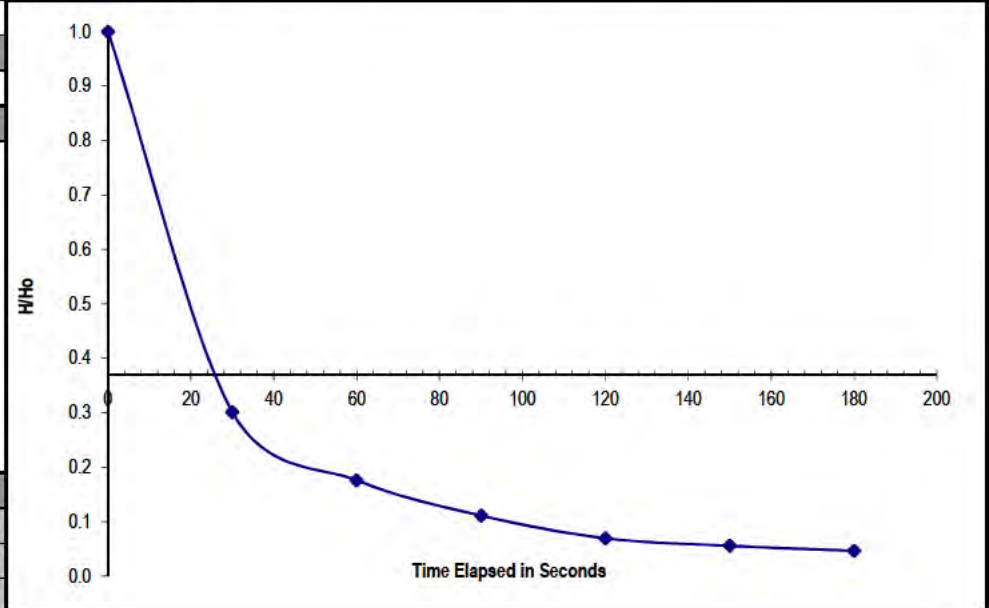
$K = \text{N/A}$       m/s

Lag Time Analysis      Eq.(ii)

$K = 2.39E-04$       m/s

**Approvals**

Operator	A.M.	19/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021





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**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Falling Head      Test No: 1 of 1

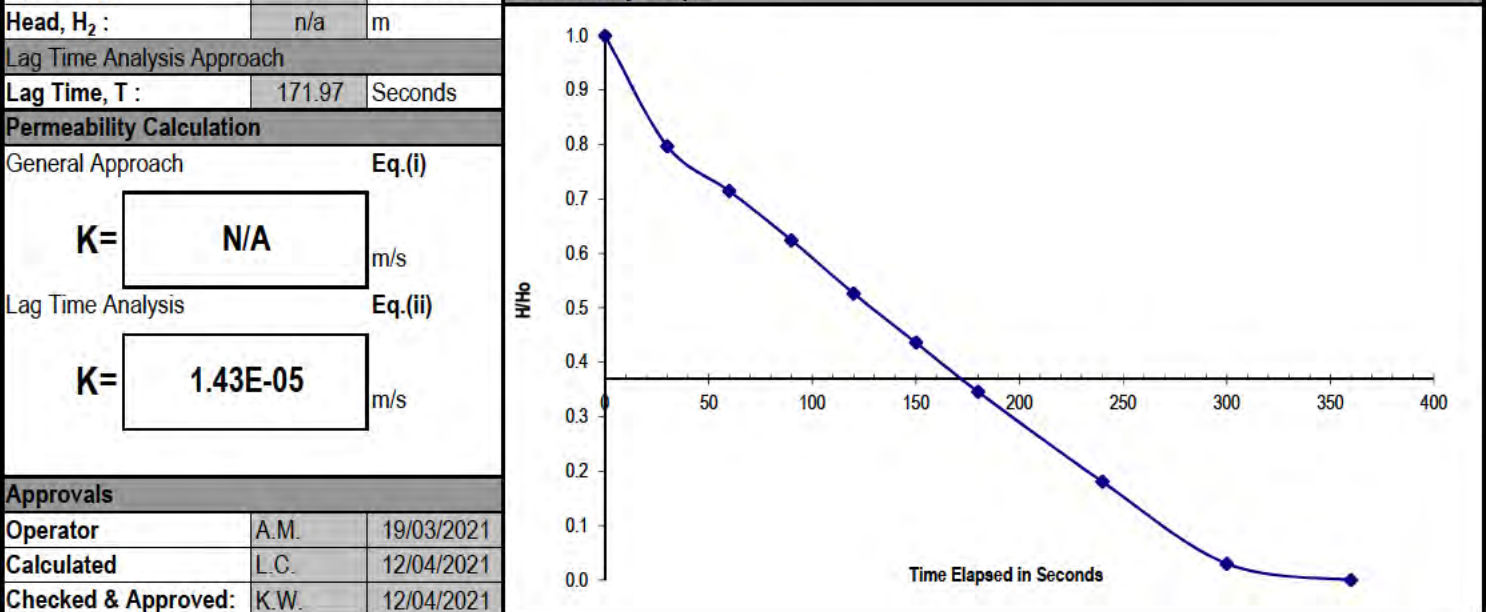
**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C      Exploratory Hole: BH BB004      Depth (mBGL): 4.50

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	1.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	5.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	150.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	1.33	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Overcast		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	4.00	m	0	0	0	0.000	1.33	1.000	
Diameter, D:	0.15	m	0	0	0	0.000	1.33	1.000	
L/D:	26.67	Ratio	0	30	30	0.270	1.06	0.797	
Response Area, A:	0.0177	m <sup>2</sup>	1	0	60	0.380	0.95	0.714	
Intake Factor, F:	7.2009	Coefficient	1	30	90	0.500	0.83	0.624	
using $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			2	0	120	0.630	0.70	0.526	
Permeability Equations			2	30	150	0.750	0.58	0.436	
General Approach			3	0	180	0.870	0.46	0.346	
Eq. (i) $K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$			4	0	240	1.090	0.24	0.180	
Lag Time Analysis			5	0	300	1.290	0.04	0.030	
Eq. (ii) $K = \frac{A}{F \cdot T}$			6	0	360	1.330	0.00	0.000	
Eq. (ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37									
Permeability Variable Determination									
General Approach									
Factor, T <sub>1</sub> :	n/a	Seconds							
Head, H <sub>1</sub> :	n/a	m							
Factor, T <sub>2</sub> :	n/a	Seconds							
Head, H <sub>2</sub> :	n/a	m							

**Permeability Graph**



**Approvals**

Operator	A.M.	19/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021



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Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Falling Head      Test No: 1 of 1

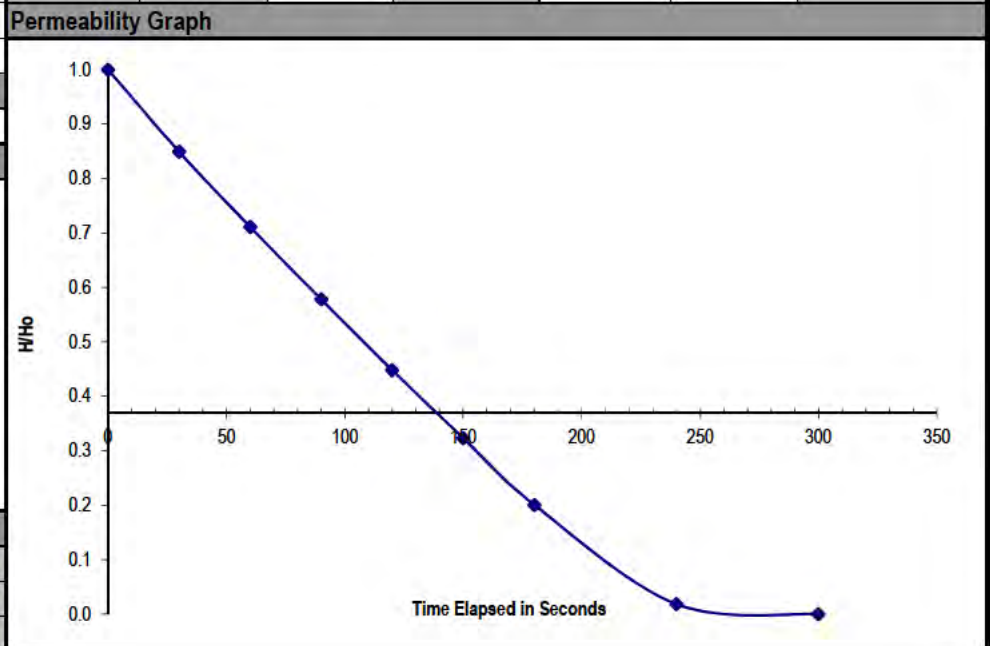
**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C      Exploratory Hole: BH BB005      Depth (mBGL): 5.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	4.50	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	5.50	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	150.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	3.84	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Overcast/Strong Wind		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	1.00	m	0	0	0	0.000	3.84	1.000	
Diameter, D:	0.15	m	0	0	0	0.580	3.26	0.849	
L/D:	6.67	Ratio	0	30	30	0.580	3.26	0.849	
Response Area, A:	0.0177	m <sup>2</sup>	1	0	60	1.110	2.73	0.711	
Intake Factor, F:	2.7329	Coefficient	1	30	90	1.620	2.22	0.578	
using $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			2	0	120	2.120	1.72	0.448	
Permeability Equations			2	30	150	2.600	1.24	0.323	
General Approach			3	0	180	3.070	0.77	0.201	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			4	0	240	3.770	0.07	0.018	
Lag Time Analysis			5	0	300	3.840	0.00	0.000	
$K = \frac{A}{F \cdot T}$ Eq.(ii)									
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37									
Permeability Variable Determination									
General Approach									
Factor, T <sub>1</sub> :	n/a	Seconds							
Head, H <sub>1</sub> :	n/a	m							
Factor, T <sub>2</sub> :	n/a	Seconds							
Head, H <sub>2</sub> :	n/a	m							

Permeability Graph		
Lag Time Analysis Approach		
Lag Time, T :	138.70	Seconds
Permeability Calculation		
General Approach Eq.(i)		
K =	N/A	m/s
Lag Time Analysis Eq.(ii)		
K =	4.66E-05	m/s
Approvals		
Operator	A.M.	23/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021





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**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

**Installation Type :** 19mm Standpipe Piezometer      **Method:** Rising Head      **Test No:** 1 of 1

**Contract & Position Details**

**Site:** A66 North Trans Pennine Scheme D Section 7  
**Contract :** 4322C      **Exploratory Hole:** BH BB011      **Depth (mBGL):** 4.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Top of Section:	3.50	mBGL	Option	Criteria	
Base of Section:	4.50	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Diameter of Section:	92.00	mm	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Measurement Offset:	0.00	mAGL	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Standpipe Diameter:	19.00	mm	<input type="radio"/> D	Well point or hole extended in uniform soil	
Initial Water Level:	1.29	mBGL	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Weather Conditions:	Cloudy/Sunny		<input type="radio"/> F	Soil in casing with bottom in uniform soil	
			<input checked="" type="radio"/> G	Standpipe or Piezometer	

**Initial Response Zone Calculations**      **Readings**

Length, L:	1.00	m	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Diameter, D:	0.09	m	0	0	0	2.770	1.48	1.000	
L/D:	10.87	Ratio	0	30	30	1.380	0.09	0.061	
Response Area, A:	0.0066	m <sup>2</sup>	1	0	60	1.290	0.00	0.000	
Intake Factor, F:	2.3118	Coefficient							

using  

$$2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$$

**Permeability Equations**

General Approach

$$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2) \quad \text{Eq.(i)}$$

Lag Time Analysis

$$K = \frac{A}{F \cdot T} \quad \text{Eq.(ii)}$$

Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H<sub>0</sub> of 0.37

**Permeability Variable Determination**

General Approach

Factor, T <sub>1</sub> :	n/a	Seconds
Head, H <sub>1</sub> :	n/a	m
Factor, T <sub>2</sub> :	n/a	Seconds
Head, H <sub>2</sub> :	n/a	m

Lag Time Analysis Approach

Lag Time, T :	20.12	Seconds
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**Permeability Calculation**

General Approach

$$K = \boxed{\text{N/A}} \quad \text{m/s} \quad \text{Eq.(i)}$$

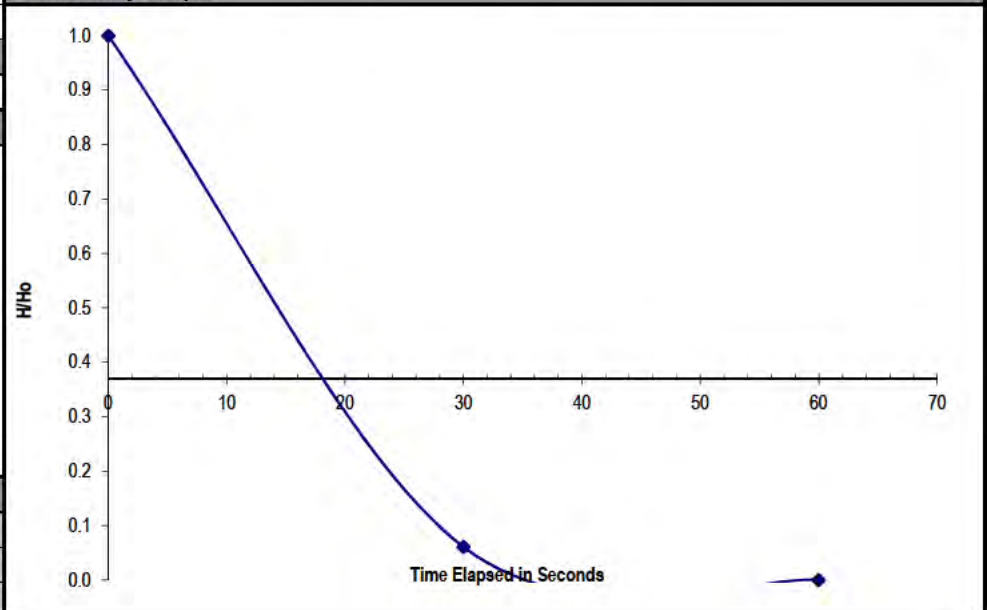
Lag Time Analysis

$$K = \boxed{1.43\text{E-}04} \quad \text{m/s} \quad \text{Eq.(ii)}$$

**Approvals**

Operator	A.M.	24/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021

**Permeability Graph**





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**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

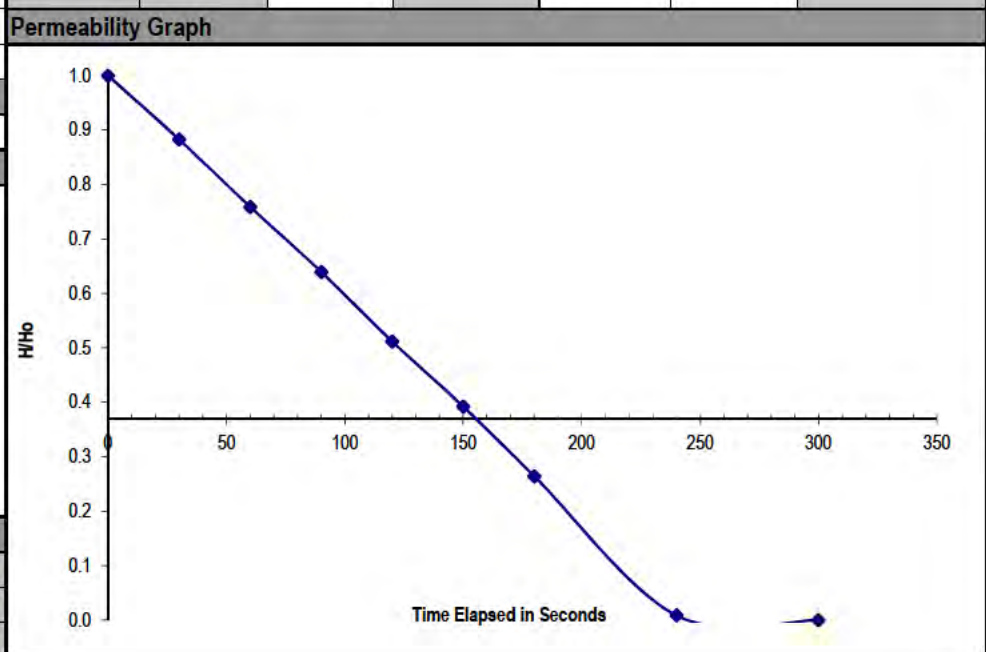
**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C      Exploratory Hole: BH BB012      Depth (mBGL): 8.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	7.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	9.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	92.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	2.08	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Cloudy/Sunny		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	2.00	m	0	0	0	6.850	4.77	1.000	
Diameter, D:	0.09	m	0	0	0	6.290	4.21	0.883	
L/D:	21.74	Ratio	0	30	30	5.700	3.62	0.759	
Response Area, A:	0.0066	m <sup>2</sup>	1	0	60	5.130	3.05	0.639	
Intake Factor, F:	3.7917	Coefficient	1	30	90	4.520	2.44	0.512	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			2	0	120	3.950	1.87	0.392	
<b>Permeability Equations</b>			3	0	180	3.340	1.26	0.264	
General Approach			4	0	240	2.120	0.04	0.008	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			5	0	300	2.080	0.00	0.000	
<b>Lag Time Analysis</b>									
$K = \frac{A}{F \cdot T}$ Eq.(ii)									
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37									
<b>Permeability Variable Determination</b>									
General Approach									
Factor, T <sub>1</sub> :	n/a	Seconds							
Head, H <sub>1</sub> :	n/a	m							
Factor, T <sub>2</sub> :	n/a	Seconds							
Head, H <sub>2</sub> :	n/a	m							

Permeability Graph		
General Approach		
Factor, T <sub>1</sub> :	n/a	Seconds
Head, H <sub>1</sub> :	n/a	m
Factor, T <sub>2</sub> :	n/a	Seconds
Head, H <sub>2</sub> :	n/a	m
<b>Lag Time Analysis Approach</b>		
Lag Time, T:	155.17	Seconds
<b>Permeability Calculation</b>		
General Approach      Eq.(i)		
K =	N/A	m/s
Lag Time Analysis      Eq.(ii)		
K =	1.13E-05	m/s
<b>Approvals</b>		
Operator	A.M.	24/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021





**ALLIED EXPLORATION & GEOTECHNICS LTD**

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 50mm Standpipe Method: Falling Head Test No: 1 of 1

**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C Exploratory Hole: BH BB013 Depth (mBGL): 4.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Top of Section:	1.50	mBGL	Option	Criteria	
Base of Section:	4.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Diameter of Section:	150.00	mm	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Measurement Offset:	0.00	mAGL	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Standpipe Diameter:	50.00	mm	<input type="radio"/> D	Well point or hole extended in uniform soil	
Initial Water Level:	2.93	mBGL	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Weather Conditions:	Overcast/Sunny		<input type="radio"/> F	Soil in casing with bottom in uniform soil	
			<input checked="" type="radio"/> G	Standpipe or Piezometer	

**Initial Response Zone Calculations**

Initial Response Zone Calculations			Readings						
Length, L:	2.50	m	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Diameter, D:	0.15	m	0	0	0	0.000	2.93	1.000	
L/D:	16.67	Ratio	0	30	30	1.520	1.41	0.481	
Response Area, A:	0.0177	m <sup>2</sup>	1	0	60	2.770	0.16	0.055	
Intake Factor, F:	5.0910	Coefficient	1	30	90	2.930	0.00	0.000	

using  
 $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$

**Permeability Equations**

General Approach  

$$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2) \quad \text{Eq.(i)}$$

Lag Time Analysis  

$$K = \frac{A}{F \cdot T} \quad \text{Eq.(ii)}$$

Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H<sub>0</sub> of 0.37

**Permeability Variable Determination**

General Approach		
Factor, T <sub>1</sub> :	n/a	Seconds
Head, H <sub>1</sub> :	n/a	m
Factor, T <sub>2</sub> :	n/a	Seconds
Head, H <sub>2</sub> :	n/a	m

**Permeability Graph**

**Lag Time Analysis Approach**

Lag Time, T : 37.82 Seconds

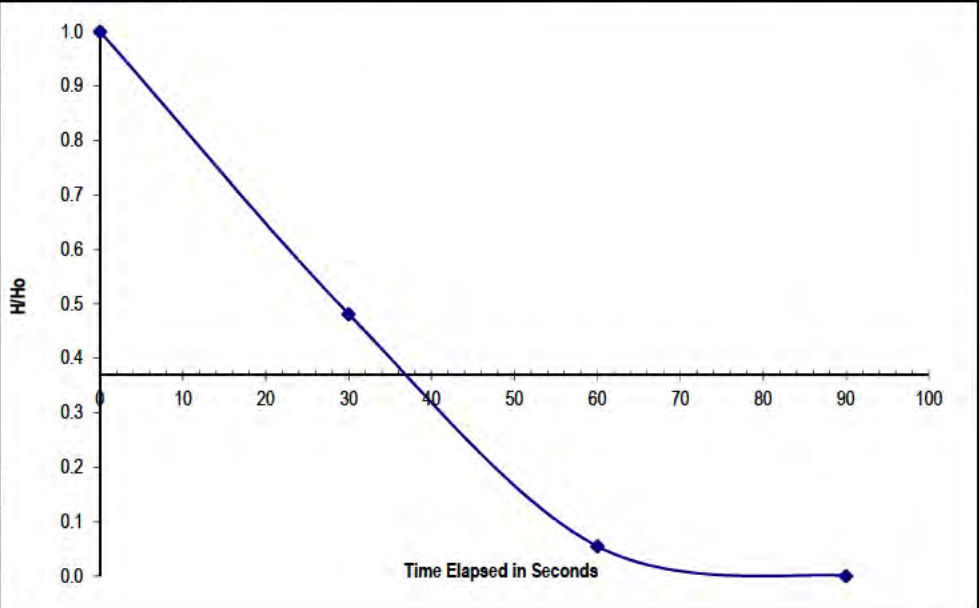
**Permeability Calculation**

General Approach Eq.(i)

$K = \frac{N/A}{m/s}$

Lag Time Analysis Eq.(ii)

$K = \frac{9.18E-05}{m/s}$



**Approvals**

Operator	A.M.	24/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021



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Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
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**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C      Exploratory Hole: BH BB018      Depth (mBGL): 4.50

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Top of Section:	3.50	mBGL	Option	Criteria	
Base of Section:	5.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Diameter of Section:	140.00	mm	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Measurement Offset:	0.00	mAGL	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Standpipe Diameter:	19.00	mm	<input type="radio"/> D	Well point or hole extended in uniform soil	
Initial Water Level:	3.84	mBGL	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Weather Conditions:	Sunny/Overcast		<input type="radio"/> F	Soil in casing with bottom in uniform soil	
			<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Length, L:	1.50	m	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Diameter, D:	0.14	m	0	0	0	4.420	0.58	1.000	
L/D:	10.71	Ratio	0	10	10	4.280	0.44	0.759	
Response Area, A:	0.0154	m <sup>2</sup>	0	20	20	4.140	0.30	0.517	
Intake Factor, F:	3.4835	Coefficient	0	30	30	4.000	0.16	0.276	
using $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			0	40	40	3.840	0.00	0.000	

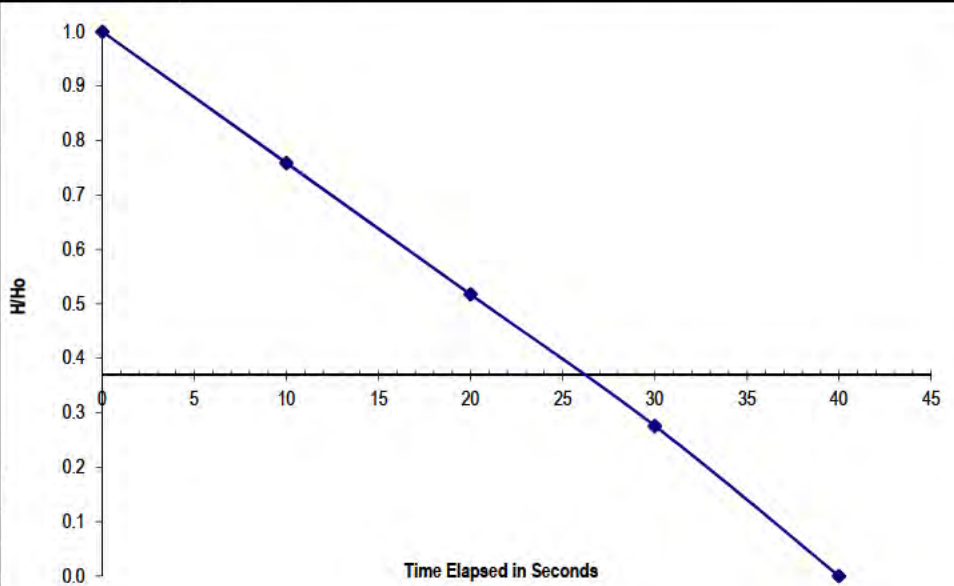
Permeability Equations		
General Approach		
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)		
Lag Time Analysis		
$K = \frac{A}{F \cdot T}$ Eq.(ii)		
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37		

Permeability Variable Determination		
General Approach		
Factor, T <sub>1</sub> :	n/a	Seconds
Head, H <sub>1</sub> :	n/a	m
Factor, T <sub>2</sub> :	n/a	Seconds
Head, H <sub>2</sub> :	n/a	m

Permeability Graph		
Lag Time Analysis Approach		
Lag Time, T:	26.10	Seconds

Permeability Calculation		
General Approach      Eq.(i)		
K =	N/A	m/s
Lag Time Analysis      Eq.(ii)		
K =	1.69E-04	m/s

Approvals		
Operator	A.M.	24/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021





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**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 7  
Contract : 4322C      Exploratory Hole: BH BB022      Depth (mBGL): 3.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	1.50	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	3.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	150.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	0.32	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Cloudy/Sunny		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	1.50	m	0	0	0	2.720	2.40	1.000	
Diameter, D:	0.15	m	1	0	60	2.720	2.40	1.000	
L/D:	10.00	Ratio	2	0	120	2.710	2.39	0.996	
Response Area, A:	0.0177	m <sup>2</sup>	3	0	180	2.710	2.39	0.996	
Intake Factor, F:	3.5615	Coefficient	4	0	240	2.700	2.38	0.992	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			5	0	300	2.700	2.38	0.992	
<b>Permeability Equations</b>			6	0	360	2.700	2.38	0.992	
General Approach			7	0	420	2.690	2.37	0.988	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			8	0	480	2.680	2.36	0.983	
Lag Time Analysis			9	0	540	2.670	2.35	0.979	
$K = \frac{A}{F \cdot T}$ Eq.(ii)			10	0	600	2.660	2.34	0.975	
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37			15	0	900	2.640	2.32	0.967	
<b>Permeability Variable Determination</b>			20	0	1200	2.620	2.30	0.958	
General Approach			25	0	1500	2.600	2.28	0.950	
Factor, T <sub>1</sub> :	0	Seconds	30	0	1800	2.590	2.27	0.946	
Head, H <sub>1</sub> :	2.40	m	40	0	2400	2.560	2.24	0.933	
Factor, T <sub>2</sub> :	600	Seconds	50	0	3000	2.540	2.22	0.925	
Head, H <sub>2</sub> :	2.34	m	60	0	3600	2.530	2.21	0.921	

Lag Time Analysis Approach  
Lag Time, T : n/a      Seconds

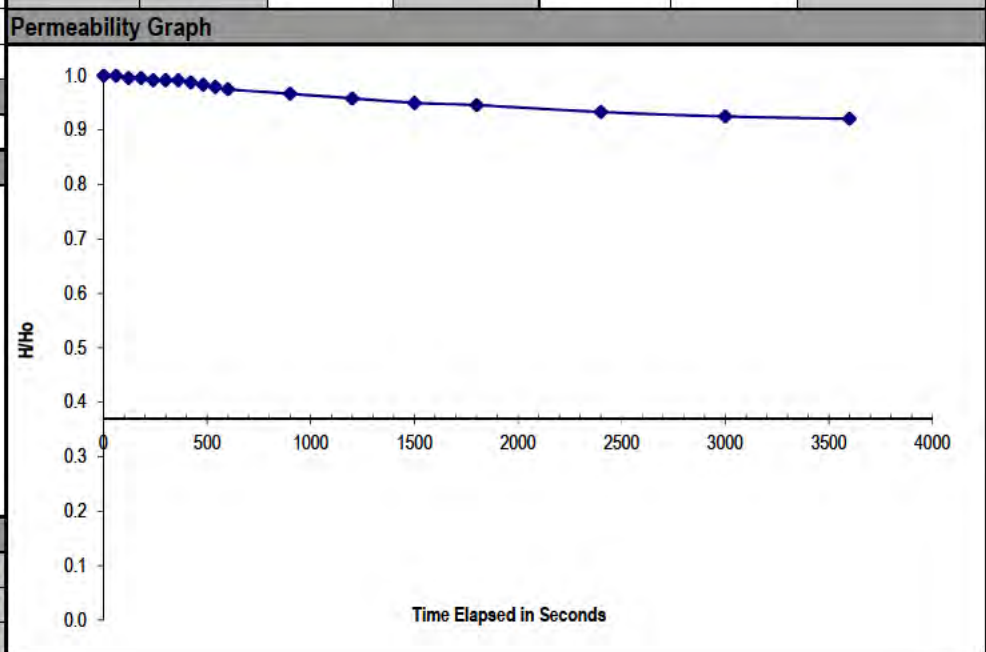
**Permeability Calculation**

General Approach      Eq.(i)  
 $K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$   
**K = 2.09E-07**      m/s

Lag Time Analysis      Eq.(ii)  
 $K = \frac{A}{F \cdot T}$   
**K = N/A**      m/s

**Approvals**

Operator	A.M.	24/03/2021
Calculated	L.C.	12/04/2021
Checked & Approved:	K.W.	12/04/2021





**ALLIED EXPLORATION & GEOTECHNICS LTD**

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Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

**Installation Type :** 19mm Standpipe Piezometer      **Method:** Rising Head      **Test No:** 1 of 1

**Contract & Position Details**

**Site:** A66 North Trans Pennine Scheme D Section 7  
**Contract :** 4322C      **Exploratory Hole:** BH BB024      **Depth (mBGL):** 2.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	1.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	3.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	150.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	1.24	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Cloudy/Sunny		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	2.00	m	0	0	0	1.880	0.64	1.000	
Diameter, D:	0.15	m	1	0	60	1.850	0.61	0.953	
L/D:	13.33	Ratio	2	0	120	1.810	0.57	0.891	
Response Area, A:	0.0177	m <sup>2</sup>	3	0	180	1.770	0.53	0.828	
Intake Factor, F:	4.3430	Coefficient	4	0	240	1.740	0.50	0.781	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			5	0	300	1.710	0.47	0.734	
<b>Permeability Equations</b>			6	0	360	1.690	0.45	0.703	
General Approach			7	0	420	1.670	0.43	0.672	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			8	0	480	1.650	0.41	0.641	
Lag Time Analysis			9	0	540	1.630	0.39	0.609	
$K = \frac{A}{F \cdot T}$ Eq.(ii)			10	0	600	1.610	0.37	0.578	
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37			15	0	900	1.520	0.28	0.438	
<b>Permeability Variable Determination</b>			20	0	1200	1.440	0.20	0.313	
General Approach			25	0	1500	1.350	0.11	0.172	
Factor, T <sub>1</sub> :	n/a	Seconds	30	0	1800	1.280	0.04	0.063	
Head, H <sub>1</sub> :	n/a	m	40	0	2400	1.240	0.00	0.000	
Factor, T <sub>2</sub> :	n/a	Seconds	<b>Permeability Graph</b>						
Head, H <sub>2</sub> :	n/a	m							
Lag Time Analysis Approach									
Lag Time, T :	1062.00	Seconds							

Permeability Calculation		
General Approach	Eq.(i)	
$K =$	<b>N/A</b>	m/s
Lag Time Analysis	Eq.(ii)	
$K =$	<b>3.83E-06</b>	m/s

Approvals		
Operator	A.M.	24/03/2021
Calculated	L.C.	09/04/2021
Checked & Approved:	K.W.	09/04/2021

*In-situ* Water Quality Parameter Test Results



# ALLIED EXPLORATION GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01254 503 200 Fax: 01254 662 590

## IN-SITU WATER QUALITY PARAMETER MONITORING RESULTS

Date of Test: 30/03/2021

Operator: A.M.

Weather Condition (inc temperature): Sunny (8-14°C)

Monitoring Point	Time	pH	Temp (°C)	Electrical Conductivity (µs)	Redox Potential (mv)	Dissolved Oxygen (%)
BH BB007	10:24:00	7.87	9.65	425.38	-2.6	3.40
	10:27:00	7.97	9.67	425.70	-22.6	3.37
	10:30:00	8.00	9.71	425.93	-10.1	3.36
BH BB013	09:13:00	8.11	10.07	554.09	-10.1	3.82
	09:16:00	8.16	10.12	555.38	-45.8	3.65
	09:19:00	8.19	10.19	556.40	-7.4	3.61

Remarks :

Contract Title: **A66 North Trans Pennine Scheme D Section 7**

Client: **AMEY OW Limited**



Checked By: LC

Approved By: [Signature]



Date of issue: 06/04/2021      Page No. : 1

AEG Contract No. : 4322C



## Photo-ionisation Detector Test Results



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office:  
Regional Office:

Unit 25 Steila Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
Tel: 01772 735 300 Fax: 01772 735 999

## PHOTO-IONISATION DETECTOR

Exploratory Hole No.	Depth (m)	PID (ppm)	Date Tested	Remarks
BH BB013	0.30	See Remarks	11/02/2021	<0.1ppm
BH BB013	0.80	See Remarks	11/02/2021	<0.1ppm
BH BB013	2.00	See Remarks	11/02/2021	<0.1ppm
BH BB013	3.40	See Remarks	11/02/2021	<0.1ppm
BH BB013	4.40	See Remarks	11/02/2021	<0.1ppm

See attached Calibration Certificate for Model No. and any other details

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Calibration Compliant :-  
YES

Date of Issue :-

01/09/2021

Page No. :-

1 of 1

Checked



AEG Contract No. :-  
4322C





...everything gas detection

## Certificate of Calibration

Customer: Allied Exploration & Geotechnics Ltd

Instrument: MiniRAE 2000

Job: Service, Test & Calibration

Serial number: 110-900192

Fleet Number: N/A

Certificate no: 900192/140720

Next calibration due date: 14 July 2021

Tested on: 14 July 2020


Calibrated for: Isobutylene

<u>Applied Gas Concentration:</u>	<u>Cylinder Reference:</u>	<u>Initial Sensor Reading</u>	<u>Final Sensor Reading</u>	<u>Accuracy Limits</u>
Isobutylene: 100 ppm	AG3607-3-2	94.0 ppm	100.0 ppm	± 2%

The Instrument has been calibrated after Re-Zeroing & Introducing Span Calibration Gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO6145-6:2008

Calibration Engineer: P Lonsdale

Sign: 

Quality Assessed by (Print):	C.S.	Sign:	
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**Determination of the Soil Infiltration Rate for Soakaway Design  
Test Results**

**ALLIED EXPLORATION & GEOTECHNICS LTD.**  
 Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
 Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

**SITE:** A66 North Trans Pennine Scheme D Section 7

**CONTRACT:** 4322C    **PIT:** TP BB005    **DEPTH:** 2.00    **mBGL**

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.15	mBGL
Operator:	J. Beckett	
Test Date:	18/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.788	m
Soakaway 75% Full:	1.363	m
Soakaway 50% Full:	1.575	m
Test No.:	1 of 1	
Weather Conditions:	Fair	
Test Zone (m):	1.15	to 2.00

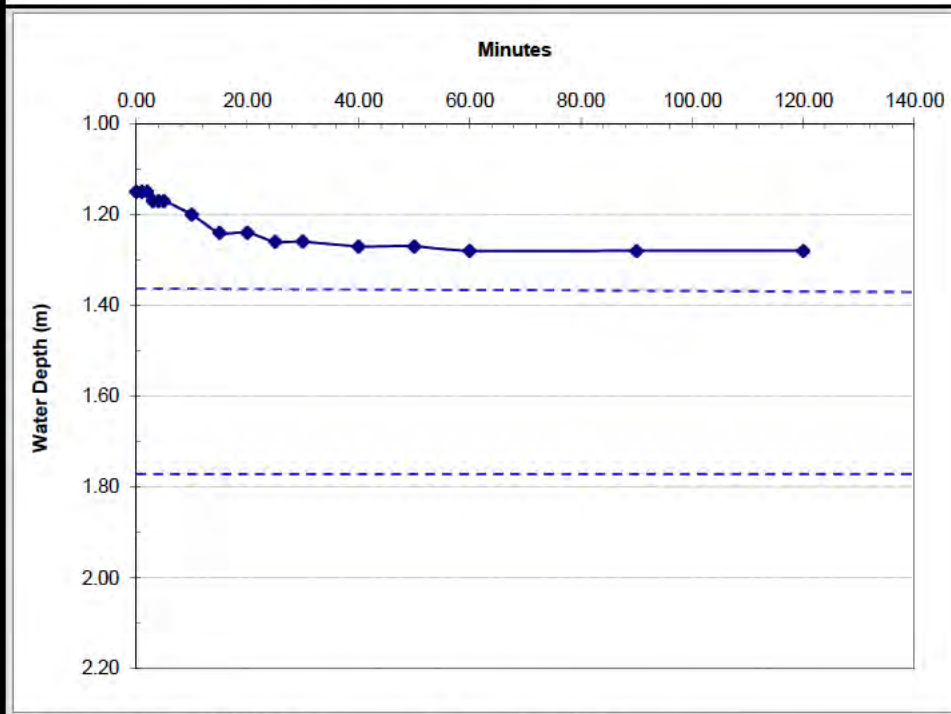
**TEST CALCULATION**

**Soil Infiltration (f)**

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

- $V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.
- $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.15	Test Start
1.00	1.15	
2.00	1.15	
3.00	1.17	
4.00	1.17	
5.00	1.17	
10.00	1.20	
15.00	1.24	
20.00	1.24	
25.00	1.26	
30.00	1.26	
40.00	1.27	
50.00	1.27	
60.00	1.28	
90.00	1.28	
120.00	1.28	Test Finish



Time (from Graph) 75% Full: n/a Minutes  
 Time (from Graph) 25% Full: n/a Minutes  
 $t_{p75-25} =$  n/a Minutes

**MATERIAL TYPE**  
 1.60-4.30m: Firm to stiff brown and grey sandy slightly gravelly CLAY with medium cobble content.

**REMARKS**

(1) Neither the 75% and 25% effective depth level reached during the test. Test should be considered failed – no infiltration (f) calculated. (2) Soakaway terminated at 120 minutes

**SOIL INFILTRATION RESULTS**

$V_{p75-25} =$  0.850 m<sup>3</sup>  
 $a_{p50} =$  4.550 m<sup>2</sup>  
 Soil Infiltration Rate (f) = n/a m/s From (i)

Calculated: KW    Date: 17/03/2021



**ALLIED EXPLORATION & GEOTECHNICS LTD.**  
 Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
 Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

**SITE:** A66 North Trans Pennine Scheme D Section 7

**CONTRACT:** 4322C    **PIT:** TP BB011    **DEPTH:** 2.00    **mBGL**

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.26	mBGL
Operator:	J. Myall	
Test Date:	08/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.815	m
Soakaway 75% Full:	1.445	m
Soakaway 50% Full:	1.630	m
Test No.:	1 of 3	
Weather Conditions:	Heavy snow	
Test Zone (m):	1.26	to 2.00

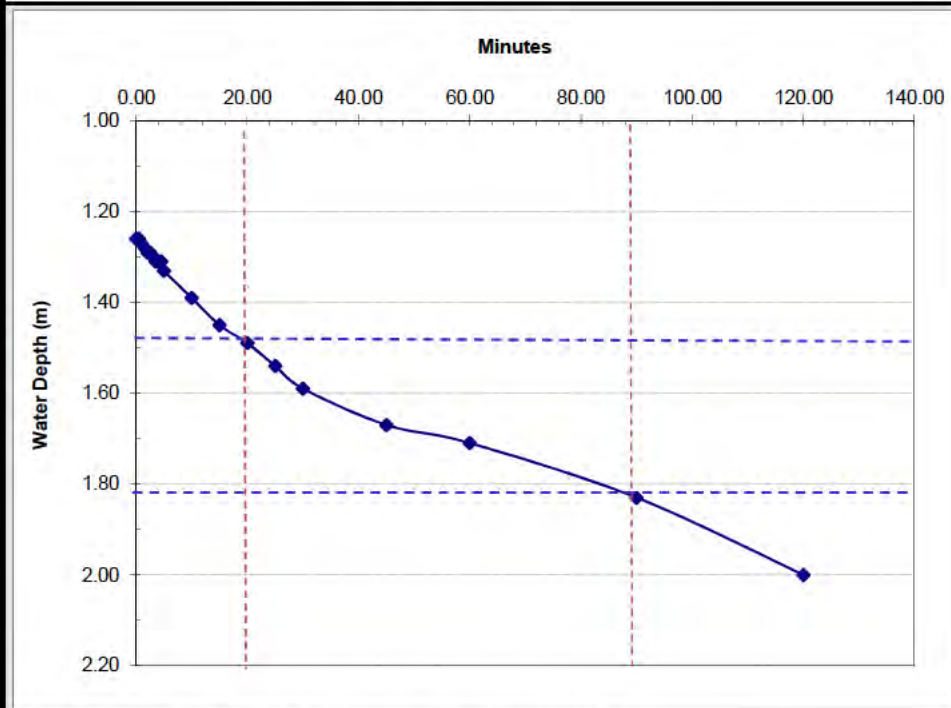
**TEST CALCULATION**

**Soil Infiltration (f)**

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

- $V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.
- $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.26	Test Start
0.50	1.26	
1.00	1.27	
1.50	1.28	
2.00	1.29	
2.50	1.29	
3.00	1.30	
3.50	1.31	
4.00	1.31	
4.50	1.31	
5.00	1.33	
10.00	1.39	
15.00	1.45	
20.00	1.49	
25.00	1.54	
30.00	1.59	
45.00	1.67	
60.00	1.71	
90.00	1.83	
120.00	2.00	Test Finish



Time (from Graph) 75% Full: 20.0 Minutes  
 Time (from Graph) 25% Full: 89.0 Minutes

$t_{p75-25} = 69.0$  Minutes

**MATERIAL TYPE**

0.80-2.20m: Soft light brown sandy gravelly CLAY with low cobble content.

**REMARKS**

(1) Infiltration rate (f) calculated. (2) Average infiltration rate (f) calculated from all three soakaway test procedures. (See sheet 3 of 3 for average infiltration rate). (3) Soakaway terminated at 120 minutes.

**SOIL INFILTRATION RESULTS**

$V_{p75-25} = 0.740 \text{ m}^3$   
 $a_{p50} = 4.220 \text{ m}^2$

**Soil Infiltration Rate (f) = 4.24E-05 m/s From (i)**

Calculated: KW    Date: 17/03/2021

**ALLIED EXPLORATION & GEOTECHNICS LTD.**  
 Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
 Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

**SITE:** A66 North Trans Pennine Scheme D Section 7

**CONTRACT:** 4322C    **PIT:** TPBB011    **DEPTH:** 2.00    **mBGL**

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.31	mBGL
Operator:	J. Myall	
Test Date:	08/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.828	m
Soakaway 75% Full:	1.483	m
Soakaway 50% Full:	1.655	m
Test No.:	2 of 3	
Weather Conditions:	Heavy snow	
Test Zone (m):	1.31	to 2.00

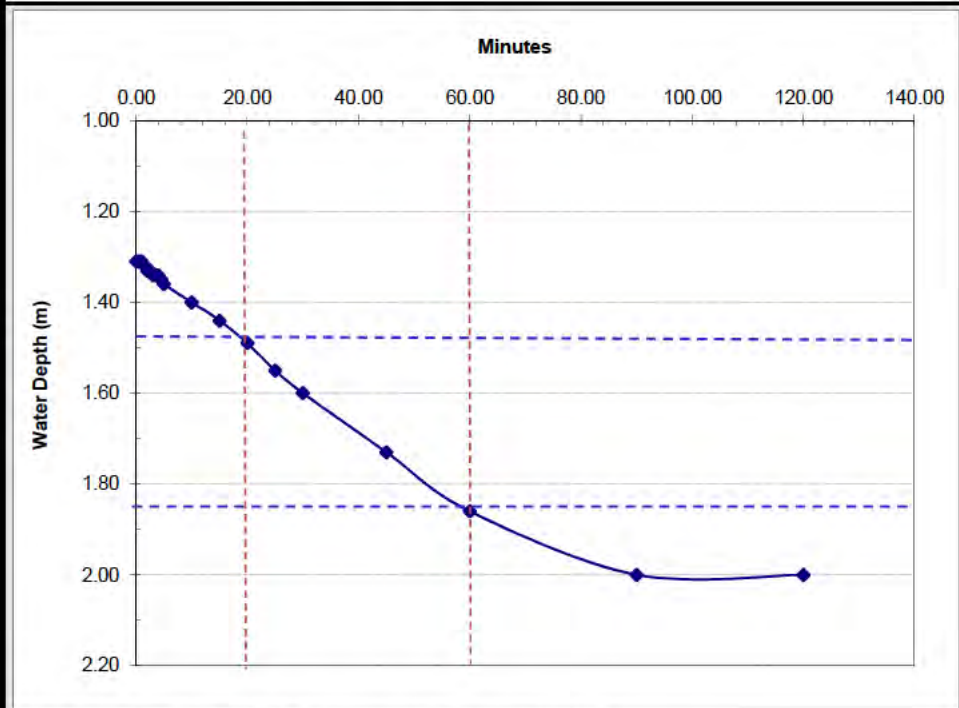
**TEST CALCULATION**

**Soil Infiltration (f)**

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

- $V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.
- $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.31	Test Start
0.50	1.31	
1.00	1.31	
1.50	1.32	
2.00	1.33	
2.50	1.33	
3.00	1.34	
3.50	1.34	
4.00	1.34	
4.50	1.35	
5.00	1.36	
10.00	1.40	
15.00	1.44	
20.00	1.49	
25.00	1.55	
30.00	1.60	
45.00	1.73	
60.00	1.86	
90.00	2.00	
120.00	2.00	Test Finish



Time (from Graph) 75% Full: 20.0 Minutes  
 Time (from Graph) 25% Full: 60.0 Minutes  
 $t_{p75-25} = 40.0$  Minutes

**MATERIAL TYPE**  
 0.80-2.20m: Soft light brown sandy gravelly CLAY with low cobble content.

**REMARKS**

(1) Infiltration rate (f) calculated. (2) Average infiltration rate (f) calculated from all three soakaway test procedures. (See sheet 3 of 3 for average infiltration rate). (3) Soakaway terminated at 120 minutes.

**SOIL INFILTRATION RESULTS**

$V_{p75-25} = 0.690 \text{ m}^3$   
 $a_{p50} = 4.070 \text{ m}^2$   
**Soil Infiltration Rate (f) = 7.06E-05 m/s From (i)**

Calculated: KW    Date: 17/03/2021



**ALLIED EXPLORATION & GEOTECHNICS LTD.**  
 Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
 Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

**SITE:** A66 North Trans Pennine Scheme D Section 7

**CONTRACT:** 4322C    **PIT:** TPBB011    **DEPTH:** 2.00    **mBGL**

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.31	mBGL
Operator:	J. Myall	
Test Date:	08/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.828	m
Soakaway 75% Full:	1.483	m
Soakaway 50% Full:	1.655	m
Test No.:	3 of 3	
Weather Conditions:	Heavy snow	
Test Zone (m):	1.31	to 2.00

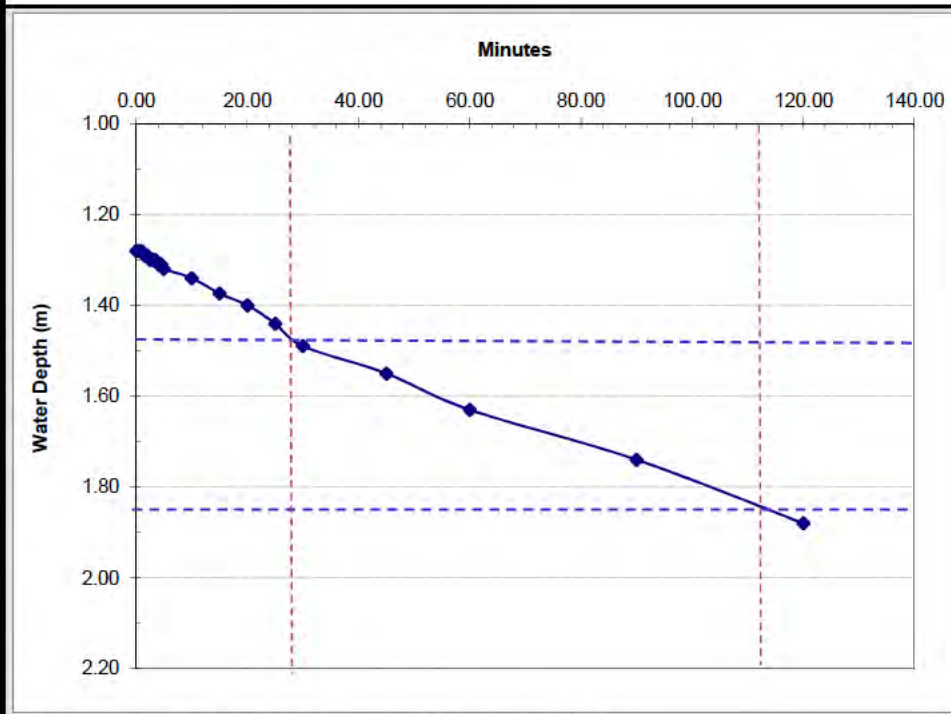
**TEST CALCULATION**

**Soil Infiltration (f)**

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

$V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.  
 $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area  
 $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.28	Test Start
0.50	1.28	
1.00	1.28	
1.50	1.29	
2.00	1.29	
2.50	1.30	
3.00	1.30	
3.50	1.30	
4.00	1.31	
4.50	1.31	
5.00	1.32	
10.00	1.34	
15.00	1.37	Test Finish
20.00	1.40	
25.00	1.44	
30.00	1.49	
45.00	1.55	
60.00	1.63	
90.00	1.74	
120.00	1.88	



Time (from Graph) 75% Full: 28.0 Minutes  
 Time (from Graph) 25% Full: 113.0 Minutes

$t_{p75-25} = 85.0$  Minutes

**MATERIAL TYPE**

0.80-2.20m: Soft light brown sandy gravelly CLAY with low cobble content.

**REMARKS**

(1) Infiltration rate (f) calculated. (2) Average infiltration rate (f) calculated from all three soakaway test procedures. (3) Soakaway terminated at 120 minutes.

**SOIL INFILTRATION RESULTS**

$V_{p75-25} = 0.690 \text{ m}^3$   
 $a_{p50} = 4.070 \text{ m}^2$

Soil Infiltration Rate (f) = 3.32E-05 m/s From (i)  
 Ave. Infiltration Rate (f) = 4.88E-05 m/s

Calculated: KW    Date: 17/03/2021

**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**

Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

SITE: A66 North Trans Pennine Scheme D Section 7

CONTRACT: 4322C      PIT: TP BB014      DEPTH: 2.00      mBGL

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.35	mBGL
Operator:	J. Beckett	
Test Date:	18/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.838	m
Soakaway 75% Full:	1.513	m
Soakaway 50% Full:	1.675	m
Test No.:	1 of 1	
Weather Conditions:	Raining	
Test Zone (m):	1.35	to 2.00

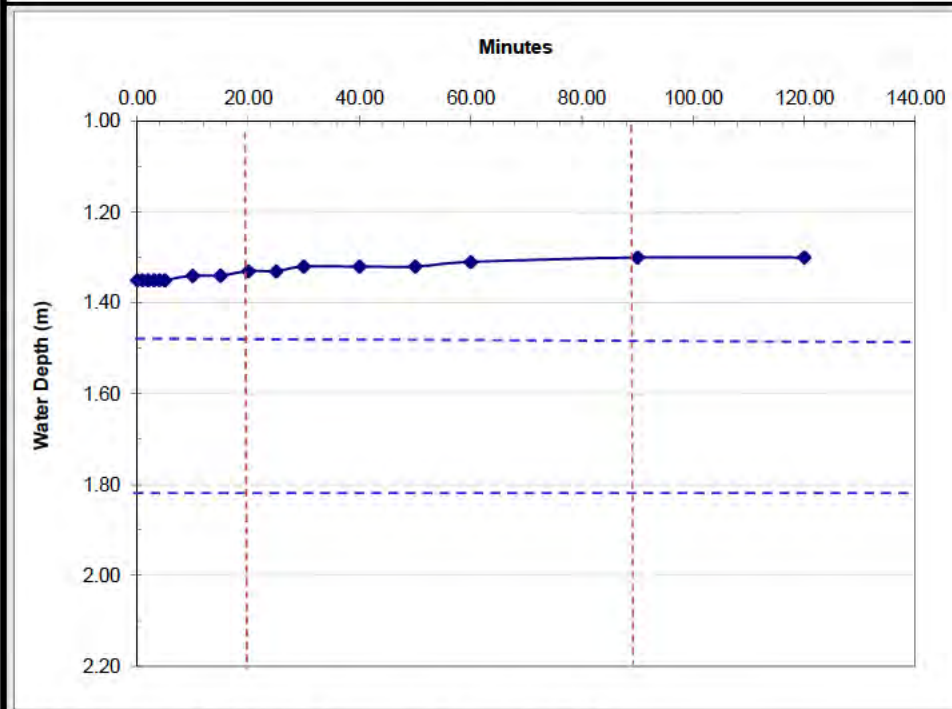
**TEST CALCULATION**

Soil Infiltration (*f*)

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

- $V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.
- $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.35	Test Start
1.00	1.35	
2.00	1.35	
3.00	1.35	
4.00	1.35	
5.00	1.35	
10.00	1.34	
15.00	1.34	
20.00	1.33	
25.00	1.33	
30.00	1.32	
40.00	1.32	
50.00	1.32	
60.00	1.31	
90.00	1.30	
120.00	1.30	Test Finish



Time (from Graph) 75% Full: n/a Minutes  
Time (from Graph) 25% Full: n/a Minutes

$$t_{p75-25} = \text{n/a} \quad \text{Minutes}$$

**MATERIAL TYPE**

0.30-1.60m: Firm slightly sandy gravelly CLAY with medium cobble content. 1.60-1.90m: Clayey sandy GRAVEL with medium cobble content. 1.90-2.70m: Firm to siff slightly sandy gravelly CLAY.

**REMARKS**

**SOIL INFILTRATION RESULTS**

$V_{p75-25} = 0.650 \quad m^3$   
 $a_{p50} = 3.950 \quad m^2$   
Soil Infiltration Rate (*f*) = n/a      m/s      From (i)

Calculated: KW      Date: 17/03/2021



## Plate Load Test Results

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

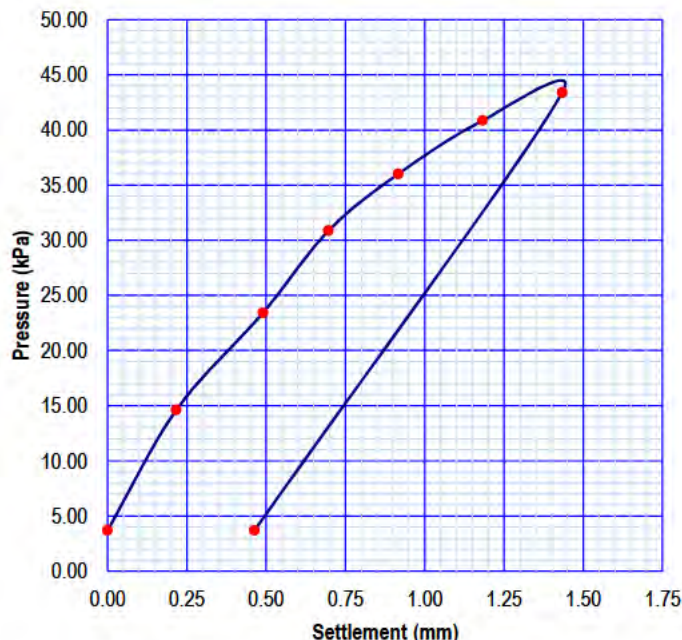
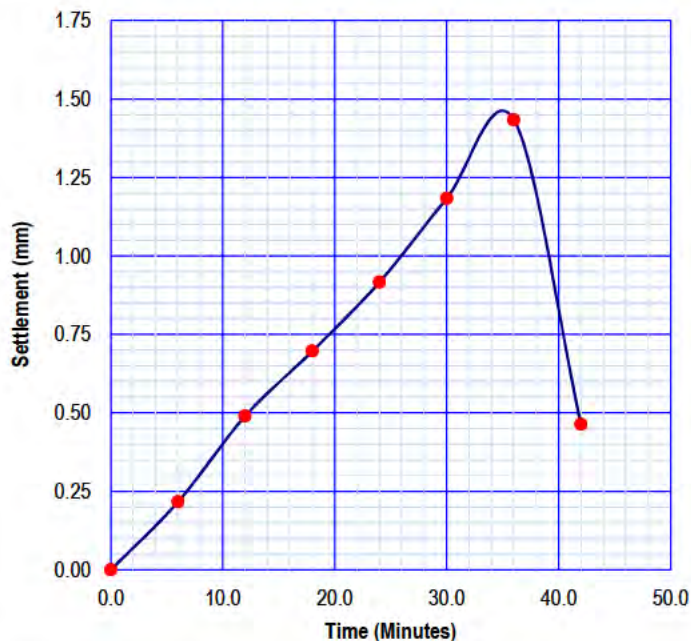
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b> A66 North Trans Pennine Scheme D Section 7			
<b>Client:</b> AMEY		<b>Project No.:</b> 4322C	
<b>Test Position:</b> TP BB001	<b>Depth (mBGL):</b> 0.40	<b>Operator:</b> JM	
<b>Date of Test:</b> 01/02/2021	<b>Plate Diameter (mm):</b> 453	<b>Plate Area (m<sup>2</sup>):</b> 0.16117	
<b>Reaction Load:</b> JCB 3CX (8T)		<b>Sample:</b> Yes	
<b>Weather:</b> Fair		<b>Equipment Mass (Kg):</b> 60.57	
<b>Test Type:</b> Incremental - Equivalent CBR		<b>Equipment Force (kN):</b> 0.594	
<b>Material Type:</b> Soft brown sandy gravelly CLAY			
<b>Remarks:</b> Self weight of the equipment calculated at 3.69 kPa (i.e. plate, extension rod, jack piston and load cell).			

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.69	0.00	0.000
1	6.0	1.76	14.61	0.22	0.015
2	12.0	3.18	23.42	0.49	0.021
3	18.0	4.38	30.86	0.70	0.023
4	24.0	5.21	36.01	0.92	0.025
5	30.0	5.99	40.85	1.18	0.029
6	36.0	6.40	43.39	1.43	0.033
7	42.0	0.00	3.69	0.46	0.126

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 21056.3	<b>kN/m<sup>2</sup>/m</b>
<b>Plate Load @1.25mm (kPa):</b> 42.00	<b>Equivalent CBR:</b> 1.90	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 26.50	<b>MN/m<sup>2</sup></b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322C/TP BB001	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> Nick Vater	<b>Moisture Content:</b> 30.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 08/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

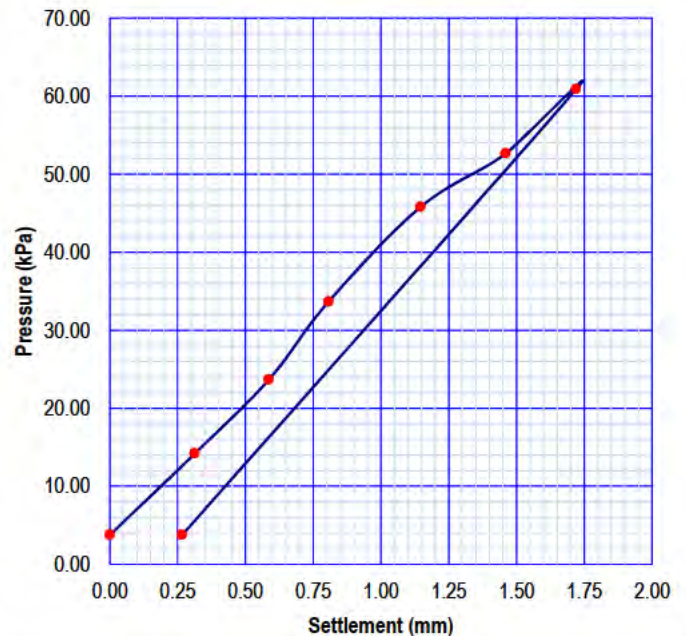
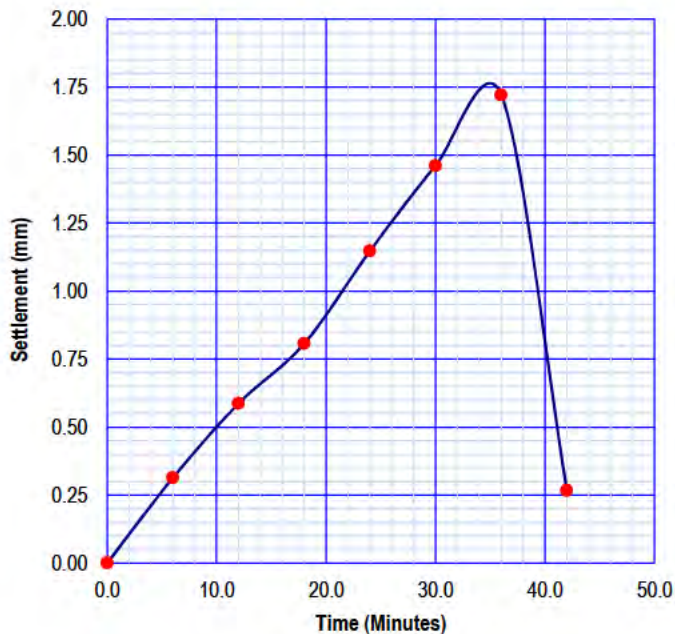
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b> A66 North Trans Pennine Scheme D Section 7	
<b>Client:</b> AMEY	<b>Project No.:</b> 4322C
<b>Test Position:</b> TP BB002	<b>Depth (mBGL):</b> 0.45
<b>Date of Test:</b> 02/01/2021	<b>Operator:</b> JM
<b>Reaction Load:</b> JCB 3CX (8T)	<b>Plate Area (m2):</b> 0.16117
<b>Weather:</b> Snowing	<b>Sample:</b> Yes
<b>Test Type:</b> Incremental - Equivalent CBR	<b>Equipment Mass (Kg):</b> 61.47
<b>Material Type:</b> Soft grey mottled orange brown slightly sandy very gravelly CLAY with low cobble content.	<b>Equipment Force (kN):</b> 0.603
<b>Remarks:</b> Self weight of the equipment calculated at 3.74 kPa (i.e. plate, extension rod, jack piston and load cell).	

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.74	0.00	0.000
1	6.0	1.68	14.16	0.31	0.022
2	12.0	3.21	23.66	0.59	0.025
3	18.0	4.82	33.65	0.81	0.024
4	24.0	6.78	45.81	1.15	0.025
5	30.0	7.88	52.63	1.46	0.028
6	36.0	9.21	60.88	1.72	0.028
7	42.0	0.00	3.74	0.27	0.071

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 24064.4	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b> 48.00	<b>Equivalent CBR:</b> 2.39	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 30.73	<b>MN/m2</b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322C/TP BB002	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 33.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 08/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

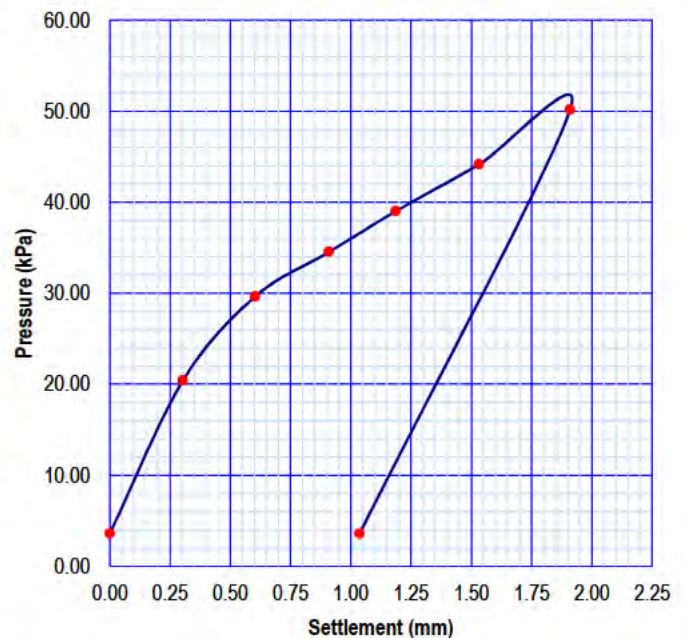
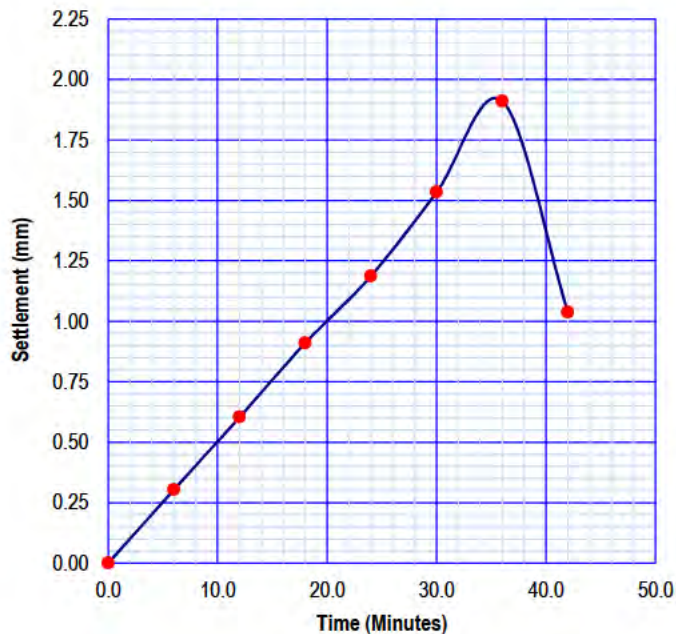
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b> A66 North Trans Pennine Scheme D Section 7	
<b>Client:</b> AMEY	<b>Project No.:</b> 4322C
<b>Test Position:</b> TP BB008	<b>Depth (mBGL):</b> 0.40
<b>Date of Test:</b> 05/02/2021	<b>Operator:</b> JM
<b>Reaction Load:</b> JCB 3CX (8T)	<b>Plate Area (m2):</b> 0.16117
<b>Weather:</b> Slight rain	<b>Sample:</b> Yes
<b>Test Type:</b> Incremental - Equivalent CBR	<b>Equipment Mass (Kg):</b> 58.66
<b>Material Type:</b> Soft brown sandy gravelly CLAY with cobbles noted.	<b>Equipment Force (kN):</b> 0.575
<b>Remarks:</b> Self weight of the equipment calculated at 3.57 kPa (i.e. plate, extension rod, jack piston and load cell).	

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.57	0.00	0.000
1	6.0	2.71	20.38	0.30	0.015
2	12.0	4.20	29.63	0.60	0.020
3	18.0	4.99	34.53	0.91	0.026
4	24.0	5.71	39.00	1.19	0.030
5	30.0	6.54	44.15	1.53	0.035
6	36.0	7.51	50.17	1.91	0.038
7	42.0	0.00	3.57	1.04	0.290

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 20053.7	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b> 40.00	<b>Equivalent CBR:</b> 1.74	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 25.11	<b>MN/m2</b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322C/TP BB008	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 20.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 08/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)



**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

**In-Situ Plate Load Test**

BS 1377 : Part 9 : 1990

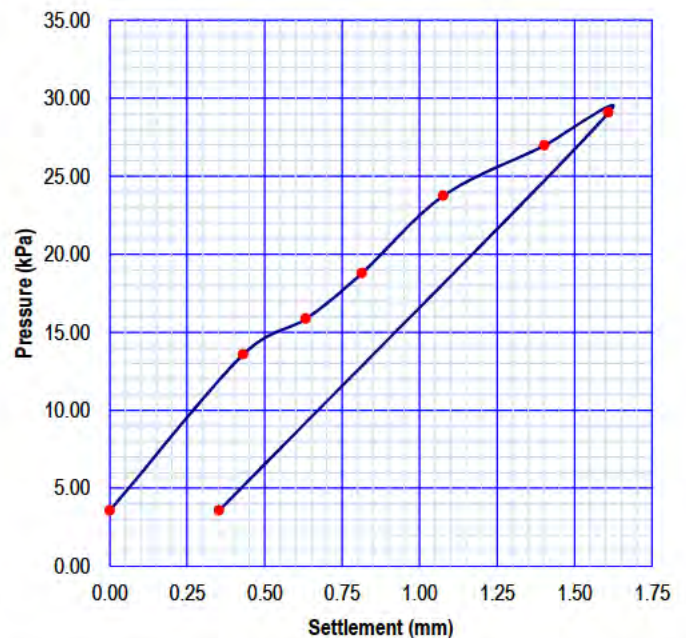
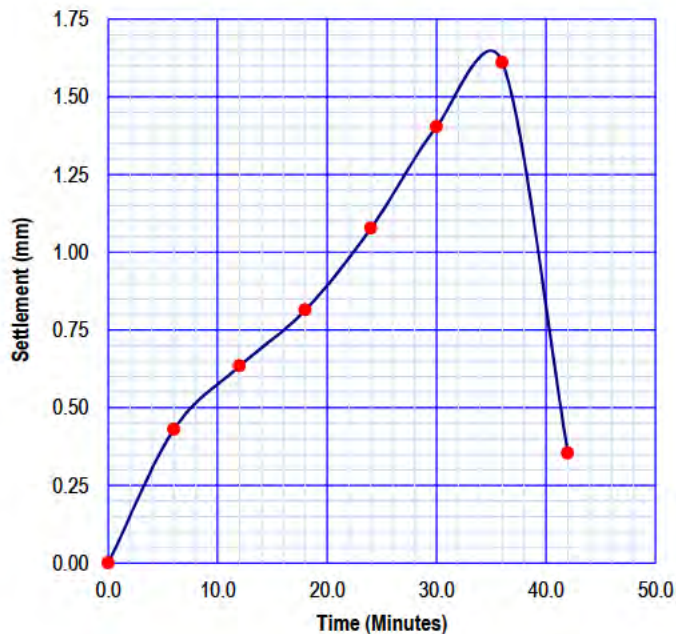
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	<b>A66 North Trans Pennine Scheme D Section 7</b>		
<b>Client:</b>	AMEY	<b>Project No.:</b>	4322C
<b>Test Position:</b>	TP BB010	<b>Depth (mBGL):</b>	0.35
<b>Date of Test:</b>	04/02/2021	<b>Plate Diameter (mm):</b>	453
<b>Reaction Load:</b>	JCB 3CX (8T)	<b>Plate Area (m2):</b>	0.16117
<b>Weather:</b>	Raining	<b>Sample:</b>	Yes
<b>Test Type:</b>	Incremental - Equivalent CBR	<b>Equipment Mass (Kg):</b>	58.66
<b>Material Type:</b>	Soft brown sandy gravelly CLAY with cobbles noted.		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.57 kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.57	0.00	0.000
1	6.0	1.61	13.56	0.43	0.032
2	12.0	1.98	15.85	0.63	0.040
3	18.0	2.45	18.77	0.81	0.043
4	24.0	3.25	23.73	1.08	0.045
5	30.0	3.77	26.96	1.40	0.052
6	36.0	4.11	29.07	1.61	0.055
7	42.0	0.00	3.57	0.35	0.099

<b>Plate Penetration (mm):</b>	1.25	<b>k762:</b>	13034.9	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b>	26.00	<b>Equivalent CBR:</b>	0.83	<b>%</b>
<b>Plate Factor:</b>	0.6267	<b>Subgrade Mod (E):</b>	15.57	<b>MN/m2</b>
<b>Penetration Comment:</b>	1.25mm achieved at given pressure			



<b>Certificate:</b>	4322C/TP BB00	<b>End Remark:</b>	Tested in accordance with specification
<b>Calculated:</b>	KW	<b>Moisture Content:</b>	35.00 %
<b>Approved:</b>	N. Vater	<b>Test Certificate:</b>	1 of 1
<b>Signed:</b>	08/09/2021	<b>CBR Reference:</b>	Interim Advice Note 73/06 (2009)



**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

**In-Situ Plate Load Test**

BS 1377 : Part 9 : 1990

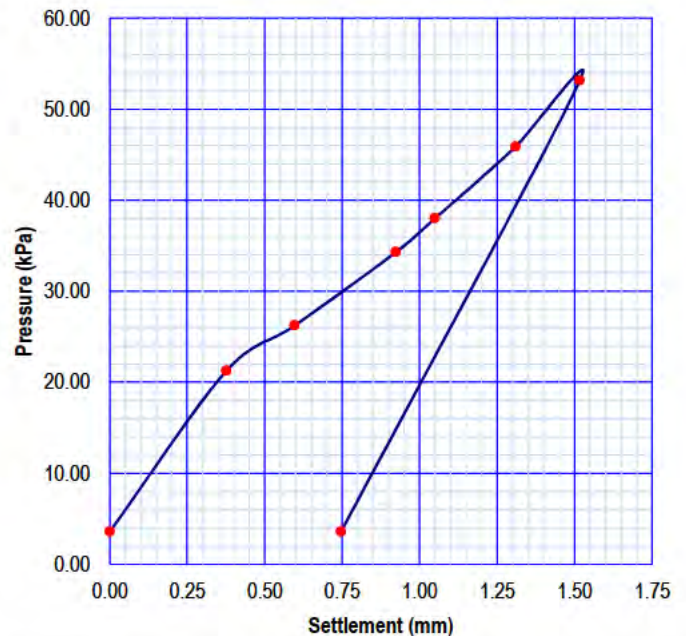
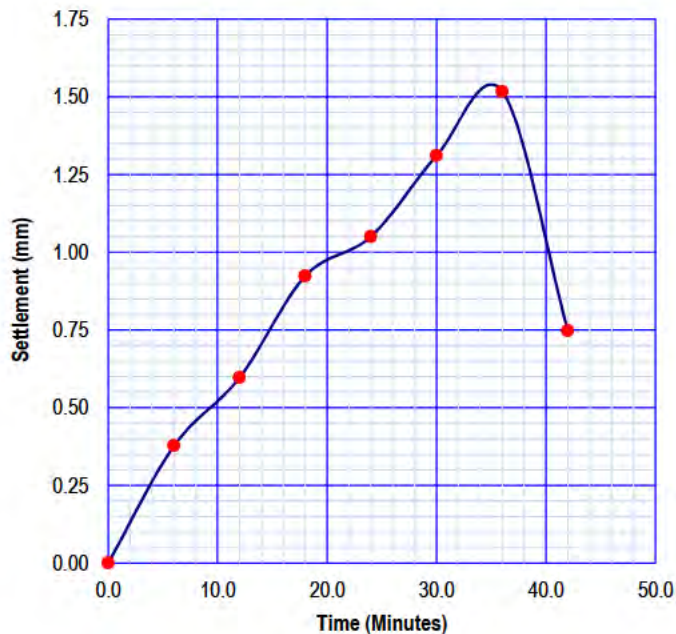
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	<b>A66 North Trans Pennine Scheme D Section 7</b>		
<b>Client:</b>	AMEY	<b>Project No.:</b>	4322C
<b>Test Position:</b>	TP BB012	<b>Depth (mBGL):</b>	0.50
<b>Date of Test:</b>	09/02/2021	<b>Plate Diameter (mm):</b>	453
<b>Reaction Load:</b>	JCB 3CX (8T)	<b>Sample:</b>	Yes
<b>Weather:</b>	Snowing	<b>Equipment Mass (Kg):</b>	58.66
<b>Test Type:</b>	Incremental - Equivalent CBR	<b>Equipment Force (kN):</b>	0.575
<b>Material Type:</b>	Firm yellowish brown slightly sandy slightly gravelly CLAY with medium cobble content		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.57kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.57	0.00	0.000
1	6.0	2.85	21.25	0.38	0.018
2	12.0	3.65	26.22	0.60	0.023
3	18.0	4.95	34.28	0.92	0.027
4	24.0	5.55	38.00	1.05	0.028
5	30.0	6.82	45.88	1.31	0.029
6	36.0	7.99	53.14	1.52	0.029
7	42.0	0.00	3.57	0.75	0.209

<b>Plate Penetration (mm):</b>	1.25	<b>k762:</b>	22059.0	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b>	44.00	<b>Equivalent CBR:</b>	2.05	<b>%</b>
<b>Plate Factor:</b>	0.6267	<b>Subgrade Mod (E):</b>	27.91	<b>MN/m2</b>
<b>Penetration Comment:</b>	1.25mm achieved at given pressure			



<b>Certificate:</b>	4322C/TP BB0012	<b>End Remark:</b>	Tested in accordance with specification
<b>Calculated:</b>	KW	<b>Moisture Content:</b>	20.00 %
<b>Approved:</b>	N. Vater	<b>Test Certificate:</b>	1 of 1
<b>Signed:</b>	08/09/2021	<b>CBR Reference:</b>	Interim Advice Note 73/06 (2009)



**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

**In-Situ Plate Load Test**

BS 1377 : Part 9 : 1990

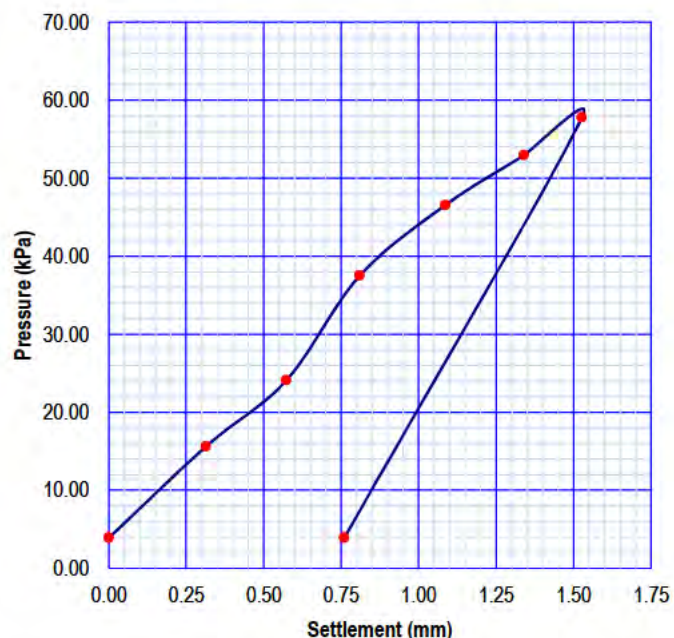
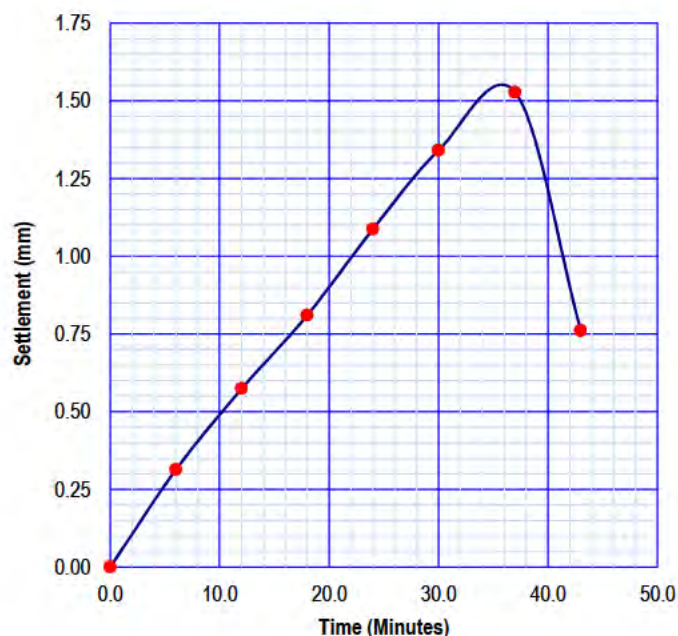
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	<b>A66 North Trans Pennine Scheme D Section 7</b>		
<b>Client:</b>	AMEY	<b>Project No.:</b>	4322C
<b>Test Position:</b>	TP BB013	<b>Depth (mBGL):</b>	0.50
<b>Date of Test:</b>	09/02/2021	<b>Plate Diameter (mm):</b>	453
<b>Reaction Load:</b>	JCB 3CX (8T)	<b>Sample:</b>	Yes
<b>Weather:</b>	Snowing	<b>Equipment Mass (Kg):</b>	63.53
<b>Test Type:</b>	Incremental - Equivalent CBR	<b>Equipment Force (kN):</b>	0.623
<b>Material Type:</b>	Firm yellowish brown slightly sandy slightly gravelly CLAY with medium cobble content.		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.87 kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.87	0.00	0.000
1	6.0	1.89	15.59	0.31	0.020
2	12.0	3.26	24.09	0.57	0.024
3	18.0	5.42	37.49	0.81	0.022
4	24.0	6.88	46.55	1.09	0.023
5	30.0	7.91	52.94	1.34	0.025
6	37.0	8.69	57.78	1.53	0.026
7	43.0	0.00	3.87	0.76	0.197

<b>Plate Penetration (mm):</b>	1.25	<b>k762:</b>	25568.4	<b>kN/m<sup>2</sup>/m</b>
<b>Plate Load @1.25mm (kPa):</b>	51.00	<b>Equivalent CBR:</b>	2.65	<b>%</b>
<b>Plate Factor:</b>	0.6267	<b>Subgrade Mod (E):</b>	32.87	<b>MN/m<sup>2</sup></b>
<b>Penetration Comment:</b>	1.25mm achieved at given pressure			



<b>Certificate:</b>	4322C/TP BB0013	<b>End Remark:</b>	Tested in accordance with specification
<b>Calculated:</b>	KW	<b>Moisture Content:</b>	23.00 %
<b>Approved:</b>	N. Vater	<b>Test Certificate:</b>	1 of 1
<b>Signed:</b>	08/09/2021	<b>CBR Reference:</b>	Interim Advice Note 73/06 (2009)

**Laboratory Report Certificate**





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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01722 735 300 Fax: 01722 735 999



## LABORATORY REPORT CERTIFICATE



**Contract Title:** A66 North Trans Pennine Scheme D  
Section 7

**AEG Reference:** 4322C

**Client Address:** AMEY OW Limited  
Chancery Exchange  
10 Furnival Street  
London  
EC4A 1AB

We certify that Laboratory testing was carried out on samples from the above contract in accordance with techniques outlined in BS 1377: 1990, BS EN ISO 17892:2014 or other appropriate standards as quoted. The samples were received from January 2021 and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

- Nick Vater (Managing Director)
- Kevin Warriner (HSE & Quality Director)
- Michelle Selkirk (Laboratory Manager)

Signed



Date: 20 July 2021

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation.

Please note the material was derived from samples taken outside the control of the laboratory.

# LABORATORY REPORT CERTIFICATE

## ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Laboratory Report Certificate	N/A		3
1	Sample Description Sheets	N/A		12
2	Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	2
2	Plasticity Index and Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	7
3	Determination of Density by Linear Measurement	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-2:2014)	1
4	Determination of Particle Density	Yes	BS 1377 Part 2 1990	2
5	Particle Size Distribution Sieving	Yes	BS 1377 Part 2 1990	55
5	Particle Size Distribution Sedimentation	No	BS 1377 Part 2 1990	52
6	Determination of Chloride, Total Sulphur, Sulphate and pH (Tested externally)	No	See DETS certificates	8
7	Determination of Dry Density/Moisture Content Relationship	Yes	BS 1377 Part 4 1990	17
8	Determination of Moisture Condition Value	Yes	BS 1377 Part 4 1990	13
9	Determination of MCV / Moisture Relationship	Yes	BS 1377 Part 4 1990	32
10	Determination of California Bearing Ratio	Yes	BS 1377 Part 4 1990	13
11	Determination of One Dimensional Consolidation Properties	Yes	BS 1377 Part 5 1990	8
12	Shear Strength by Hand Vane	No		1
13	Shear Strength by Direct Shear	Yes	BS 1377 Part 7 1990	40
14	Undrained Shear Strength in Triaxial Cell without Pore Water Pressure Measurement	Yes	BS 1377 Part 7 1990	1
15	Consolidated Undrained Shear Strength in Triaxial Cell with Measurement of Pore Pressure	No	BS 1377 Part 8 1990	8
16	Moisture Content of Rock	Yes	ISRM 1981	1
17	Determination of Point Load Index	Yes	ISRM 1985	15
18	Determination of Water Content and Unconfined Compressive Strength (Tested externally)	No	See subcontract lab certs	9



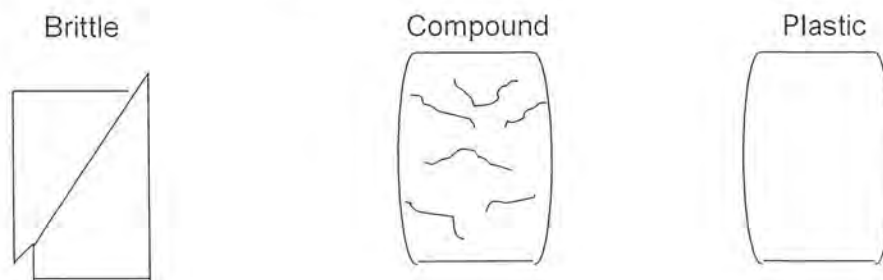
# LABORATORY REPORT CERTIFICATE

## ABBREVIATIONS

All the abbreviations used on the laboratory certificates are given below:

<b>Br</b>	Brittle	<b>PSD</b>	Particle Size Distribution by sieve analysis
<b>C</b>	Compound	<b>SB</b>	Shear Box
<b>CBR</b>	California Bearing Ratio	<b>SED</b>	Sedimentation Analysis
<b>CDT</b>	Consolidated Drained Triaxial	<b>SO4</b>	Sulphate (total, water extract, groundwater)
<b>CL</b>	Chloride content (water or soil)	<b>CP2</b>	Dry Density/Moisture Content 2.5kg rammer
<b>US</b>	Unsuitable sample for test	<b>CP4</b>	As above using 4.5kg rammer
<b>UUT</b>	Undrained Unconsolidated Triaxial	<b>CPV</b>	As above using vibrating hammer
<b>HSV</b>	Vane Test	<b>CUT</b>	Consolidated Undrained Triaxial
<b>IS</b>	Insufficient sample for test	<b>R</b>	Remoulded
<b>LOI</b>	Loss On Ignition	<b>U</b>	Undisturbed
<b>M</b>	Multi-stage testing	<b>MC</b>	Moisture Content
<b>MCV</b>	Moisture Content Value	<b>PL</b>	Point Load
<b>NAT</b>	Natural preparation method	<b>NMC</b>	Natural (or as received) moisture content
<b>P</b>	Plastic	<b>PFH</b>	Permeability Falling Head Method
<b>OED</b>	Oedometer	<b>PTXL</b>	Permeability in Triaxial Cell
<b>OMC</b>	Optimum Moisture Content	<b>ORG</b>	Organic content
<b>B</b>	Large disturbed (bulk) sample	<b>PD</b>	Particle Density (SG)
<b>J</b>	Small disturbed (jar) sample	<b>PI</b>	Liquid limit, plastic limit and plasticity index

### Typical Mode of Failure for Triaxial Testing



**Sample Description Sheets**





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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB002	0.10	J1	Brown sandy gravelly CLAY with occasional rootlets.	MC
BH BB002	0.40	B3	Light brown slightly sandy gravelly CLAY.	MCV IS for CP4
BH BB002	0.60	B4	Grey slightly sandy slightly gravelly CLAY.	PSD SED IS for CBR
BH BB002	1.70	J6	Brown sandy gravelly CLAY fo low plasticity.	MC PI
BH BB002	2.30	J8	Light brown sandy gravelly CLAY/clayey sandy GRAVEL.	MC IS for PI
BH BB002	2.50	J9	Light brown sandy gravelly CLAY/clayey sandy GRAVEL.	MC PI (IS for LL)
BH BB003	0.10	J1	Dark brown slightly organic slightly sandy slightly gravelly CLAY with some rootlets.	MC
BH BB003	0.40	B3	Dark brown grey clayey very sandy GRAVEL with rootlets.	PSD SED
BH BB003	1.00	B5	Dark brown grey slightly sandy gravelly CLAY.	PD CP4 MCV
BH BB003	1.70	J6	Brown slightly sandy gravelly CLAY.	MC IS for PI
BH BB003	2.10	B7	Dark brown slightly sandy slightly gravelly CLAY.	PSD SED MCV
BH BB003	2.50	J8	Brown sandy slightly gravelly CLAY.	BRE
BH BB003	3.00	B9	Brown slightly sandy gravelly CLAY.	MCV IS for CBR
BH BB003	4.50	J11	Grey sandy gravelly CLAY.	BRE
BH BB003	6.00	J12	Dark grey slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB003	9.00	J14	Brown slightly sandy gravelly CLAY.	MC IS for PI
BH BB004	0.70	J2	MADE GROUND (Brown sandy gravelly clay).	BRE
BH BB004	0.70	B3	MADE GROUND (Brown sandy gravelly clay. Gravel includes plastic fragments).	MCV
BH BB004	1.00	J5	Dark grey slightly sandy gravelly CLAY.	MC
BH BB004	1.20	J6	Brown sandy gravelly CLAY.	BRE
BH BB004	1.20	B7	Grey slightly sandy gravelly CLAY.	SB US for MCV

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY QW Limited



Signed :-



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Date of issue :-

20/07/2021

Certificate No :-

SD/4322C/1

AEG Contract No. :-

4322C



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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 900 Fax: 01772 735 999

## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB004	2.50	J9	Dark grey slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB004	2.50	B10	Dark grey slightly sandy slightly gravelly CLAY of low plasticity with occasional rootlets.	Density SB IS for CP4 and MCV
BH BB004	4.00	J12	Dark grey slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB004	4.00	B13	Grey very clayey sandy GRAVEL with a high cobble content.	PSD SED IS for CBR
BH BB004	5.50	J15	Dark grey slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB005	0.20	J2	Brown slightly organic slightly sandy gravelly CLAY with rootlets.	MC PI (IS for LL)
BH BB005	1.00	J5	Brown slightly sandy gravelly CLAY/SILT of high plasticity.	MC PI
BH BB005	1.00	B6	Grey brown slightly sandy gravelly CLAY.	MCV
BH BB005	1.20	J7	Light brown with orange mottling slightly sandy gravelly CLAY.	MC
BH BB005	1.20	B8	Brown sandy gravelly CLAY with rootlets.	BRE
BH BB005	2.00	B10	Brown very clayey very sandy GRAVEL.	Density PSD SED CBR
BH BB005	3.00	J11	Brown sandy gravelly CLAY.	BRE
BH BB005	3.00	B12	Brown sandy gravelly CLAY/very clayey sandy GRAVEL.	PD US for CP4 and MCV
BH BB005	4.00	J13	Brown slightly clayey slightly sandy GRAVEL.	MC
BH BB005	4.00	B14	Brown clayey sandy GRAVEL.	BRE US for MCV
BH BB005	5.00	B15	Black brown clayey sandy GRAVEL.	PD US for CPV
BH BB005	6.00	B16	Brown clayey sandy GRAVEL with a medium cobble content.	PSD US for Density
BH BB005	7.00	B17	Brown sandy GRAVEL.	US for MCV
BH BB006	0.20	J2	Brown slightly organic slightly sandy CLAY with some rootlets.	MC
BH BB006	1.00	J5	Brown slightly sandy gravelly CLAY of intermediate plasticity.	MC PI
BH BB006	1.00	B6	Brown sandy slightly gravelly CLAY.	MCV

Contract Title :-

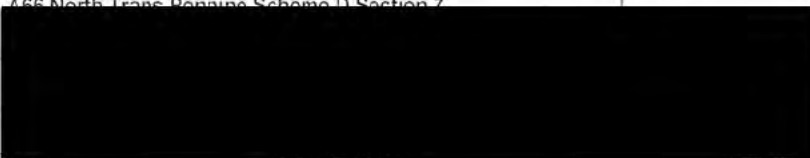
A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB006	1.20	J7	Brown sandy gravelly CLAY.	BRE
BH BB006	1.20	B8	Brown sandy slightly gravelly CLAY.	SB US for MCV
BH BB006	2.50	J11	Grey brown sandy gravelly CLAY of intermediate plasticity.	MC PI
BH BB006	2.50	B12	Brown slightly sandy gravelly CLAY.	Density CL CP4 MCV
BH BB006	3.50	J14	Dark grey very clayey sandy GRAVEL.	BRE
BH BB006	3.50	B15	Dark grey very clayey sandy GRAVEL.	PSD SED SB
BH BB006	5.00	J18	Dark grey slightly clayey sandy GRAVEL.	MC US for PI
BH BB006	6.00	B21	Brown slightly clayey sandy GRAVEL.	US for CBR
BH BB007	0.40	J2	Brown slightly sandy gravelly CLAY/SILT of intermediate plasticity.	MC PI
BH BB007	0.70	B3	Grey slightly sandy slightly gravelly CLAY.	US for MCV
BH BB007	1.50	J5	Brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB007	1.50	B6	Brown slightly sandy gravelly CLAY.	PD CP4 MCV
BH BB007	2.40	J8	Brown sandy gravelly CLAY.	BRE
BH BB007	2.50	B10	Brown slightly sandy slightly gravelly CLAY.	Density PSD SED
BH BB007	3.20	B11	Grey slightly sandy slightly gravelly CLAY.	MCV SB
BH BB007	3.50	J12	Brown sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB007	3.50	B13	Brown slightly sandy slightly gravelly CLAY.	CBR
BH BB007	4.20	J14	Grey brown sandy gravelly CLAY.	BRE
BH BB007	4.50	J15	Grey slightly clayey GRAVEL.	MC
BH BB008	0.30	J2	Brown slightly organic slightly sandy slightly gravelly CLAY with some rootlets.	MC
BH BB008	1.00	B4	Brown with orange and grey mottling slightly sandy slightly gravelly CLAY with a high cobble content.	PSD SED PD US for CP4 and MCV

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of



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Contract No. :-

4322C



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Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blackburn, BB1 5BL - Tel: 01772 735 200 Fax: 01772 735 999

## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB008	1.50	U6	Soft and firm brown and grey slightly sandy slightly gravelly CLAY with occasional rootlets.	MCUT
BH BB008	2.00	J7	Brown with orange mottling slightly sandy gravelly CLAY of intermediate plasticity.	MC PI
BH BB008	2.50	B11	Grey slightly sandy gravelly CLAY with a low cobble content.	SB US for MCV
BH BB008	2.60	B9	Brown slightly sandy slightly gravelly CLAY.	PSD SED
BH BB009	0.30	J2	Brown organic slightly sandy SILT of extremely high plasticity with some rootlets.	MC PI
BH BB009	0.70	B3	Brown slightly sandy slightly gravelly CLAY.	MCV
BH BB009	1.50	J5	Brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH BB009	1.50	B6	Grey brown sandy gravelly CLAY with some rootlets.	Density MCV SB
BH BB009	2.50	U8	Firm brown and grey slightly sandy slightly gravelly CLAY.	US for MCUT
BH BB009	3.00	J9	Dark grey slightly sandy gravelly CLAY.	MC
BH BB009	3.20	B10	Brown slightly sandy gravelly CLAY.	PD CP4 MCV
BH BB009	3.50	J11	Grey sandy gravelly CLAY. Gravel of mudstone.	BRE
BH BB009	3.50	B12	Grey slightly sandy gravelly CLAY. Gravel of mudstone.	PSD SED
BH BB009	4.20	J13	Grey sandy gravelly CLAY. Gravel of mudstone.	BRE
BH BB009	4.50	J14	Grey clayey GRAVEL of weathered mudstone.	MC PI (IS for LL)
BH BB009	4.50	B15	Dark grey clayey sandy GRAVEL of weathered mudstone.	US for CBR
BH BB010	0.05	J1	Brown sandy CLAY with some rootlets.	MC
BH BB010	0.05	B2	Brown very clayey very gravelly SAND with some rootlets.	PSD SED
BH BB010	0.50	J7	Brown slightly clayey GRAVEL of weathered mudstone.	MC
BH BB011	0.40	B2	Dark brown clayey sandy GRAVEL with a high cobble content.	PSD SED
BH BB011	0.80	J4	Dark grey GRAVEL.	MC US for PI

Contract Title :-

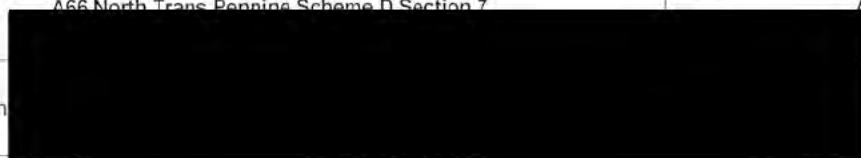
A66 North Trans Penning Scheme D Section 7

Client :-

AMEY OW Limited



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Date of issue :-

20/07/2021

Certificate No :-

SD/4322C/4

AEG Contract No. :-

4322C



1367



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Regional Office: Unit 29, Business Development Centre, Ewan Wharf, Blackburn, BB1 5GL • Tel: 01772 735 300 Fax: 01772 735 999

## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB012	0.05	J1	MADE GROUND (Brown sandy clay with some rootlets).	MC
BH BB012	0.05	B2	MADE GROUND (Brown very clayey very gravelly sand with rootlets. Gravel includes brick and plastic fragments).	PSD SED
BH BB012	0.35	J4	Brown clayey GRAVEL of weathered mudstone.	MC
BH BB013	0.05	J1	Brown slightly organic sandy CLAY with some rootlets.	MC
BH BB013	0.05	B2	Brown clayey sandy GRAVEL with some rootlets.	PSD SED
BH BB013	0.50	J6	Brown with orange and grey mottling sandy CLAY of intermediate plasticity.	MC PI
BH BB013	1.30	U9	Firm dark brown slightly sandy slightly gravelly CLAY with a low cobble content.	US for MCUT
BH BB013	2.00	J10	Brown sandy gravelly CLAY.	BRE
BH BB013	2.35	B12	Grey slightly sandy gravelly CLAY.	PD MCV IS for CP4
BH BB013	3.10	J14	Dark grey slightly sandy gravelly CLAY of low plasticity.	MC PI
BH BB013	3.40	B16	Grey brown slightly sandy gravelly CLAY.	Density MCV SB
BH BB013	4.20	J18	Dark grey slightly sandy gravelly CLAY of low plasticity.	MC PI
BH BB013	4.40	B20	Dark grey slightly sandy gravelly CLAY.	CBR MCV
BH BB013	5.00	J21	Grey sandy slightly gravelly CLAY.	BRE
BH BB014	0.30	B2	Brown mottled sandy slightly gravelly CLAY.	PSD SED
BH BB014	1.50	U4	Low becoming high strength brown sandy slightly gravelly CLAY of low to intermediate plasticity.	MC PI HSV UUT
BH BB014	2.00	J5	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH BB015	0.20	B4	Brown sandy slightly gravelly CLAY.	PSD SED PD CBR IS for CPV and MCV
BH BB015	0.30	J5	Light brown sandy gravelly CLAY.	MC
BH BB015	0.75	B6	Light brown slightly sandy gravelly CLAY with a low cobble content.	CBR US for MCV
BH BB015	0.80	J7	Brown slightly sandy gravelly CLAY of low plasticity.	MC PI

Contract Title :- [REDACTED] Client :- AMEY OW Limited



Signed

[REDACTED SIGNATURE]

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Date of issue :-

20/07/2021

Certificate No. :-

SD/4322C/5

AEG Contract No. :-

4322C



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Regional Office: Unit 20, Business Development Centre, Earsom Wharf, Blackburn, BB1 5DL - Tel: 01722 735 300 Fax: 01772 735 999

## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m) ID	Description	Laboratory Tests/Remarks
BH BB015	1.30 B10	Brown sandy slightly gravelly CLAY.	MCV
BH BB015	2.15 J12	Dark grey sandy CLAY of low plasticity.	PI
BH BB016	0.35 J5	Light brown with orange and grey mottling slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH BB016	1.30 B9	Dark brown slightly sandy slightly gravelly CLAY.	PSD SED PD CBR IS for CP4 and MCV
BH BB016	2.00 J10	Dark grey slightly sandy gravelly CLAY of low plasticity.	MC PI
BH BB017	0.20 J2	Brown slightly organic clayey slightly sandy slightly gravelly SILT of high plasticity with some rootlets.	MC PI
BH BB017	0.20 B3	Brown slightly sandy gravelly CLAY with a medium cobble content.	PD MCV US for CP4
BH BB017	0.50 J4	Brown slightly sandy CLAY/SILT of high plasticity.	MC PI
BH BB017	0.50 B5	Brown slightly sandy slightly gravelly CLAY.	PSD SED CBR
BH BB017	1.20 B8	Brown slightly sandy CLAY.	MCV
BH BB018	0.70 J2	Dark grey clayey sandy GRAVEL of mudstone.	MC PSD
BH BB019	0.20 J2	Light brown slightly organic clayey slightly sandy SILT of very high plasticity.	MC PI
BH BB019	0.20 B3	Brown very clayey/silty very gravelly SAND with some rootlets.	PSD SED
BH BB019	1.00 J6	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH BB020	0.20 J2	Light brown slightly sandy slightly gravelly CLAY.	MC
BH BB020	1.00 J5	Light brown with orange and grey mottling sandy gravelly CLAY of low plasticity.	MC PI
BH BB020	1.20 B7	Brown slightly sandy slightly gravelly CLAY.	PSD SED
BH BB020	2.00 U8	Soft brown slightly sandy gravelly CLAY.	MCUT OED
BH BB020	2.45 J9	Dark grey slightly sandy gravelly CLAY of low plasticity.	PI
BH BB021	0.20 J2	Light brown slightly organic slightly sandy CLAY with some rootlets.	MC
BH BB021	0.20 B3	Brown sandy slightly gravelly CLAY.	PSD SED

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

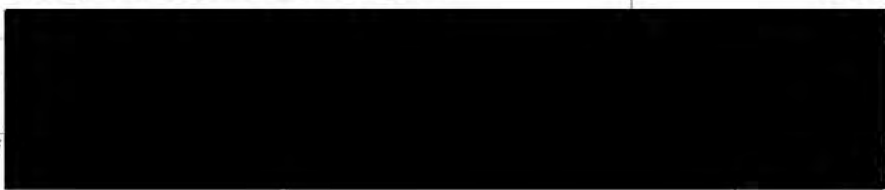
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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB021	0.50	J4	Yellow brown slightly sandy slightly gravelly CLAY/SILT of high plasticity.	MC PI
BH BB021	1.00	J6	Yellow grey slightly sandy slightly gravelly CLAY of intermediate to high plasticity.	PI
BH BB021	1.20	U8	Soft brown slightly sandy slightly gravelly CLAY.	OED
BH BB021	3.00	U12	Very low strength brown sandy gravelly CLAY.	MUUT OED
BH BB022	0.60	B2	Light brown slightly sandy slightly gravelly CLAY.	PSD SED
BH BB022	0.70	J3	Brown grey slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH BB022	1.50	U5	Low strength brown sandy gravelly CLAY of low plasticity.	MC PI MUUT OED
BH BB022	2.40	B8	Brown sandy gravelly CLAY of low plasticity with a low cobble content.	MC PI
BH BB022	2.50	J9	Brown sandy slightly gravelly CLAY.	MC
BH BB023	1.00	J5	Light brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH BB023	1.00	B6	Light brown sandy slightly gravelly CLAY.	PSD SED
BH BB023	2.50	J10	Dark grey slightly sandy gravelly CLAY of low plasticity.	MC PI
BH BB023	3.50	J12	Grey sandy gravelly CLAY.	BRE
BH BB023	5.00	J15	Grey clayey sandy GRAVEL.	BRE
BH BB024	0.70	J3	Brown sandy slightly gravelly CLAY of low to intermediate plasticity.	MC PI
BH BB024	1.50	B5	Brown slightly sandy gravelly CLAY.	PSD SED PD
BH BB024	2.00	J6	Dark grey slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH BB024	2.50	J8	Grey brown slightly sandy slightly gravelly CLAY.	BRE
BH BB025	0.60	B2	Light brown with orange and grey mottling slightly sandy slightly gravelly CLAY.	PSD SED
BH BB025	0.70	J3	Light brown sandy gravelly CLAY of intermediate plasticity.	MC PI
BH BB025	1.20	U5	Low strength brown sandy gravelly CLAY of intermediate plasticity.	PI HSV US for MUUT

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A66 North Trans Pennine Scheme D Section 7

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH BB025	2.40	J8	Grey brown sandy gravelly CLAY.	MC
BH BB026	0.00	B3	Brown sandy slightly gravelly CLAY/SILT (Topsoil).	PSD SED
BH BB026	0.20	J2	Light brown organic sandy CLAY with some rootlets.	MC
BH BB026	1.00	J5	Light brown with orange mottling CLAY of intermediate to high plasticity.	MC PI
HDP BB001	0.30	B2	MADE GROUND (Brown slightly sandy gravelly clay with some rootlets. Gravel includes brick fragments).	MC PSD SED
HDP BB001	0.50	J3	Grey GRAVEL of mudstone.	MC
TP BB001	0.30	J3	Brown sandy CLAY.	BRE
TP BB001	0.40	B4	Brown very clayey very gravelly SAND.	PSD SED
TP BB001	1.00	J6	Light brown with grey and orange mottling slightly sandy gravelly CLAY of intermediate plasticity.	MC PI
TP BB001	1.50	B7	Light brown with grey and orange mottling sandy gravelly CLAY.	PD CP4 MCV
TP BB001	2.10	J9	Light brown slightly sandy gravelly CLAY.	MC
TP BB001	2.50	B10	Brown very clayey sandy GRAVEL with a low cobble content.	PSD SED
TP BB001	3.10	J11	Brown sandy gravelly CLAY.	BRE
TP BB002	0.50	J4	Brown with orange mottling slightly sandy gravelly CLAY of intermediate plasticity.	MC PI
TP BB002	0.75	B5	Light brown with orange and grey mottling very clayey very sandy GRAVEL.	PSD SED PD
TP BB002	1.50	J6	Brown sandy gravelly CLAY.	BRE
TP BB002	1.75	B7	Light brown with orange mottling slightly sandy gravelly CLAY.	CP4 MCV
TP BB002	2.30	J9	Grey sandy gravelly CLAY.	BRE
TP BB002	2.50	B10	Brown slightly sandy slightly gravelly CLAY.	MCV
TP BB002	3.30	J11	Dark grey sandy gravelly CLAY.	MC
TP BB002	3.50	B13	Dark grey slightly sandy slightly gravelly CLAY.	PSD SED

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m) ID	Description	Laboratory Tests/Remarks
TP BB002	4.50 B15	Brown sandy gravelly CLAY.	CP4
TP BB003	0.05 J1	Dark brown slightly organic clayey sandy gravelly SILT of intermediate plasticity.	MC PI
TP BB003	0.20 B3	Dark grey slightly organic very clayey/silty very gravelly SAND.	PSD SED PD CP4 IS for MCV
TP BB004	0.50 B4	Brown with orange and grey mottling slightly sandy slightly gravelly CLAY.	PSD SED
TP BB004	1.30 J6	Grey slightly sandy gravelly CLAY.	MC
TP BB004	1.50 B7	Brown slightly sandy gravelly CLAY.	PD CP4
TP BB004	2.30 J8	Brown sandy slightly gravelly CLAY.	BRE
TP BB004	2.50 B9	Brown slightly sandy gravelly CLAY with a medium cobble content.	PD CP4 MCV
TP BB004	3.30 J11	Grey sandy gravelly CLAY of low plasticity.	MC PI
TP BB004	3.50 B12	Dark grey slightly sandy gravelly CLAY.	PSD SED
TP BB004	4.30 J13	Grey sandy gravelly CLAY.	BRE
TP BB004	4.50 B14	Grey slightly sandy slightly gravelly CLAY.	MCV
TP BB005	0.30 J2	MADE GROUND (Dark grey slightly sandy gravelly clay. Gravel includes brick fragments).	MC
TP BB005	0.50 B4	MADE GROUND (Dark brown very clayey very sandy gravel including brick and pottery fragments).	PSD SED
TP BB005	1.00 B6	Brown slightly sandy slightly gravelly CLAY.	CBR
TP BB005	2.00 B9	Brown sandy slightly gravelly CLAY.	PSD SED CL CP4 MCV
TP BB005	2.70 J11	Light brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
TP BB006	0.30 B4	MADE GROUND (Brown very clayey sandy gravel including concrete fragments).	PD US for CP4
TP BB006	0.50 J5	MADE GROUND (Grey slightly sandy gravelly clay).	MC
TP BB006	1.20 B7	MADE GROUND (Brown slightly sandy gravelly clay. Gravel includes brick fragments).	PSD SED
TP BB006	1.90 J9	Dark grey slightly sandy gravelly CLAY of low plasticity.	MC PI

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A66 North Trans Pennine Scheme D Section 7

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m) ID	Description	Laboratory Tests/Remarks
TP BB006	2.20 B10	Dark grey slightly sandy slightly gravelly CLAY.	PSD SED
TP BB007	0.40 J2	Brown sandy gravelly CLAY of intermediate plasticity.	MC PI
TP BB007	0.80 B4	Brown with grey veining slightly sandy slightly gravelly CLAY.	CP4 CBR MCV
TP BB007	1.40 J6	Grey slightly sandy gravelly CLAY.	MC
TP BB007	1.80 B7	Brown with grey and orange veining slightly sandy slightly gravelly CLAY.	PSD SED
TP BB007	3.00 B10	Grey clayey sandy GRAVEL of mudstone.	PSD SED
TP BB008	0.45 J3	Light brown sandy gravelly CLAY/SILT of intermediate plasticity.	MC PI
TP BB008	0.80 B4	Brown slightly sandy slightly gravelly CLAY.	PSD SED CBR
TP BB008	1.20 J6	Brown grey slightly sandy gravelly CLAY. Gravel includes mudstone.	MC
TP BB008	1.40 B7	Light brown very clayey very sandy GRAVEL of weathered mudstone.	PSD SED PD MCV IS for CP4
TP BB009	0.10 J1	Light brown sandy slightly gravelly CLAY.	MC
TP BB009	0.80 B4	Light brown slightly sandy slightly gravelly CLAY.	PSD SED PD CP4
TP BB009	1.50 J6	Light brown slightly sandy gravelly CLAY of high plasticity.	MC PI
TP BB009	1.80 B7	Orange brown with grey mottling slightly sandy slightly gravelly CLAY.	PSD SED PD CP4 MCV
TP BB010	0.35 J3	Light brown slightly sandy CLAY of intermediate plasticity.	MC PI
TP BB010	1.70 J7	Dark grey silty CLAY of low plasticity.	MC PI
TP BB010	2.00 B8	Grey slightly sandy slightly gravelly SILT.	PSD SED
TP BB011	0.20 J2	Light brown slightly sandy gravelly CLAY of intermediate plasticity.	MC PI
TP BB011	0.70 B4	Brown very clayey very sandy GRAVEL	PSD SED
TP BB011	1.70 B7	Brown slightly sandy slightly gravelly CLAY.	PD CP4 CBR MCV
TP BB011	2.30 J9	Light brown silty slightly sandy CLAY.	MC

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A66 North Trans Pennine Scheme D Section 7

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m) ID	Description	Laboratory Tests/Remarks
TP BB011	2.70 B11	Grey and brown organic silty slightly sandy slightly gravelly CLAY.	PSD SED
TP BB012	0.20 J1	Brown slightly organic clayey sandy SILT of very high plasticity with some rootlets.	MC PI
TP BB012	0.50 J4	Grey with orange mottling slightly sandy gravelly CLAY of low plasticity.	MC PI
TP BB012	0.80 B5	Brown slightly sandy slightly gravelly CLAY.	PSD SED
TP BB012	1.50 J7	Grey brown slightly sandy gravelly CLAY.	MC
TP BB013	0.10 J1	Brown clayey gravelly SAND with some rootlets.	PSD
TP BB013	0.30 J2	Brown clayey sandy SILT of high plasticity with some rootlets	MC PI
TP BB013	0.55 J4	Grey brown slightly sandy slightly gravelly CLAY.	PSD SED
TP BB013	0.70 J5	Grey brown slightly sandy gravelly CLAY.	MC
TP BB013	0.80 B6	Brown slightly sandy gravelly CLAY.	PD CP4 CBR MCV
TP BB014	0.60 J4	Light brown with grey and orange mottling slightly sandy slightly gravelly CLAY.	MC
TP BB014	0.80 B5	Brown sandy gravelly CLAY.	PD CP4 CBR MCV
TP BB014	1.70 B8	Brown very clayey very sandy GRAVEL	PSD SED
TP BB014	2.00 J9	Brown slightly sandy gravelly CLAY of low plasticity.	MC PI
TP BB014	2.20 B11	Brown slightly sandy gravelly CLAY.	PSD SED
WS BB001	0.30 B3	Brown sandy gravelly CLAY.	PD MCV IS for CP4
WS BB001	1.00 B6	Brown slightly sandy gravelly CLAY/very clayey sandy GRAVEL.	US for CBR
WS BB001	1.20 J7	Grey slightly sandy gravelly CLAY of low plasticity.	MC PI
WS BB002	0.20 J2	MADE GROUND (Light brown sandy gravelly clay of intermediate plasticity).	MC PI
WS BB002	1.00 B6	MADE GROUND (Brown very clayey very sandy gravel including brick fragments and rootlets).	PSD SED
WS BB002	1.20 J7	Light brown sandy gravelly CLAY of intermediate plasticity.	MC PI

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m) ID	Description	Laboratory Tests/Remarks
WS BB002	2.20 J10	Light brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI

Contract Title :- A66 North Trans Pennine Scheme D Section 7	Client :- AMEY OW Limited
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## Moisture Content/Plasticity Index and Moisture Content



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## MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH BB002	0.10	J1	0.10	30	18/03/2021	
BH BB002	2.30	J8	2.30	16	18/03/2021	
BH BB003	0.10	J1	0.10	43	19/03/2021	
BH BB003	1.70	J6	1.70	18	19/03/2021	
BH BB003	9.00	J14	9.00	20	19/03/2021	
BH BB004	1.00	J5	1.00	18	26/03/2021	
BH BB005	1.20	J7	1.20	27	26/03/2021	
BH BB005	4.00	J13	4.00	15	26/03/2021	
BH BB006	0.20	J2	0.20	69	23/03/2021	
BH BB006	5.00	J18	5.00	14	23/03/2021	
BH BB007	4.50	J15	4.50	6.1	12/03/2021	
BH BB008	0.30	J2	0.30	45	15/03/2021	
BH BB009	3.00	J9	3.00	11	12/03/2021	
BH BB010	0.05	J1	0.05	60	12/03/2021	
BH BB010	0.50	J7	0.50	8.4	12/03/2021	
BH BB011	0.80	J4	0.80	5.1	23/03/2021	
BH BB012	0.05	J1	0.05	52	12/03/2021	
BH BB012	0.35	J4	0.35	10	12/03/2021	
BH BB013	0.05	J1	0.05	55	16/03/2021	
BH BB015	0.30	J5	0.30	29	23/03/2021	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- <b>A66 North Trans Pennine Scheme D Section 7</b>	Client :- <b>AMEY OW Limited</b>
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## MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH BB018	0.70	J2	0.70	7.1	24/03/2021	
BH BB020	0.20	J2	0.20	37	23/03/2021	
BH BB021	0.20	J2	0.20	68	16/03/2021	
BH BB022	2.50	J9	2.50	29	24/03/2021	
BH BB025	2.40	J8	2.40	8.2	26/03/2021	
BH BB026	0.20	J2	0.20	86	23/03/2021	
HDP BB001	0.30	B2	0.30	20	11/03/2021	
HDP BB001	0.50	J3	0.50	8.7	24/03/2021	
TP BB001	2.10	J9	2.10	23	17/03/2021	
TP BB002	3.30	J11	3.30	11	18/03/2021	
TP BB004	1.30	J6	1.30	16	11/03/2021	
TP BB005	0.30	J2	0.30	17	23/03/2021	
TP BB006	0.50	J5	0.50	15	11/03/2021	
TP BB007	1.40	J6	1.40	24	11/03/2021	
TP BB008	1.20	J6	1.20	24	19/03/2021	
TP BB009	0.10	J1	0.10	28	19/03/2021	
TP BB011	2.30	J9	2.30	40	19/03/2021	
TP BB012	1.50	J7	1.50	19	12/03/2021	
TP BB013	0.70	J5	0.70	15	12/03/2021	
TP BB014	0.60	J4	0.60	21	23/03/2021	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- <b>A66 North Trans Pennine Scheme D Section 7</b>	Client :- <b>AMEY OW Limited</b>
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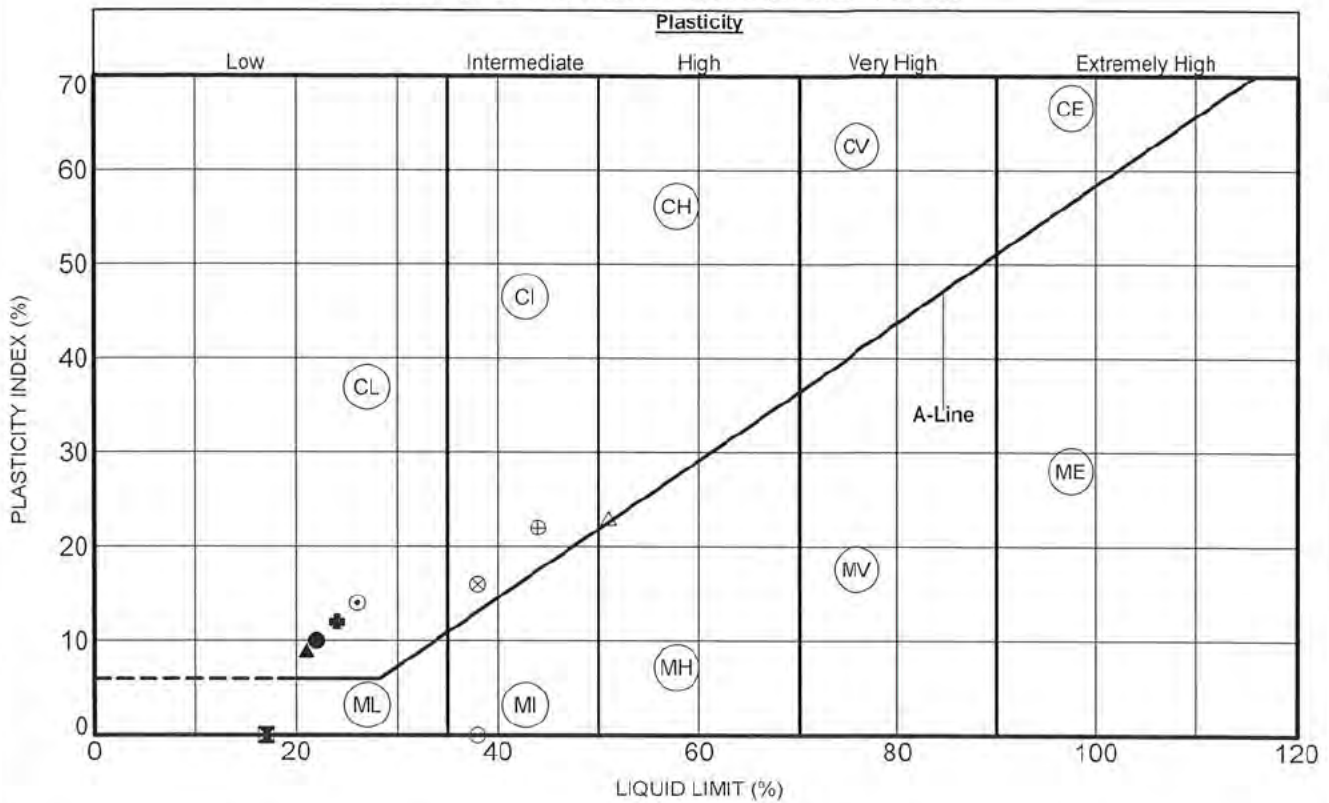
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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	$I_L$	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●BH BB002	1.70	J6	1.70	22	12	10	-0.36	Natural		8.4	18/03/2021
⊠BH BB002	2.50	J9	2.50		17			Air Dried	59.0	15	18/03/2021
▲BH BB003	6.00	J12	6.00	21	12	9	0.11	Natural		13	19/03/2021
★BH BB004	2.50	J9	2.50	24	12	12	0.25	Natural		15	26/03/2021
⊙BH BB004	4.00	J12	4.00	26	12	14	-0.16	Natural		9.8	26/03/2021
⊕BH BB004	5.50	J15	5.50	24	12	12	0.17	Natural		14	26/03/2021
○BH BB005	0.20	J2	0.20		38			Natural		36	26/03/2021
△BH BB005	1.00	J5	1.00	51	28	23	0.17	Natural		32	26/03/2021
⊗BH BB006	1.00	J5	1.00	38	22	16	0.44	Natural		29	23/03/2021
⊕BH BB006	2.50	J11	2.50	44	22	22	0.18	Natural		26	23/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

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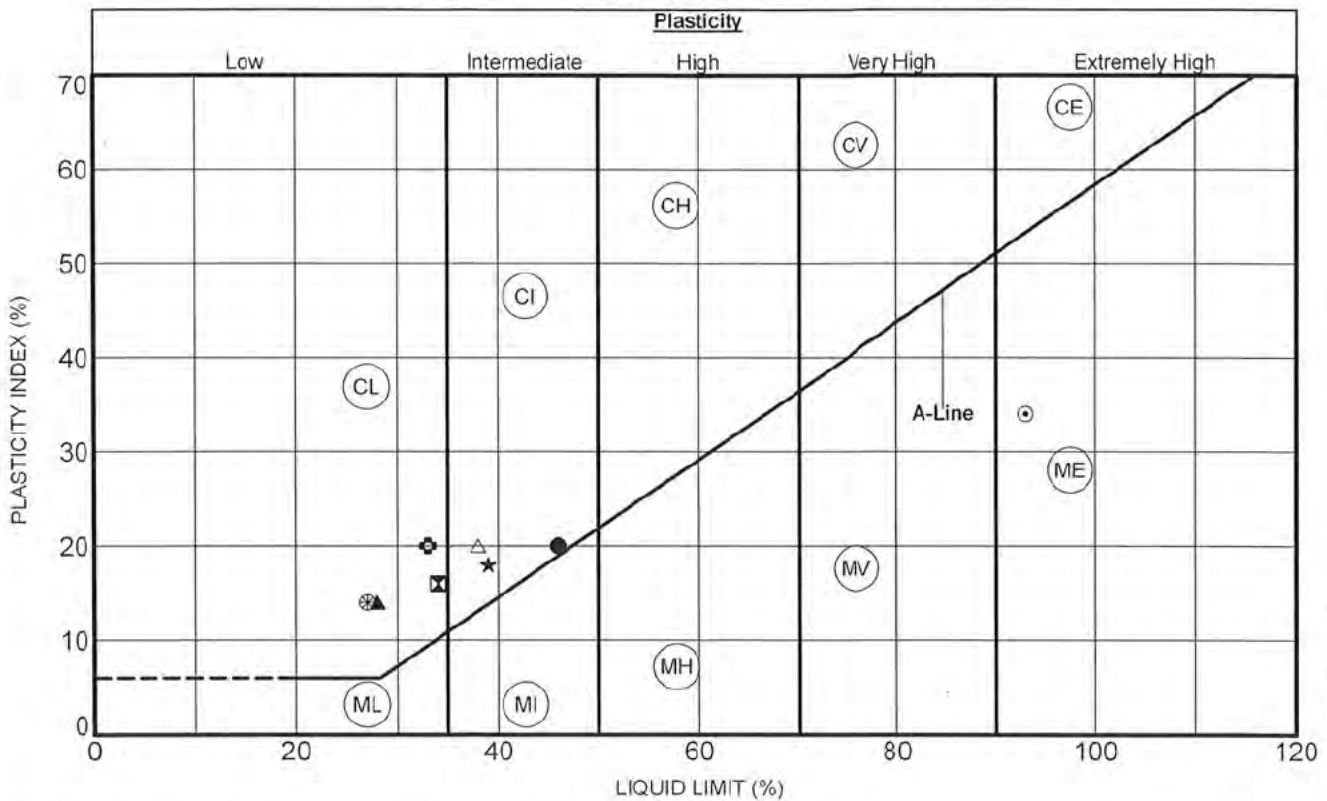


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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 ; Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I <sub>L</sub>	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●BH BB007	0.40	J2	0.40	46	26	20	0.60	Natural		38	11/03/2021
⊗BH BB007	1.50	J5	1.50	34	18	16	0.25	Natural		22	11/03/2021
▲BH BB007	3.50	J12	3.50	28	14	14	0.07	Natural		15	11/03/2021
★BH BB008	2.00	J7	2.00	39	21	18	0.11	Natural		23	15/03/2021
⊙BH BB009	0.30	J2	0.30	93	59	34	0.97	Natural		92	11/03/2021
⊕BH BB009	1.50	J5	1.50	33	13	20	0.05	Natural		14	11/03/2021
○BH BB009	4.50	J14	4.50	27	13	14	-0.33	Natural		8.4	11/03/2021
△BH BB013	0.50	J6	0.50	38	18	20	0.20	Natural		22	15/03/2021
⊗BH BB013	3.10	J14	3.10	27	13	14	-0.14	Natural		11	16/03/2021
⊕BH BB013	4.20	J18	4.20	27	13	14	0.00	Natural		13	15/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signature

Date

20/04/2021

PI/4322C/2

EG Contract No. :-

4322C

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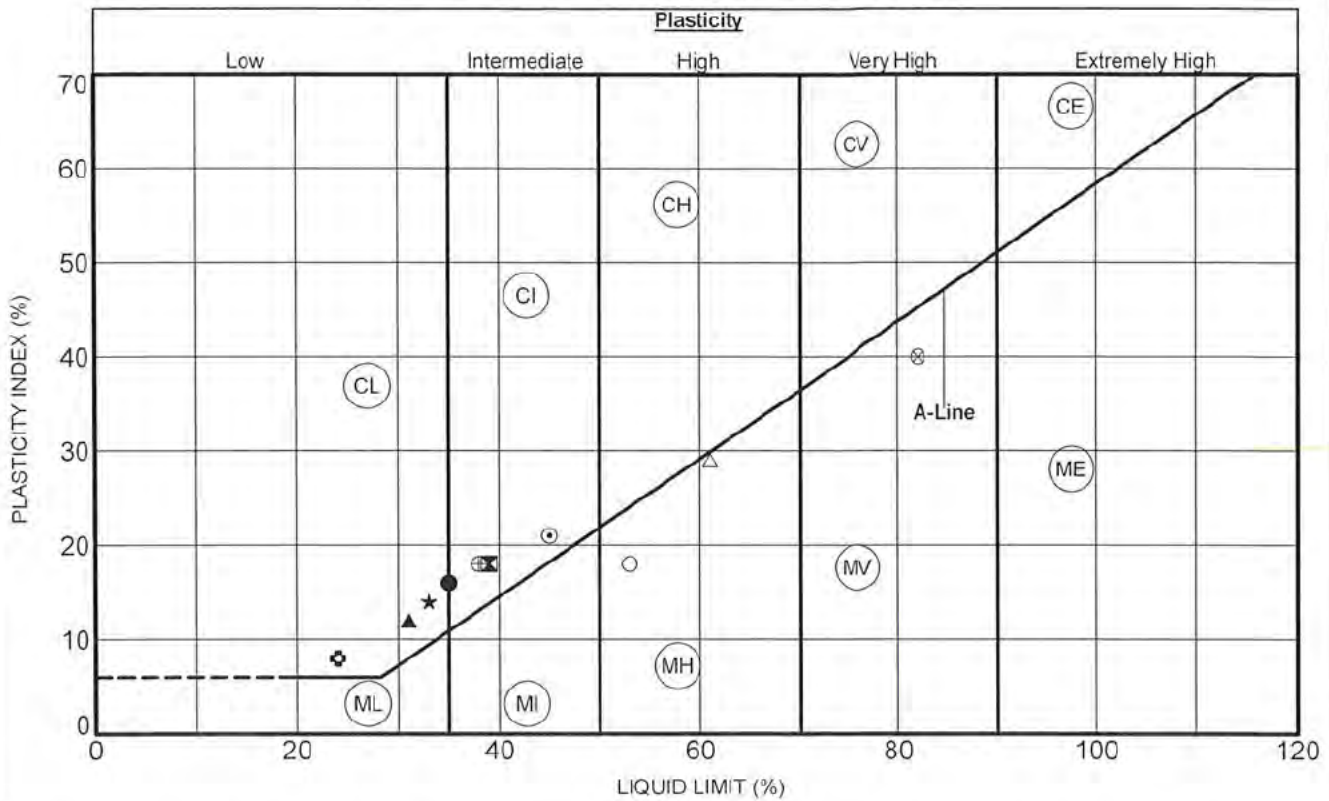


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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01752 735 300 Fax: 01752 735 999

## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	$I_L$	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
● BH BB014	1.50	U4	1.50	35	19	16	0.00	Natural	83.0	19	26/03/2021
⊠ BH BB014	2.00	J5	2.00	39	21	18	0.94	Natural		38	23/03/2021
▲ BH BB015	0.80	J7	0.80	31	19	12	-0.08	Natural		18	23/03/2021
★ BH BB015	2.15	J12	2.15	33	19	14		Natural			23/03/2021
⊙ BH BB016	0.35	J5	0.35	45	24	21	0.14	Natural		27	23/03/2021
⊕ BH BB016	2.00	J10	2.00	24	16	8	-0.50	Natural		12	23/03/2021
○ BH BB017	0.20	J2	0.20	53	35	18	0.33	Natural		41	11/03/2021
△ BH BB017	0.50	J4	0.50	61	32	29	0.24	Natural		39	11/03/2021
⊗ BH BB019	0.20	J2	0.20	82	42	40	0.88	Natural		77	11/03/2021
⊕ BH BB019	1.00	J6	1.00	38	20	18	0.06	Natural		21	11/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :-

Date of issue

21/04/2021

PI/432203

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Contract No. :-

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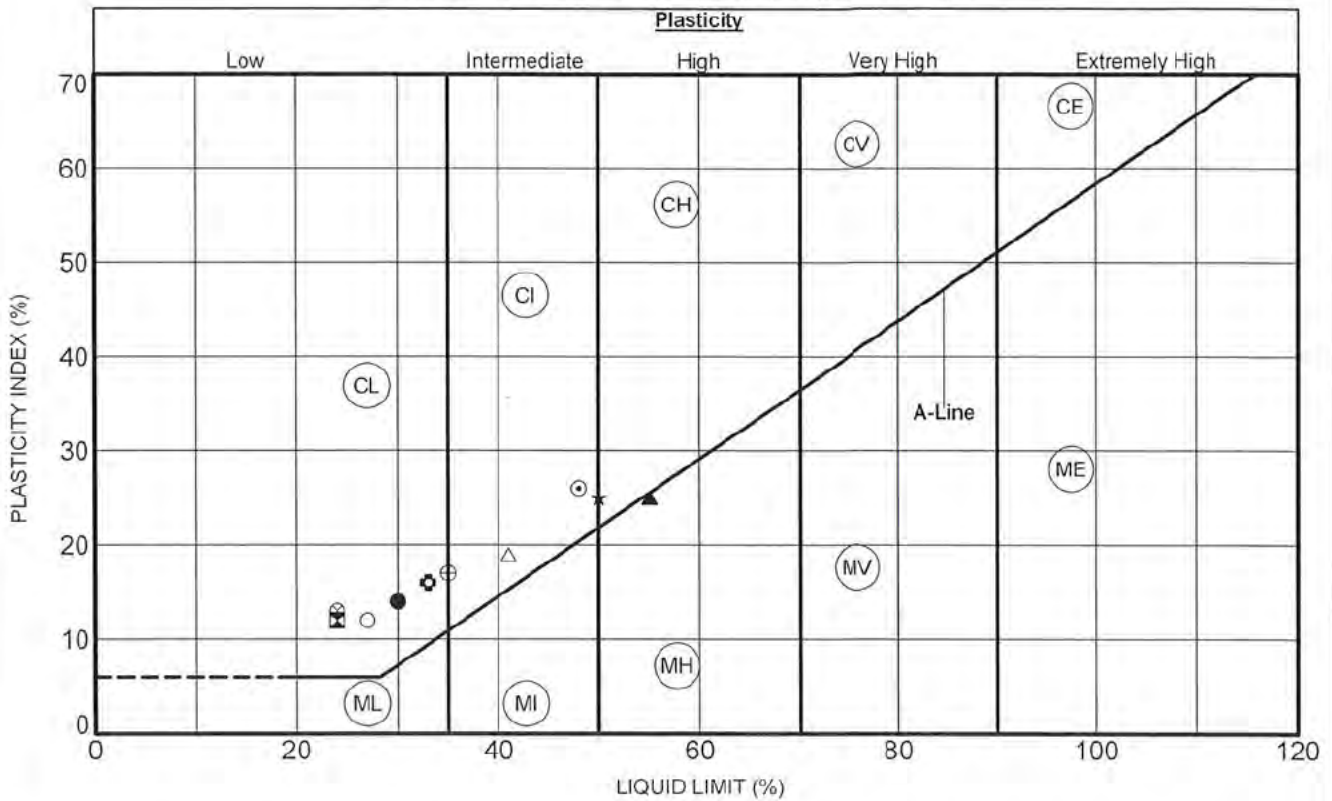


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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	$I_L$	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●BH BB020	1.00	J5	1.00	30	16	14	0.14	Natural		18	27/03/2021
⊠BH BB020	2.45	J9	2.45	24	12	12		Natural			23/03/2021
▲BH BB021	0.50	J4	0.50	55	30	25	0.68	Natural		47	16/03/2021
★BH BB021	1.00	J6	1.00	50	25	25		Natural			16/03/2021
⊙BH BB022	0.70	J3	0.70	48	22	26	0.92	Natural		46	26/03/2021
◆BH BB022	1.50	U5	1.50	33	17	16	0.00	Natural		17	01/04/2021
○BH BB022	2.40	B8	2.40	27	15	12	-0.17	Natural		13	01/04/2021
△BH BB023	1.00	J5	1.00	41	22	19	0.26	Natural		27	23/03/2021
⊗BH BB023	2.50	J10	2.50	24	11	13	0.31	Natural		15	23/03/2021
⊕BH BB024	0.70	J3	0.70	35	18	17	0.41	Natural		25	26/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of Issue :-

20/04/2021

Certificate No. :-

PI/4322C/4

AEG Contract No. :-

4322C

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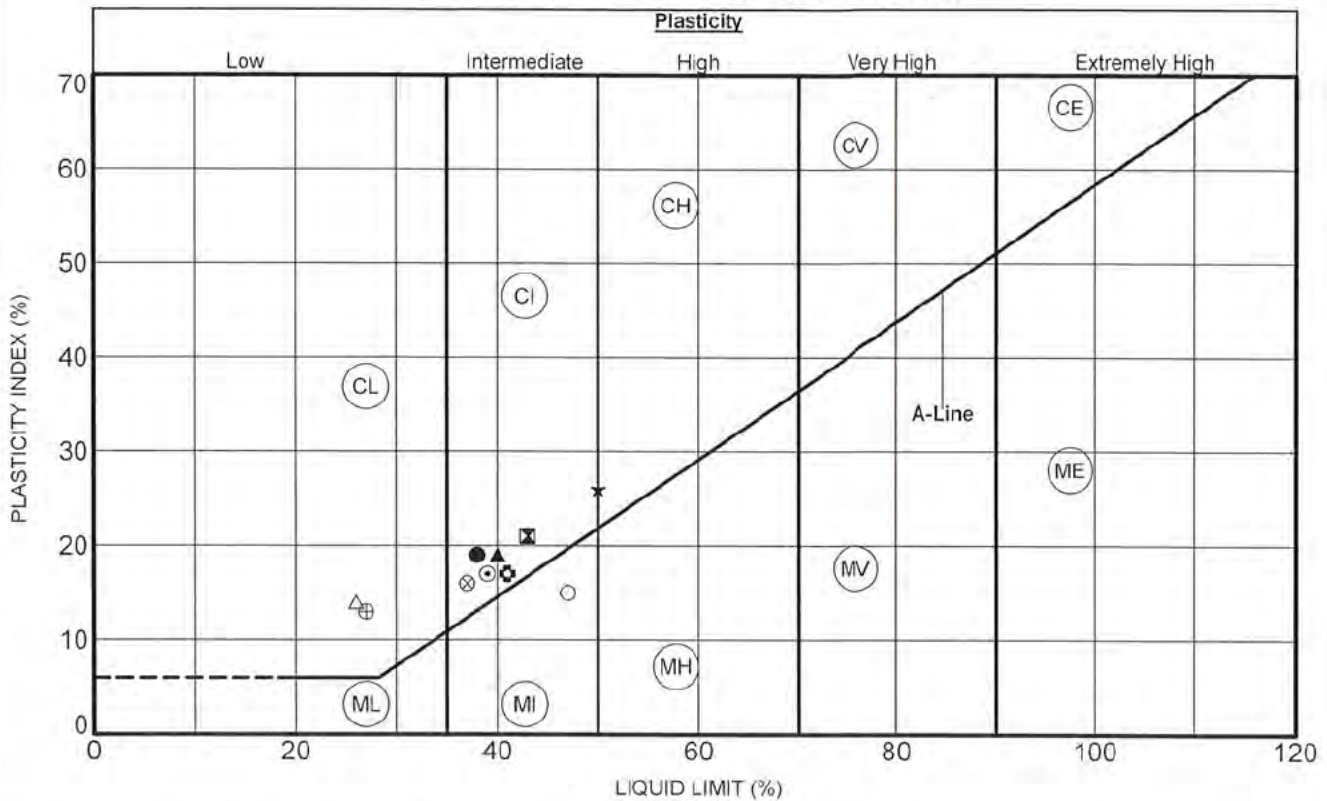
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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	$I_L$	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●BH BB024	2.00	J6	2.00	38	19	19	-0.32	Natural		13	26/03/2021
⊠BH BB025	0.70	J3	0.70	43	22	21	0.62	Natural		35	26/03/2021
▲BH BB025	1.20	U5	1.20	40	21	19		Natural			01/04/2021
★BH BB026	1.00	J5	1.00	50	24	26	0.00	Natural		24	23/03/2021
⊙TP BB001	1.00	J6	1.00	39	22	17	0.24	Natural		26	17/03/2021
⊕TP BB002	0.50	J4	0.50	41	24	17	0.53	Natural		33	17/03/2021
○TP BB003	0.05	J1	0.05	47	32	15	-0.33	Natural		27	19/03/2021
△TP BB004	3.30	J11	3.30	26	12	14	-0.07	Natural		11	11/03/2021
⊗TP BB005	2.70	J11	2.70	37	21	16	0.56	Natural		30	23/03/2021
⊕TP BB006	1.90	J9	1.90	27	14	13	-0.08	Natural		13	11/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :-

Date of issue

20/04/2021

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No. :-

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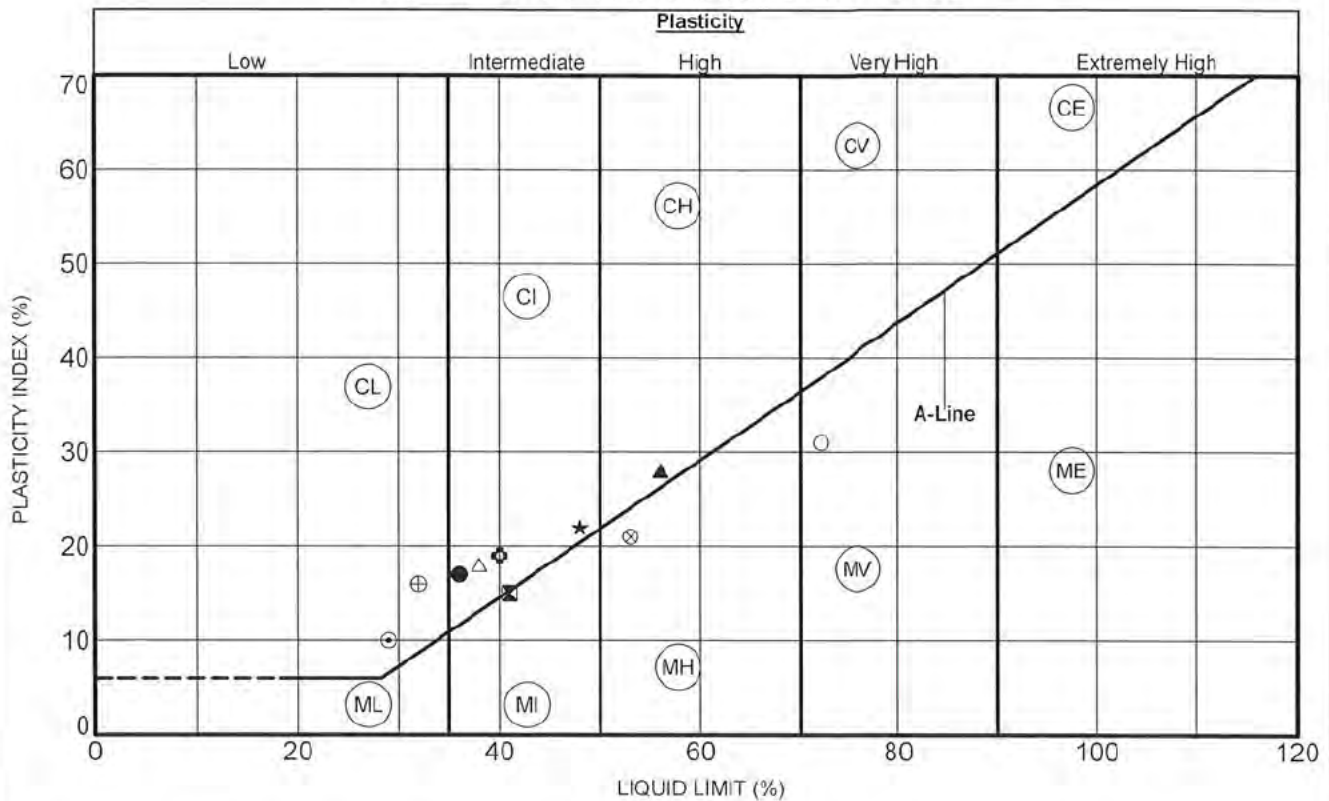


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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I <sub>L</sub>	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
● TP BB007	0.40	J2	0.40	36	19	17	0.29	Natural		24	11/03/2021
⊗ TP BB008	0.45	J3	0.45	41	26	15	-0.40	Natural		20	19/03/2021
▲ TP BB009	1.50	J6	1.50	56	28	28	0.64	Natural		46	19/03/2021
★ TP BB010	0.35	J3	0.35	48	26	22	0.41	Natural		35	19/03/2021
⊙ TP BB010	1.70	J7	1.70	29	19	10	0.40	Natural		23	19/03/2021
⊕ TP BB011	0.20	J2	0.20	40	21	19	0.05	Natural		22	19/03/2021
○ TP BB012	0.20	J1	0.20	72	41	31	0.45	Natural		55	12/03/2021
△ TP BB012	0.50	J4	0.50	38	20	18	0.00	Natural		20	11/03/2021
⊗ TP BB013	0.30	J2	0.30	53	32	21	0.05	Natural		33	11/03/2021
⊕ TP BB014	2.00	J9	2.00	32	16	16	0.25	Natural		20	23/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

466 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of

20/04/2021

PI/4322C/6

Contract No :-

4322C

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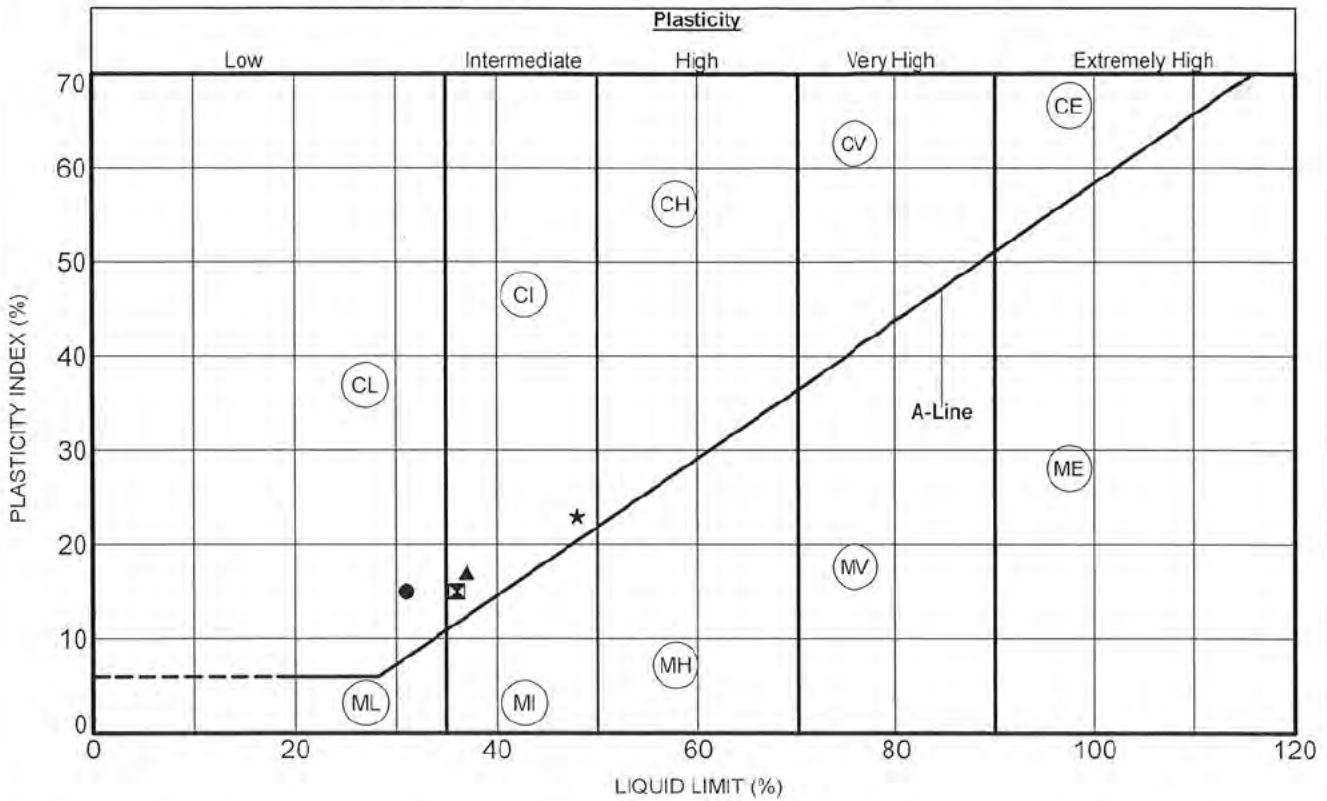


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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I <sub>L</sub>	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
● WS BB001	1.20	J7	1.20	31	16	15	-0.33	Natural		11	11/03/2021
☒ WS BB002	0.20	J2	0.20	36	21	15	0.07	Natural		22	26/03/2021
▲ WS BB002	1.20	J7	1.20	37	20	17	0.18	Natural		23	26/03/2021
★ WS BB002	2.20	J10	2.20	48	25	23	0.22	Natural		30	26/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet, # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed

Date of

21/04/2021

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Contract No. :-  
4322C



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## Determination of Density by Linear Measurement



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## DETERMINATION OF DENSITY BY LINEAR MEASUREMENT

BS 1377 : Part 2 : Clause 7 : 1990

Exploratory Hole No.:-	Sample Type & No.:-	Sample Depth (m):-	Specific Depth (m):-	Bulk Density (Mg/m <sup>3</sup> ):-	Dry Density (Mg/m <sup>3</sup> ):-	Moisture Content (%):-	Date Tested	Test Method
BH BB005	B10	2.00	2.00	2.21	1.77	25	30/03/2021	Undisturbed
BH BB006	B12	2.50	2.50	1.94	1.54	26	25/03/2021	4.5kg Remould @ NMC
BH BB007	B10	2.50	2.50	2.28	1.98	15	11/03/2021	Undisturbed
BH BB009	B6	1.50	1.50	2.13	1.78	20	11/03/2021	Undisturbed
BH BB013	B16	3.40	3.40	2.19	1.90	15	10/03/2021	Undisturbed

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :-

Date of issue

18/06/2021

DENS/4322C/1

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Contract No. :-

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## Determination of Particle Density

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## DETERMINATION OF PARTICLE DENSITY

BS1377 : Part 2 : Clause 8.2 : 1990

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Particle Density (Mg/m <sup>3</sup> )	Date Tested
BH BB003	1.00	B5	1.00	2.66	24/03/2021
BH BB005	3.00	B12	3.00	2.59	14/04/2021
BH BB005	5.00	B15	5.00	2.64	14/04/2021
BH BB007	1.50	B6	1.50	2.61	15/03/2021
BH BB008	1.00	B4	1.00	2.65	16/03/2021
BH BB009	3.20	B10	3.20	2.65	15/03/2021
BH BB013	2.35	B12	2.35	2.67	16/03/2021
BH BB015	0.20	B4	0.20	2.56	14/04/2021
BH BB016	1.30	B9	1.30	2.59	29/03/2021
BH BB017	0.20	B3	0.20	2.52	15/03/2021
BH BB024	1.50	B5	1.50	2.66	30/03/2021
TP BB001	1.50	B7	1.50	2.54	23/03/2021
TP BB002	0.75	B5	0.75	2.60	23/03/2021
TP BB003	0.20	B3	0.20	2.45	29/03/2021
TP BB004	1.50	B7	1.50	2.65	18/03/2021
TP BB004	2.50	B9	2.50	2.67	18/03/2021
TP BB006	0.30	B4	0.30	2.64	18/03/2021
TP BB008	1.40	B7	1.40	2.50	23/03/2021
TP BB009	0.80	B4	0.80	2.61	23/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- A66 North Trans Pennine Scheme D Section 7 Client :- AMEY OW Limited



Signature

Date



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Contract No. :-  
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## DETERMINATION OF PARTICLE DENSITY

BS1377 : Part 2 : Clause 8.2 : 1990

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Particle Density (Mg/m <sup>3</sup> )	Date Tested
TP BB009	1.80	B7	1.80	2.67	23/03/2021
TP BB011	1.70	B7	1.70	2.65	23/04/2021
TP BB013	0.80	B6	0.80	2.63	15/03/2021
TP BB014	0.80	B5	0.80	2.64	30/03/2021
WS BB001	0.30	B3	0.30	2.50	15/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signature

Date



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Contract No. :-  
4322C



## Particle Size Distribution Sieving and Sedimentation



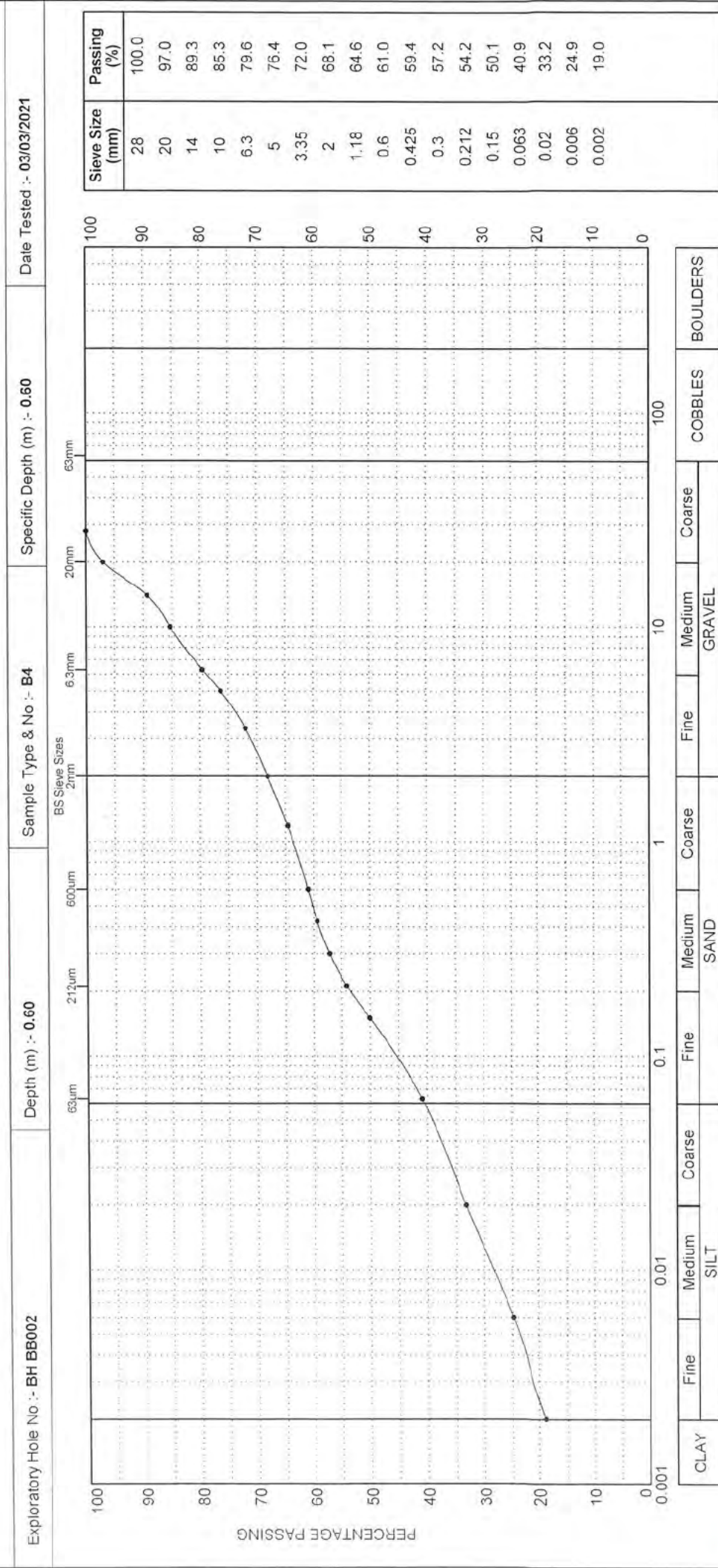


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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/BH BB002/B4/0.60	Signature	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :- Scheme D Section 7	Signature	AEG Contract No :- 4322C



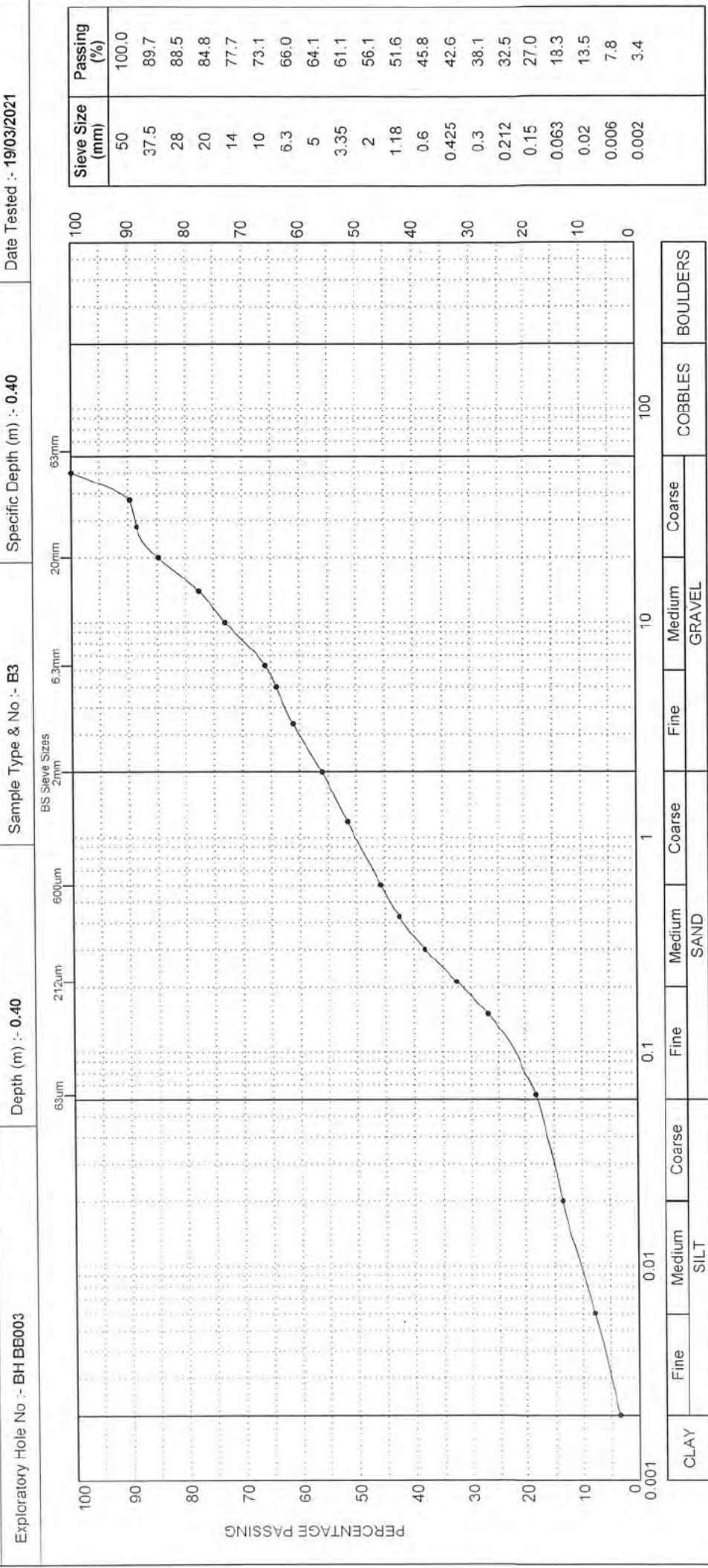
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Easingwold, East Yorkshire, YO21 2JL - Tel: 01772 735 300 Fax: 01772 735 959

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



**AMEY**

Date of issue :- 30/03/2021

Client :- AMEY OW Limited

Certificate No :- PSD/4322C/BH BB003/B3/0.40

Contract Title :-

For description of sample please refer to the Laboratory Sample Description Sheet

Signature

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Page 1 of 1

AEG Contract No :- 4322C

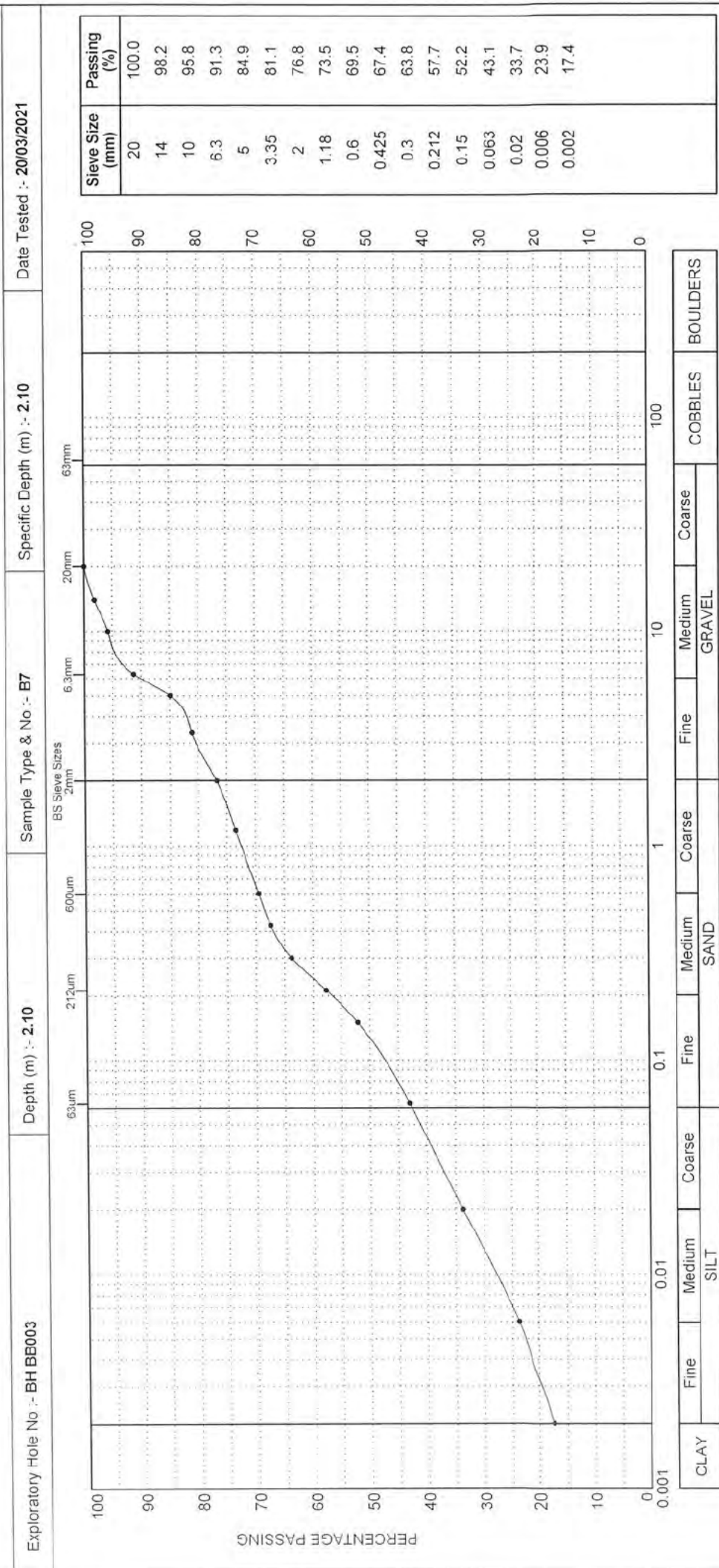


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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/BH BB003/B7/2.10	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7		AEG Contract No :- 4322C
UKAS TESTING 1367			

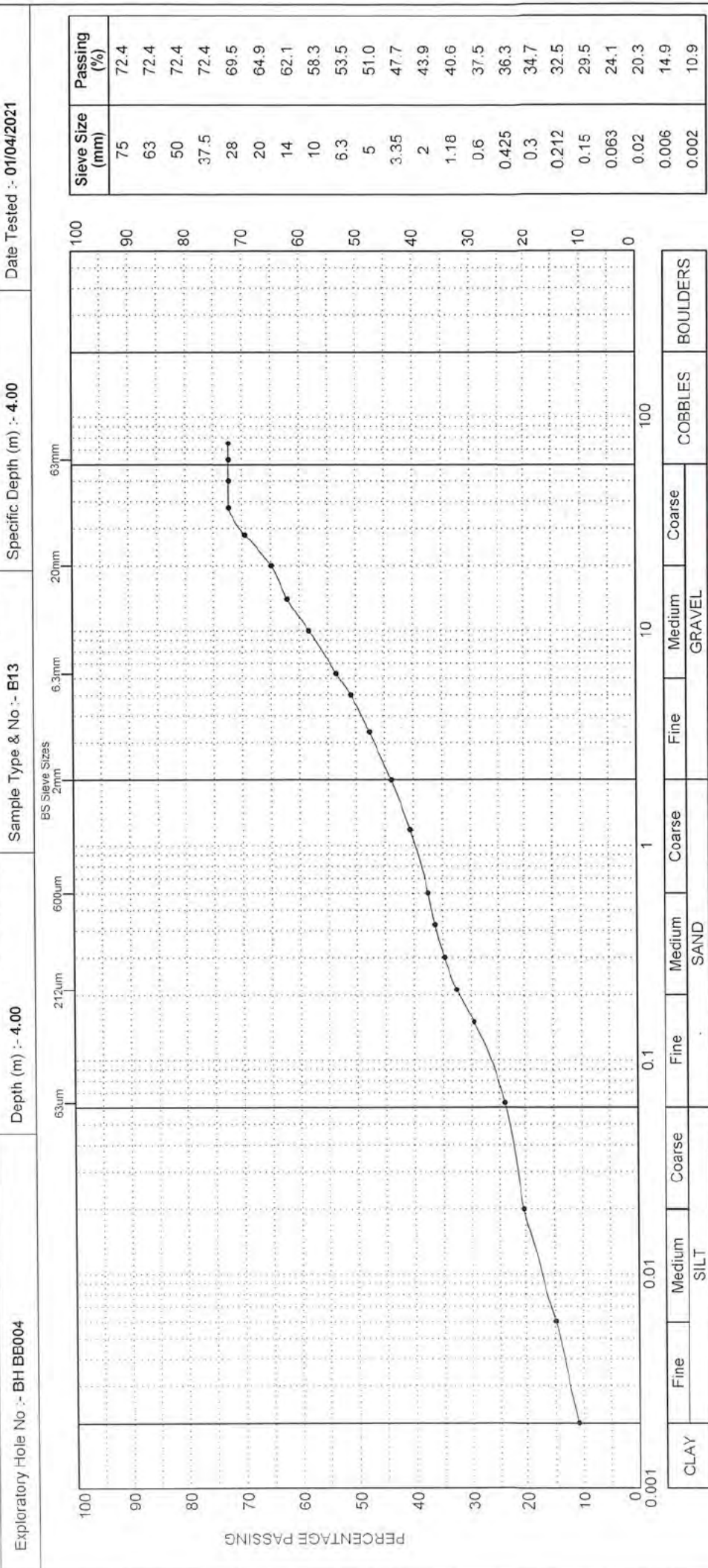
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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



Exploratory Hole No :- BH BB004      Depth (m) :- 4.00      Sample Type & No :- B13      Specific Depth (m) :- 4.00      Date Tested :- 01/04/2021

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/BH BB004/B13/4.00	Signed [Redacted]	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :- [Redacted]	Schematic [Redacted]	Contract No :- 4322C



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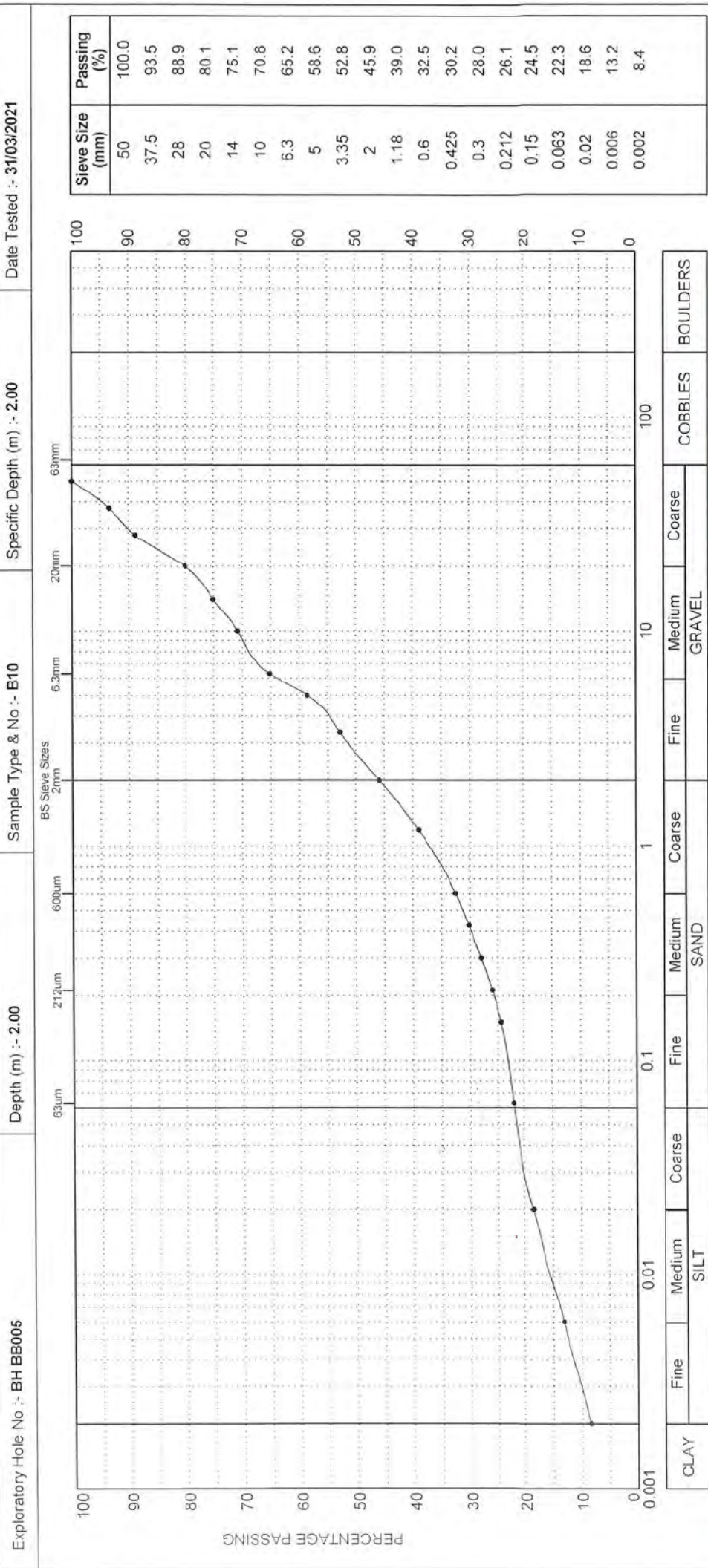
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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



For description of sample please refer to the Laboratory Sample Description Sheet

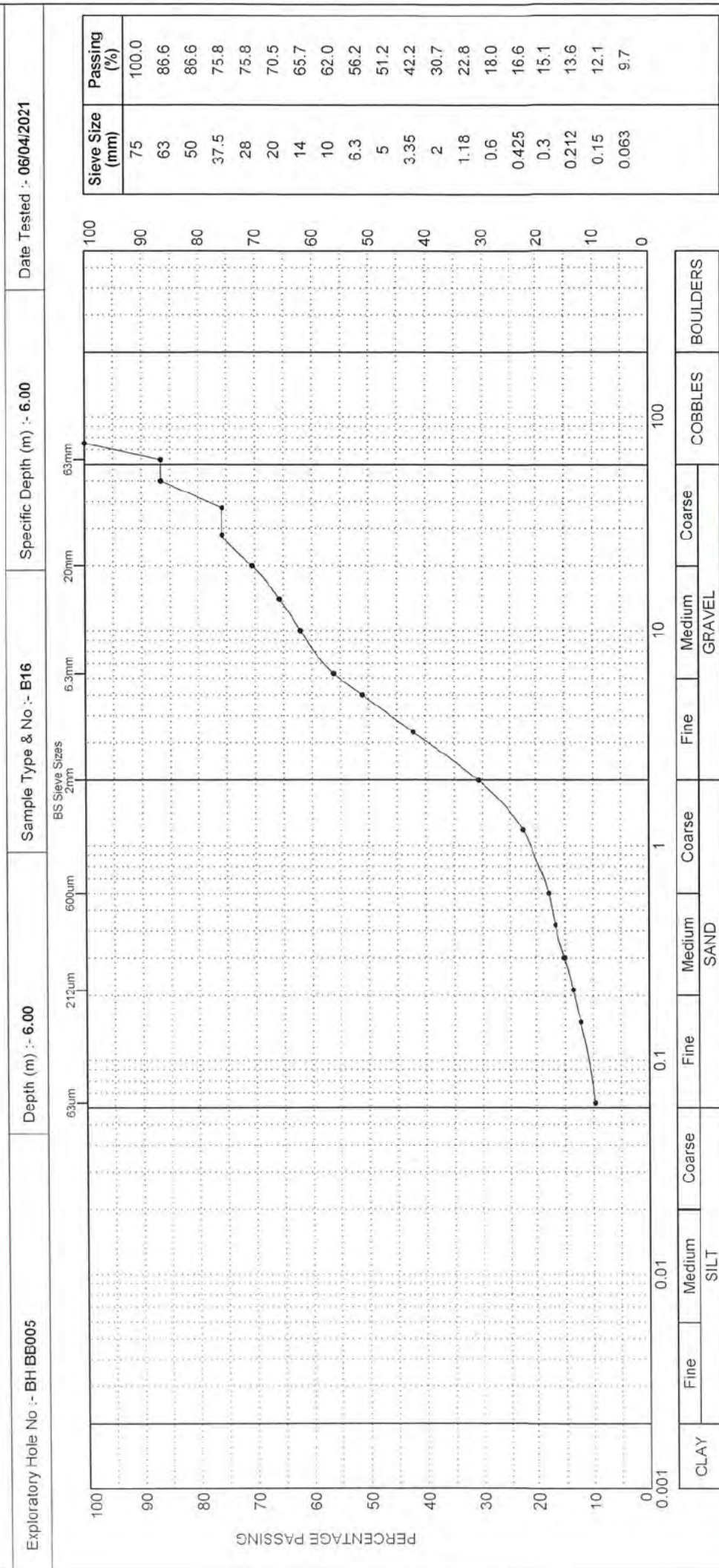
Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/BH BB005/B10/2.00	Signed :-	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	Contract No :- 4322C	UKAS TESTING 1367

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Regional Office: Unit 20 Business Development Centre, Eham Wharf, Babburn, BB1 5BL. Tel: 01772 735300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please

Date of issue :- 20/04/2021	Certificate No :- PSD/4322C/BH BB005/B16/6.00	Signed :-
Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322C

AMEY OW Limited

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UKAS TESTING 1367



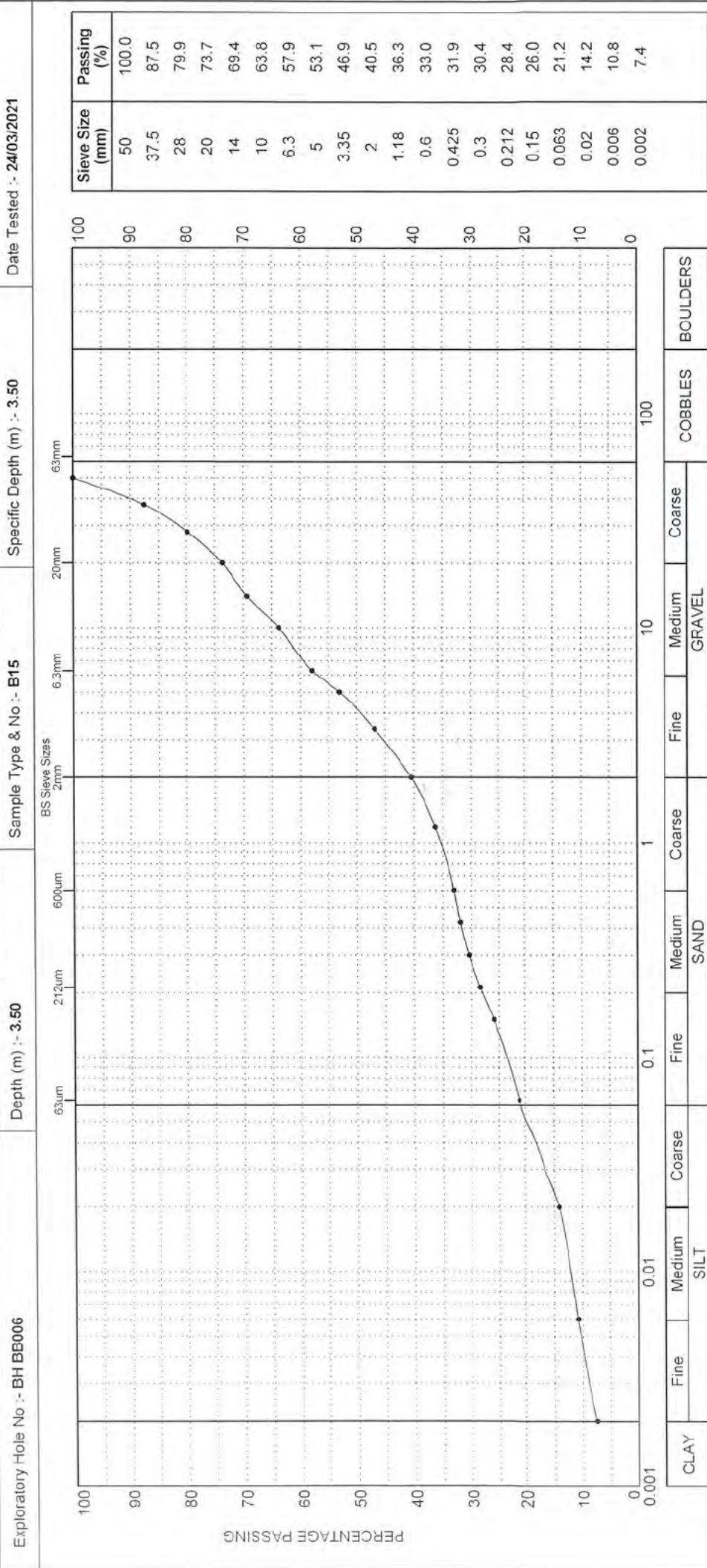
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 Regional Office: Unit 20 Business Development Centre, Easingwold, East Yorkshire, East Yorkshire, YO21 2JL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 20/04/2021	Certificate No :- PSD/4322C/BH BB006/B15/3.50	Signed
Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322C

A66 North Trans Pennine Scheme D Section 7

Page 1 of 1

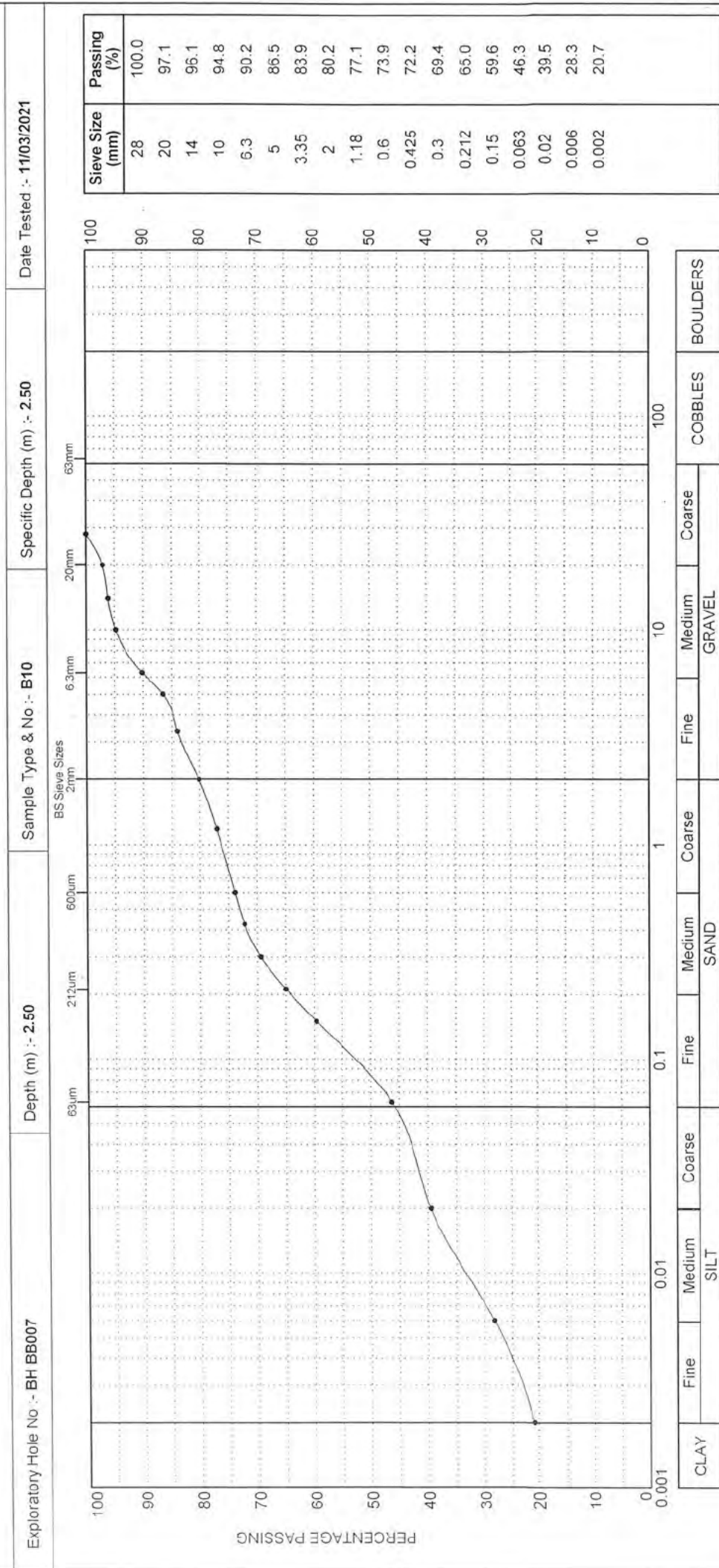


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Hill Industrial Estate, Chester-le-Street, Co. Durham, DH2 4RS. Tel: 0191 837 4100 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Eban Way, Baxbarn, EBBW, SBL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 25/03/2021	Certificate No. :- PSD/4322C/BH BB007/B/10/2.50	Page 1 of 1	UKAS TESTING 1367
Client :- AMEY OW Limited		EG Contract No. :- 4322C	



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Giff Industrial Estate, Pelton Fall, Chester-le-Street, Co. Durham, DH2 3RG. Tel: 0191 837 4700 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Easingwold, East Yorkshire, YO21 2JL. Tel: 01752 735300 Fax: 01752 735999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

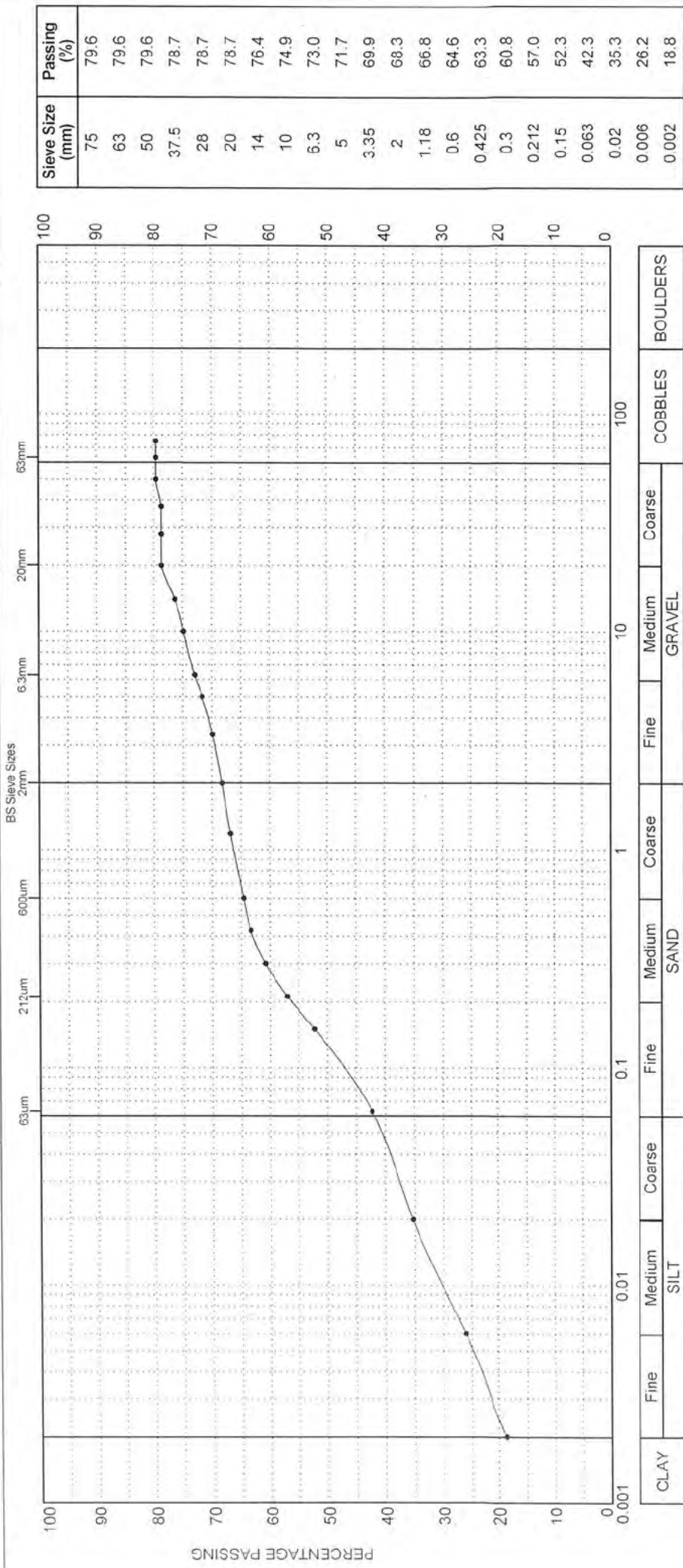
Exploratory Hole No :- BH BB008

Depth (m) :- 1.00



Sample Type & No :- B4

Specific Depth (m) :- 1.00

Date Tested :- 15/03/2021



For description of sample please refer to the Laboratory Sample Description Sheet

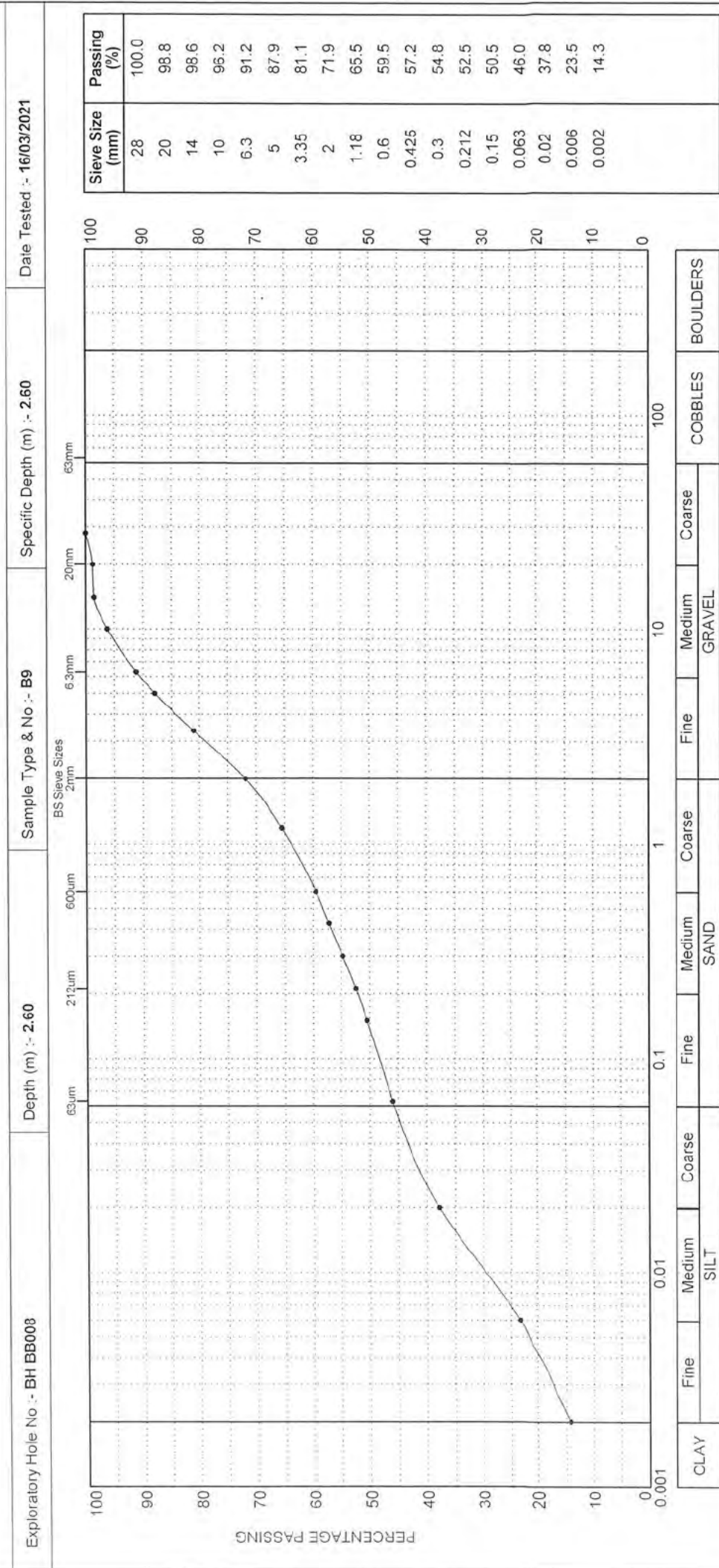
	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/BH BB008/B4/1.00 Sign	Page 1 of 1	
	Client :- AMEY OW Limited			

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton PA1, Chester-le-Street Co. Durham, DH2 2JG. Tel: 0191 837 4000 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eamam Way, Evesham, BBI 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/BH BB008/B9/2.60	Signed :- [Redacted]	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :- [Redacted]		
[Redacted]		REG Contract No :- 4322C	

1367



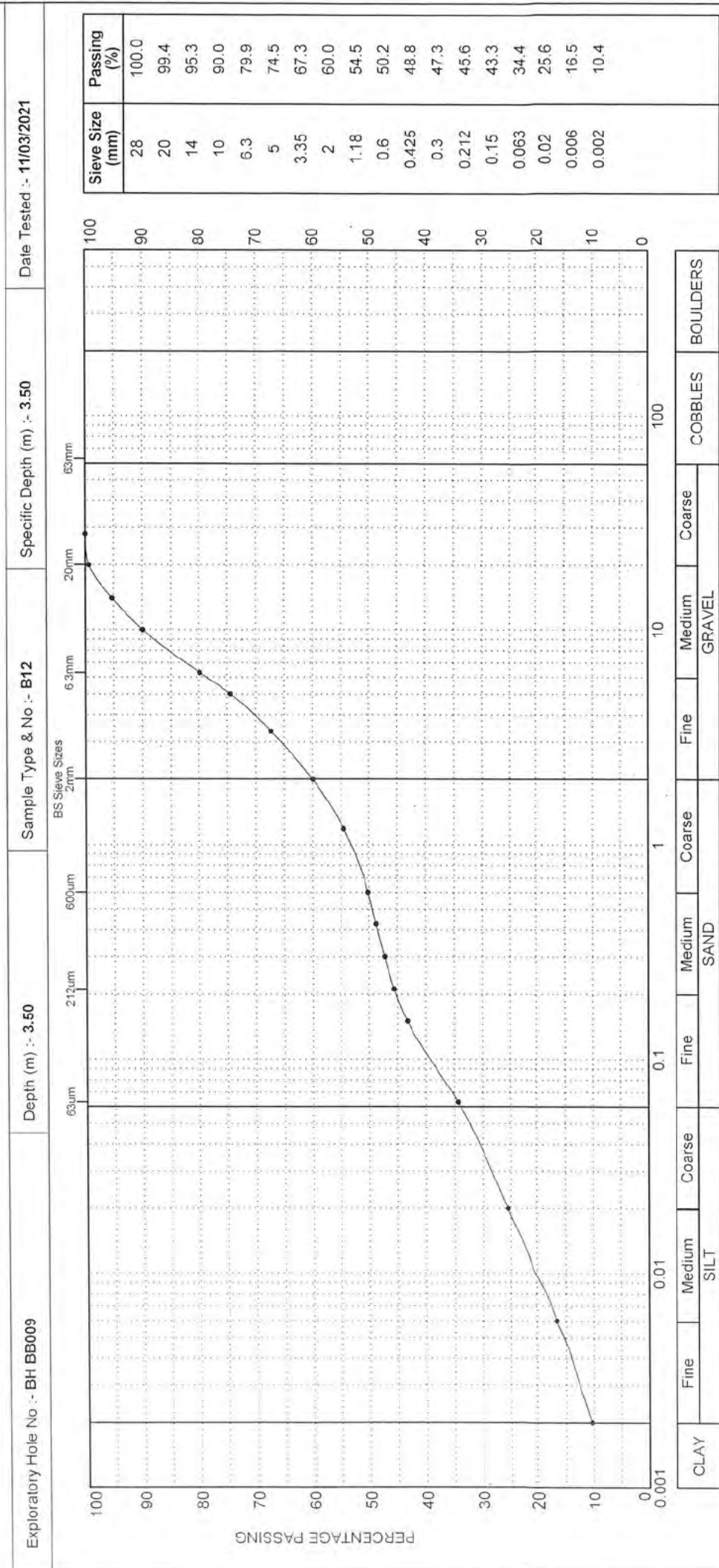


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Perton Hill, Cheshire, Chester, CH1 4JG. Tel: 01244 887 4100 Fax: 01244 362 4710  
 Regional Office: Unit 20, Business Development Centre, Eanam Ynher, Bischoff, EBBW Vale, Gwent, NP23 5LJ. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/BH BB009/B12/3.50	Signed	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :-	[Redacted Signature]	
		EG Contract No :- 4322C	

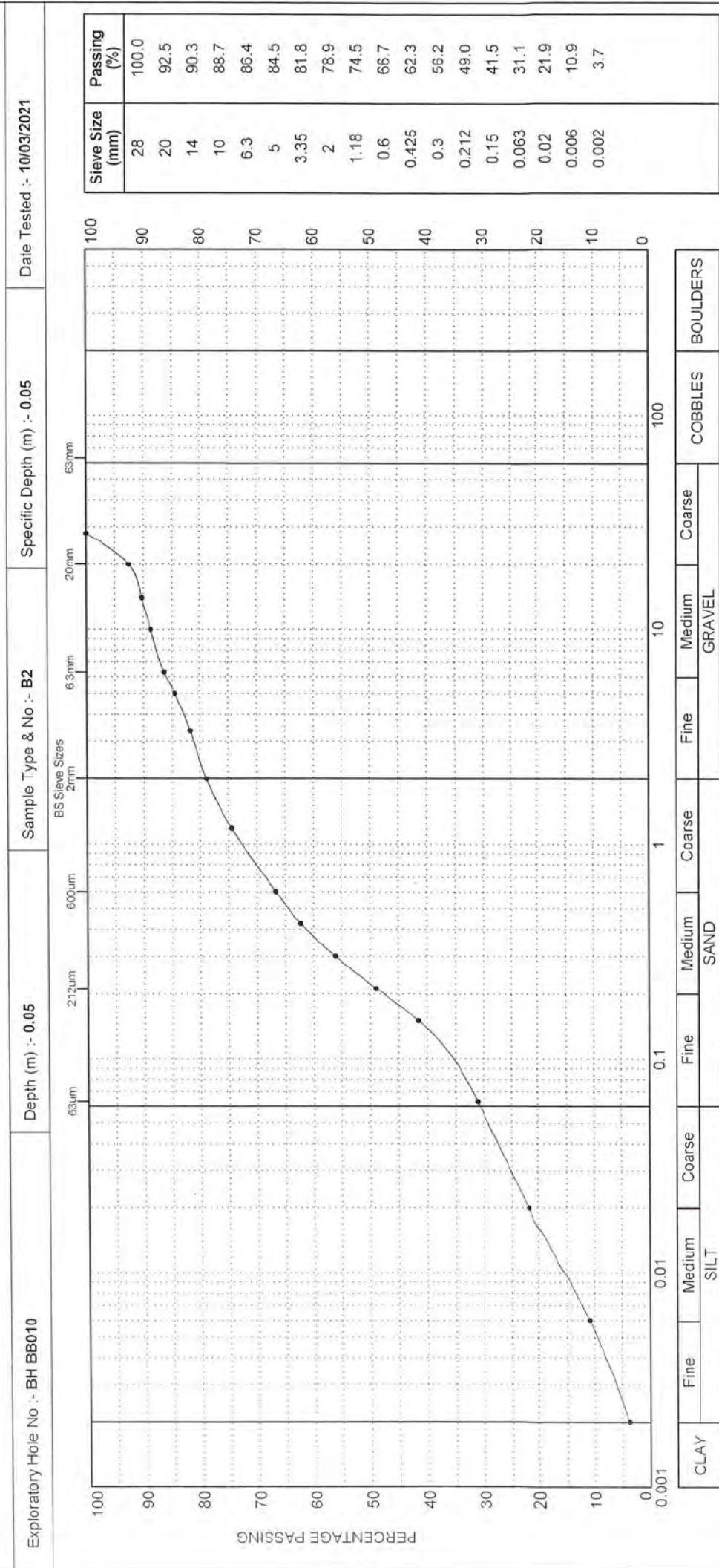


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Felton Hill, Cheshire-Sheriff, Co. Durham, DL12 3JG. Tel: 0161 882 4100 Fax: 0161 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Backburn, BB1 3EL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

<b>Date of issue :-</b> 25/03/2021	<b>Certificate No. :-</b> PSD/4322C/BH BB010/B2/0.05	<b>Signe</b>	<b>Page 1 of 1</b>
<b>Client :-</b> AMEY OW Limited	<b>Contract Title :-</b> [REDACTED]		
<b>Contract No. :-</b> 4322C			<b>UKAS TESTING</b> 1367





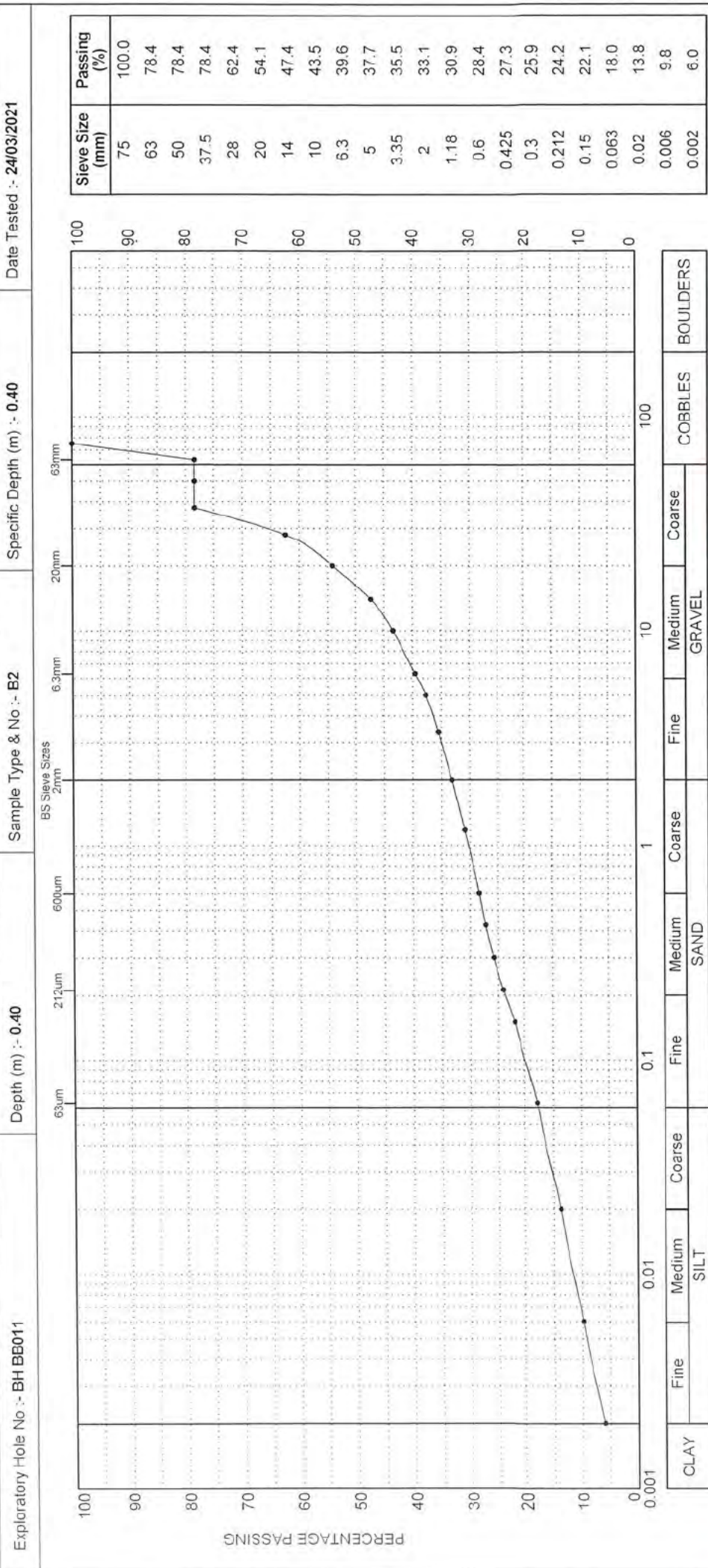
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Skells, Gill Industrial Estate, Pelton Hill, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 389 4710  
Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



Exploratory Hole No :- BH BB011

Depth (m) :- 0.40

Sample Type & No :- B2

Specific Depth (m) :- 0.40

Date Tested :- 24/03/2021

**AMEY**

Date of issue :- 20/04/2021

Client :- AMEY OW Limited

Certificate No :- PSD/4322C/BH BB011/B2/0.40

Contract Title :-

Signature

Contract No :- AEG Contract No :- 4322C

Page 1 of 1

1367

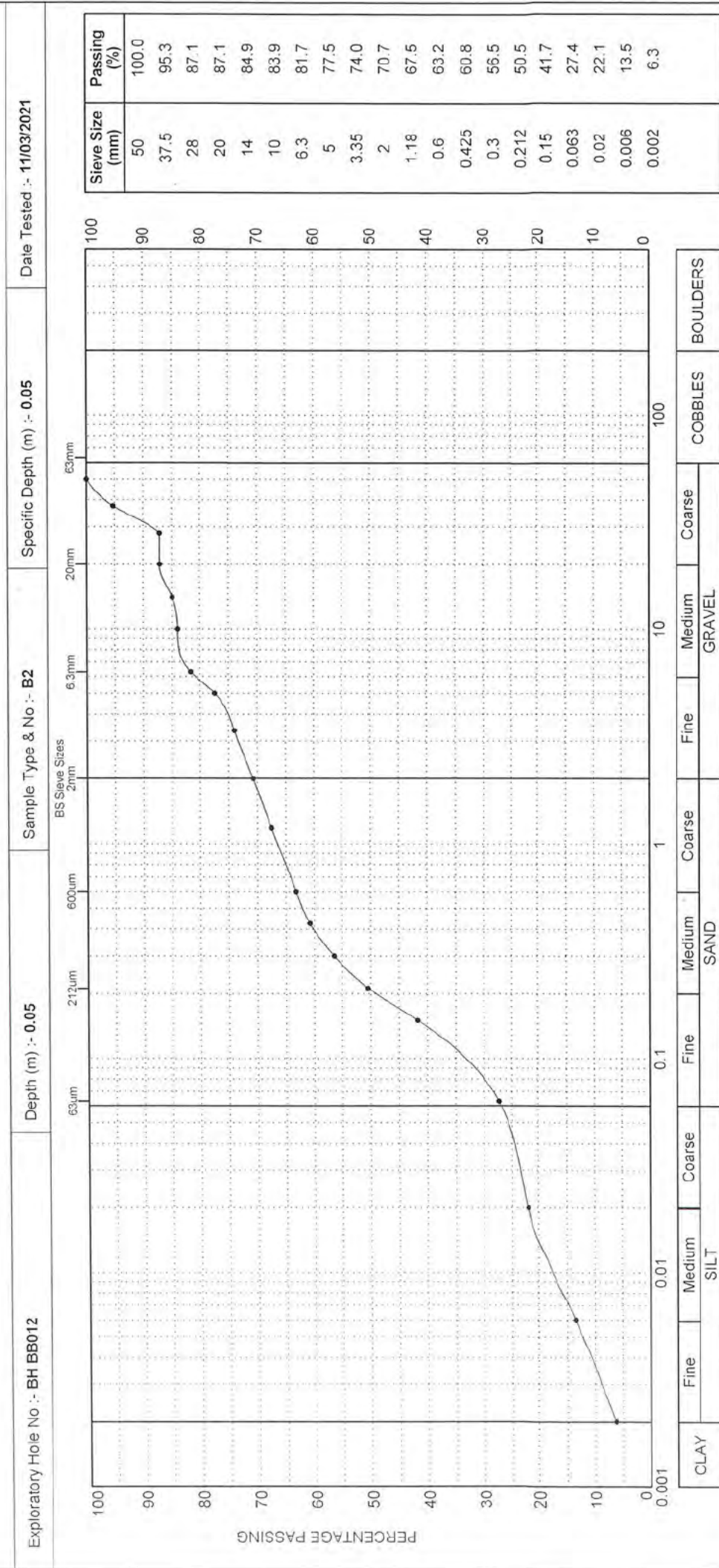
For description of sample please refer to the Laboratory Sample Description Sheet

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Sheila Gill Industrial Estate, Pelton Fall, Chester-le-Street, Co. Durham, DH2 2JG. Tel: 0161 887 4000 Fax: 0161 367 4710  
Regional Office: Unit 20, Business Development Centre, Eanan Yrhaf, Backburn, BB1 3BL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No. :- PSD/4322C/BH BB012/B2/0.05	Signature 
	Client :- AMEY OW Limited		

Page 1 of 1	AEG Contract No. :- 4322C
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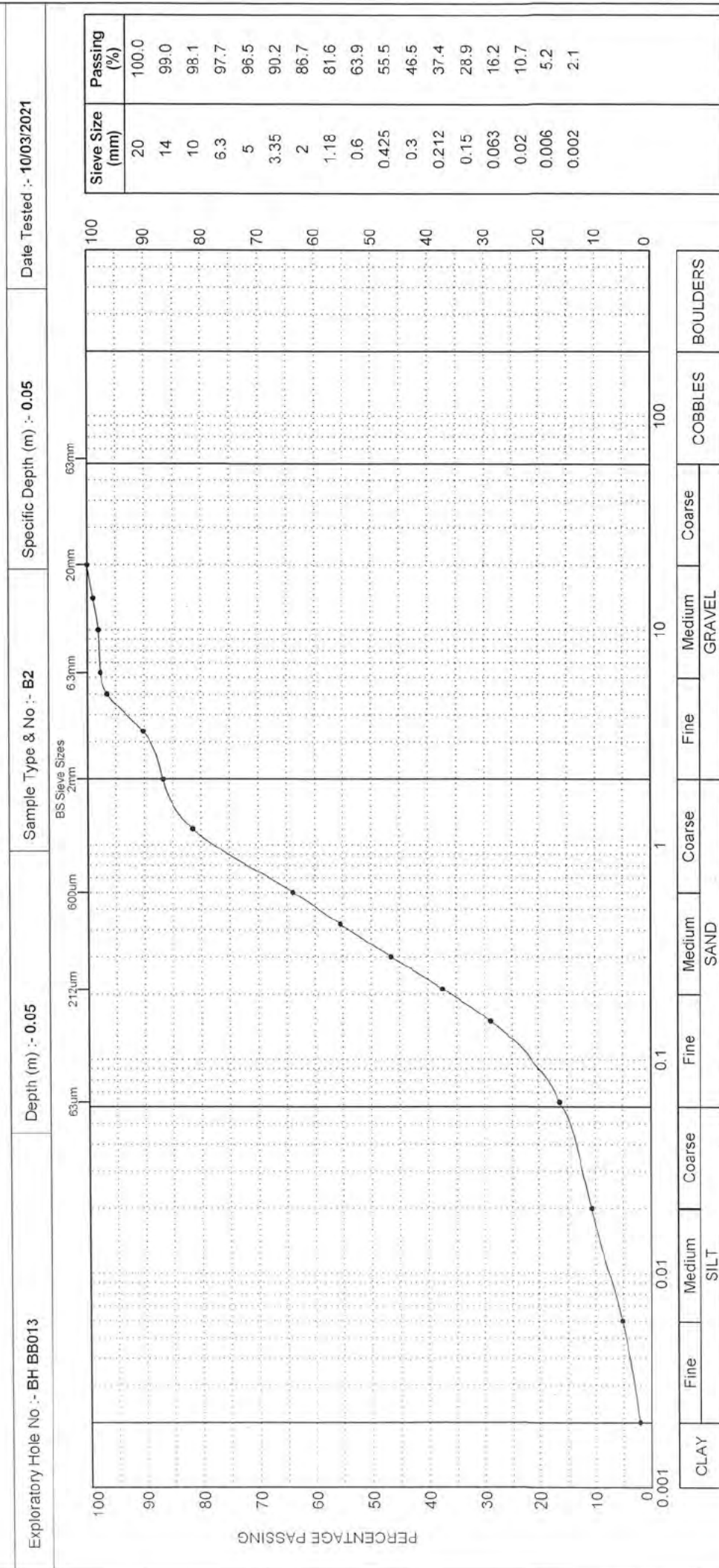


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gull Industrial Estate, Felton Fell, Chester-le-Street, Co. Durham, DN2 2JG - Tel: 0191 382 1700 Fax: 0191 382 4710  
Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Blackburn, BB1 3RL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No. :- PSD/4322C/BH BB013/B2/0.05	Signed :- 
Client :- AMEY OW Limited	Contract Title :- 		
Page 1 of 1		AEG Contract No :- 4322C	

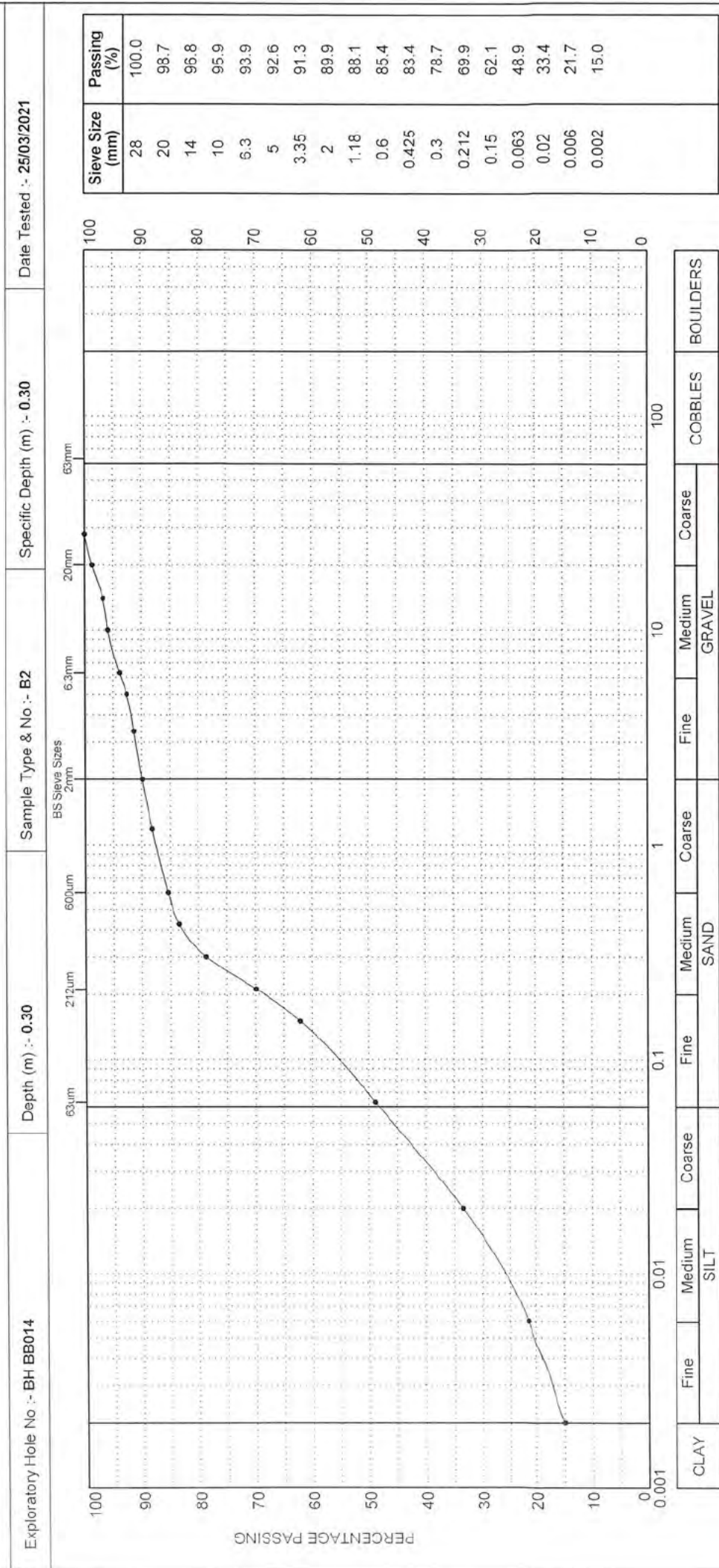


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stalls, Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2JG. Tel: 0191 387 4700 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Easingham Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 20/04/2021	Certificate No :- PSD/4322C/BH BB014/B2/0.30	Sign
Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322C

Page 1 of 1

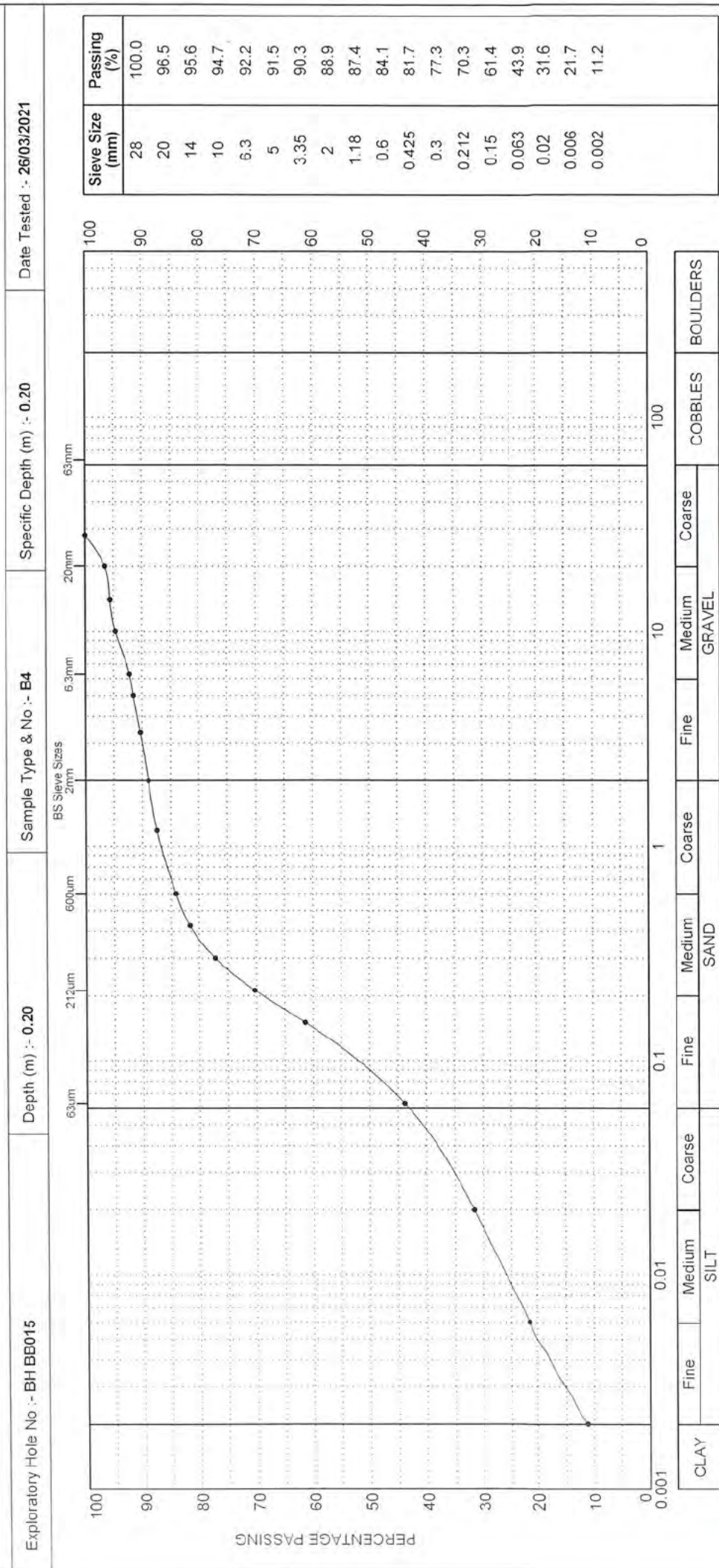


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office, Unit 25, Stalls, Cot Industrial Estate, Botton Fold, Chester-le-Street, Co. Durham, DH2 3RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office, Unit 20, Business Development Centre, Easing Wharf, Blaxkburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 20/04/2021	Certificate No :- PSD/4322C/BH BB015/B4/0.20	Signed	
Client :- AMEY OW Limited	Contract Title :-		
A66 North Trans Pennine Scheme D Section 7		AEG Contract No :- 4322C	

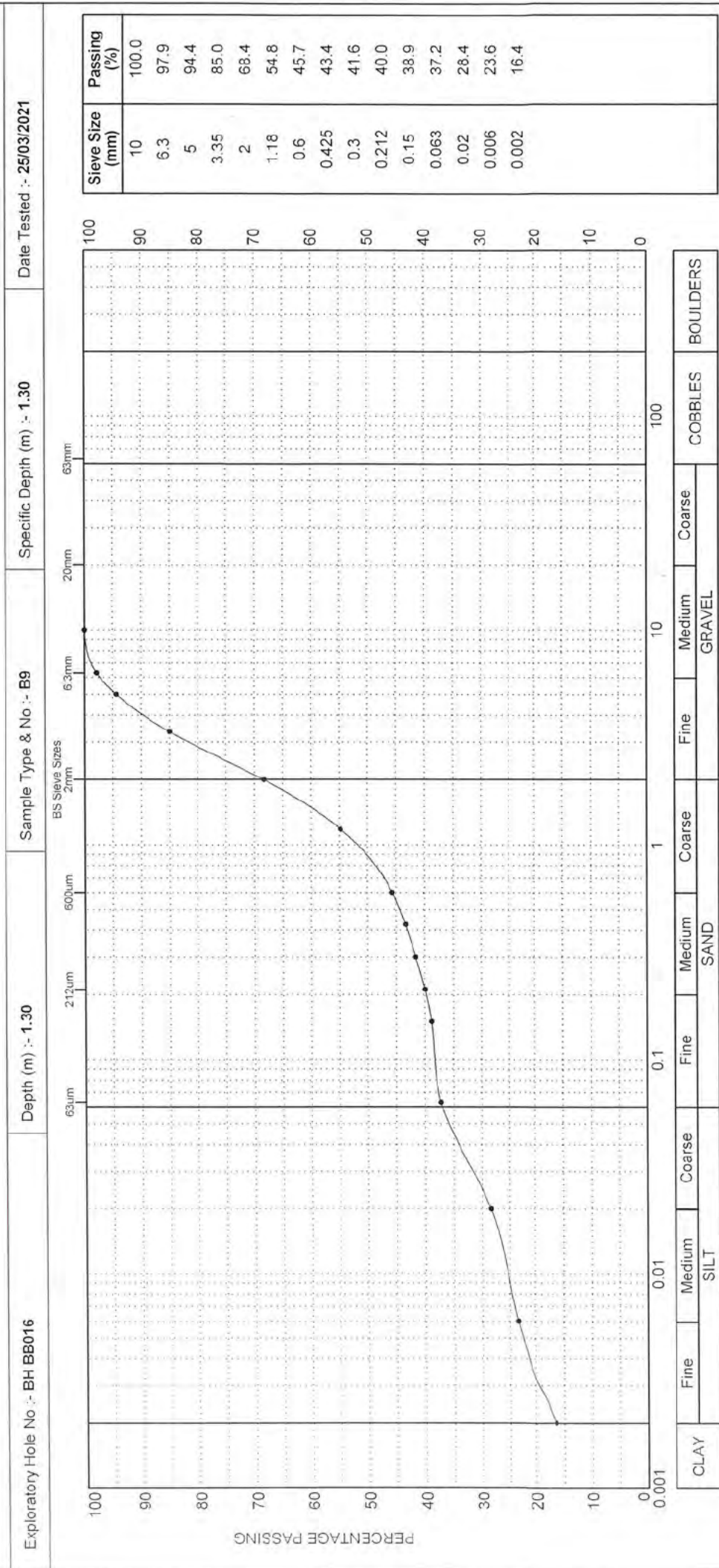


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Steels Gill Industrial Estate, Panton Hill, Chester-le-Street, Co. Durham, DH2 3JG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



Date of issue :- 20/04/2021

Client :- AMEY OW Limited

Certificate No :- PSD/4322C/BH BB016/B9/1.30

Contract Title :-

For description of sample please refer to the test report.

Signature

Contract No :- 4322C

Page 1 of 1

REG Contract No :- 4322C

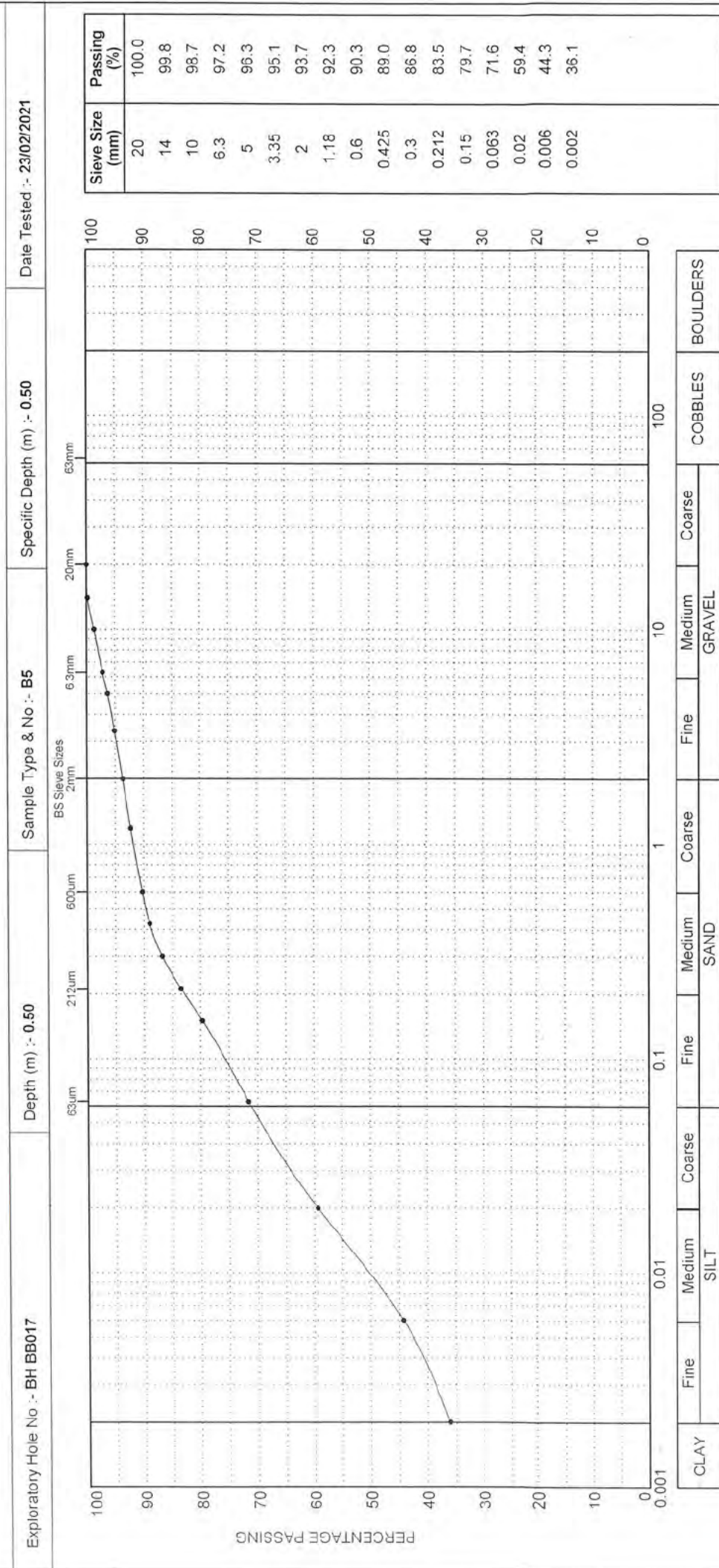


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cell Industrial Estate, Pelton Hill, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eamon Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/BH BB017/B5/0.50	Signed :- 
Client :- AMEY OW Limited	Contract Title :- 		
		AEG Contract No :- 4322C	Page 1 of 1



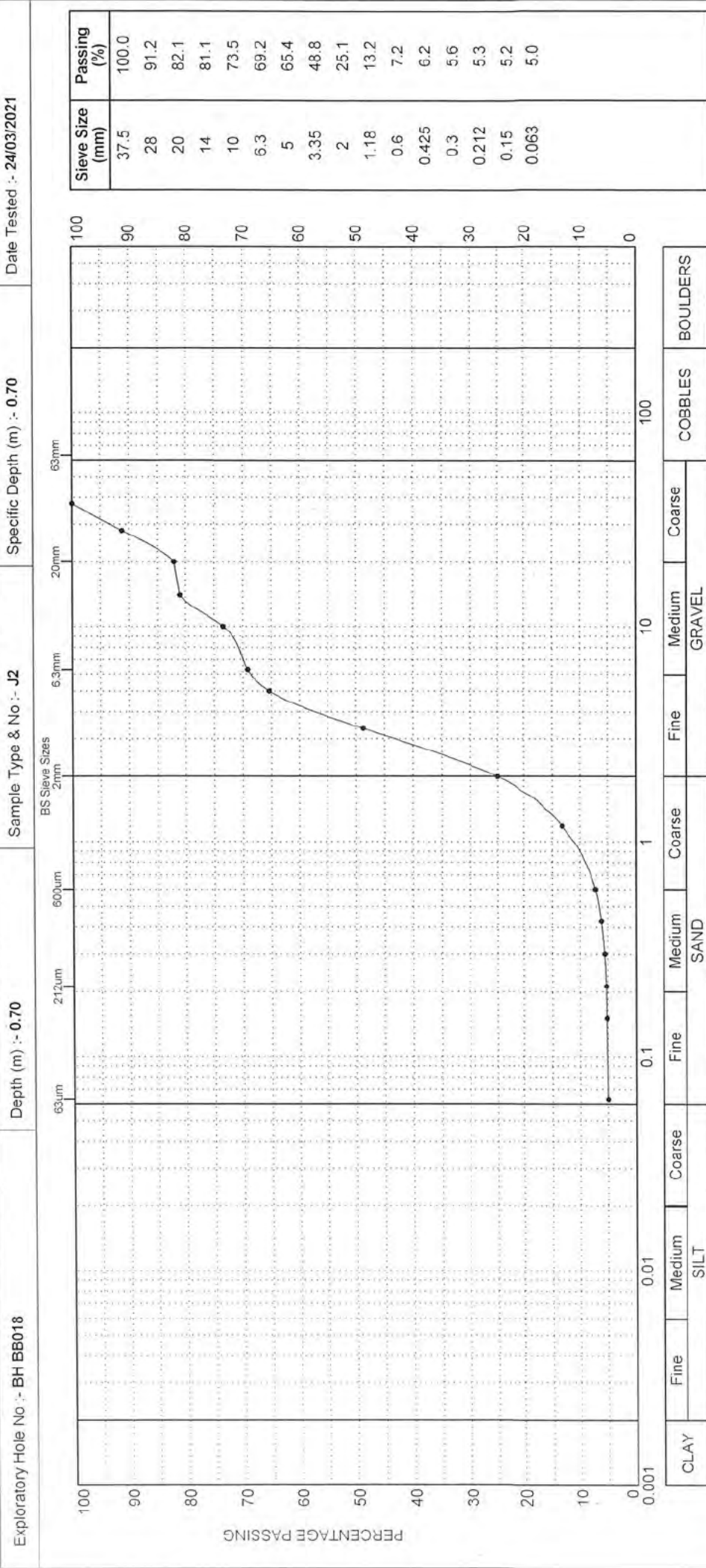
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Cresswell-Sheriff Co. Durham, DH2 2RG. Tel: 0191 887 4100 Fax: 0191 382 4710  
Regional Office: Unit 20, Business Development Centre, Ebbw Vale, Blaenau Gwent, NP23 5SD. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



For description of sample please refer to the Laboratory Sample Description Sheet

UKAS TESTING 1367	Page 1 of 1 AEG Contract No :- 4322C	[Redacted Information]
Date of issue :- 26/03/2021	Certificate No :- PSD/4322C/BH BB018/J2/0.70	Contract Title :- AMEY OW Limited



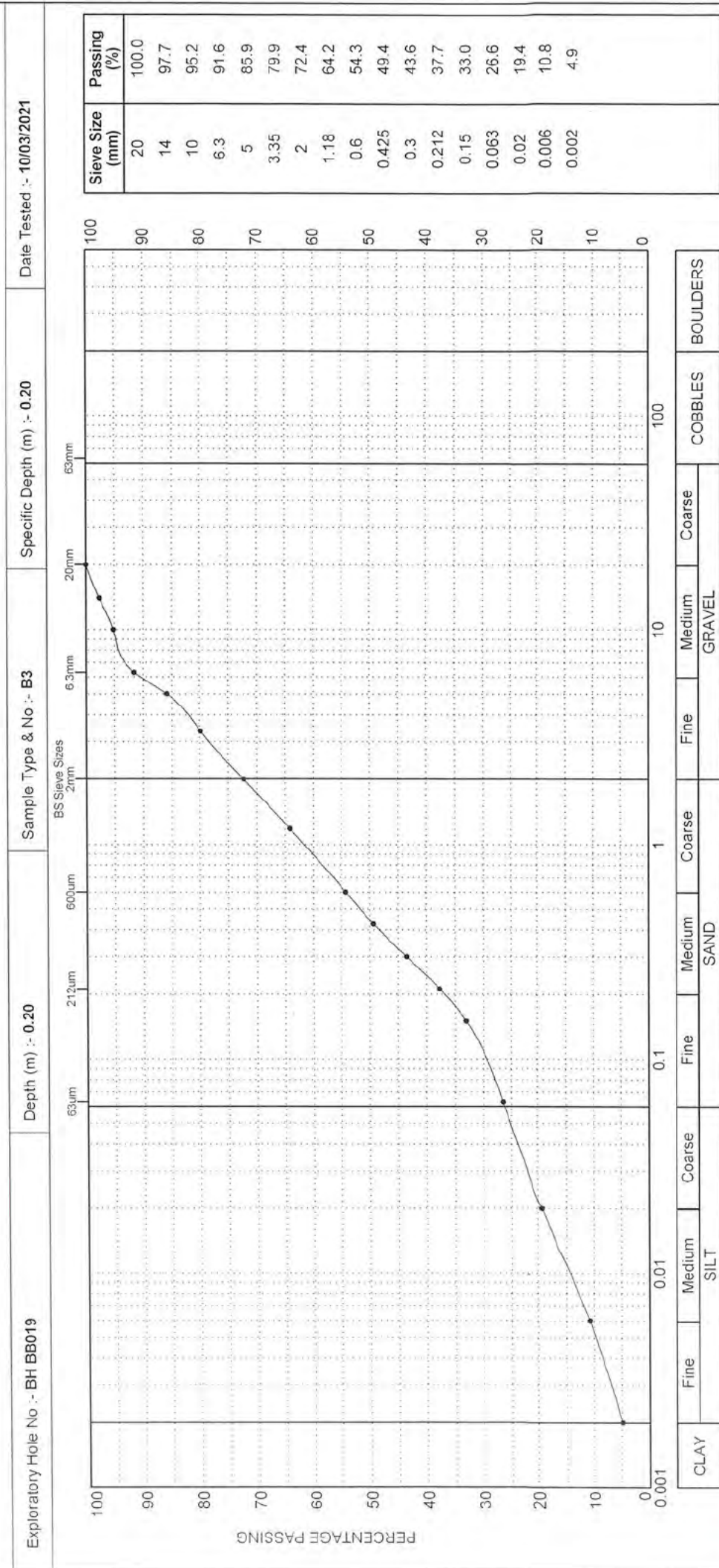


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Call Industrial Estate, Perton Fri., Cheslerie-Street, Co. Durham, DH2 2RG. Tel: 0161 887 4000 Fax: 0161 367 4710  
 Regional Office: Unit 20, Business Development Centre, Eanan Way, Easingwold, EBBW 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



**AMEY**

Date of issue :- 25/03/2021

Client :- AMEY OW Limited

**UKAS TESTING**  
1367

Page 1 of 1

AEG Contract No :- 4322C

Certificate No :- PSD/4322C/BH BB019/B3/0.20

Signed

Contract Title :-

For description of sample please refer to the Laboratory Sample Description Sheet

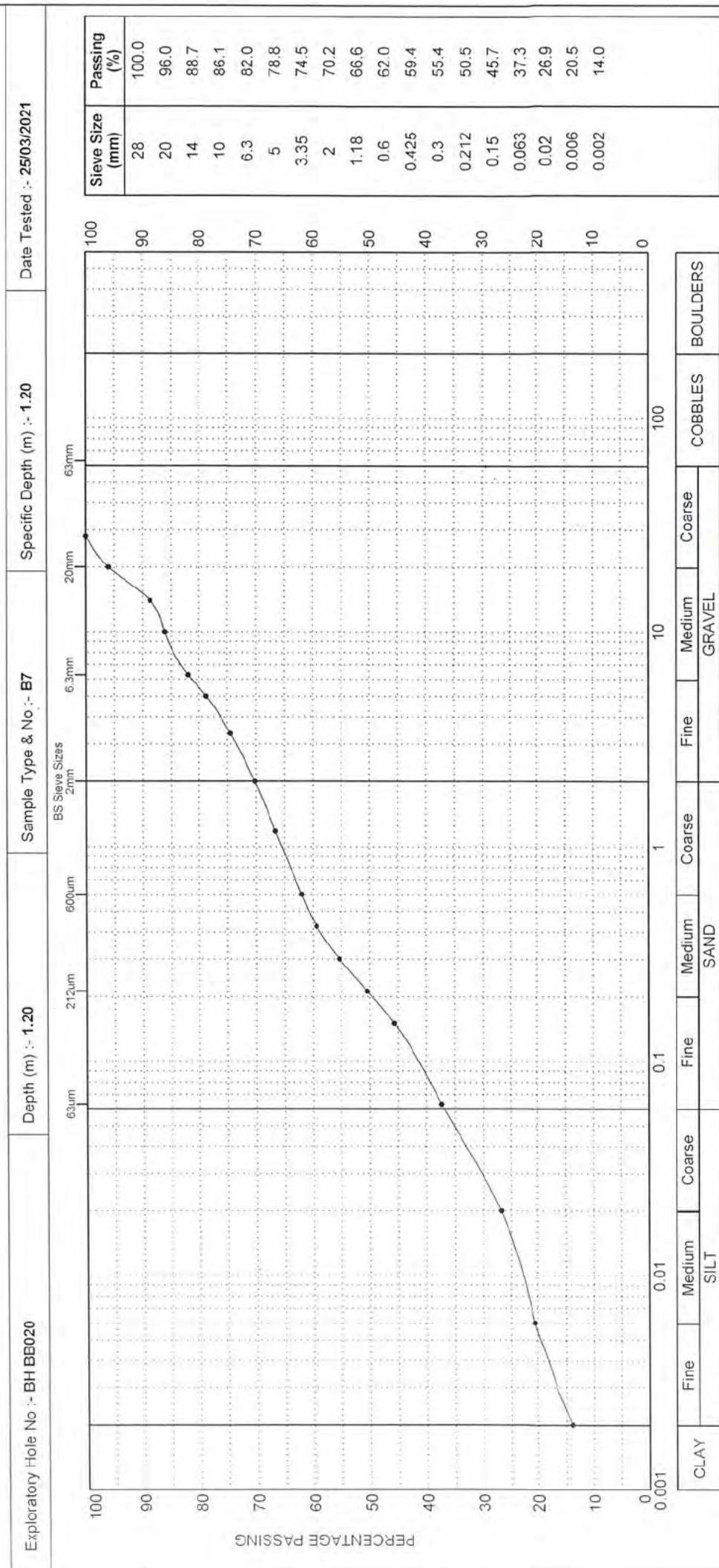
A66 North Trans Pennine Scheme D Section 7

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Oil Industrial Estate, Palfrey Fell, Chester-Street, Cheshire, Chester, Ch42 9RS. Tel: 0191 487 4100 Fax: 0191 387 4710  
 Regional Office: Unit 20 Business Development Centre, Easingwold, East Yorkshire, YO21 2JL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



Date of issue :- 20/04/2021

Client :- AMEY OW Limited

Certificate No :- PSD/4322C/8H BB020/B7/1.20

Contract Title :-

For description of sample please refer to the Laboratory Sample Description Sheet

AMEY

Page 1 of 1

AMEG Contract No :- 4322C

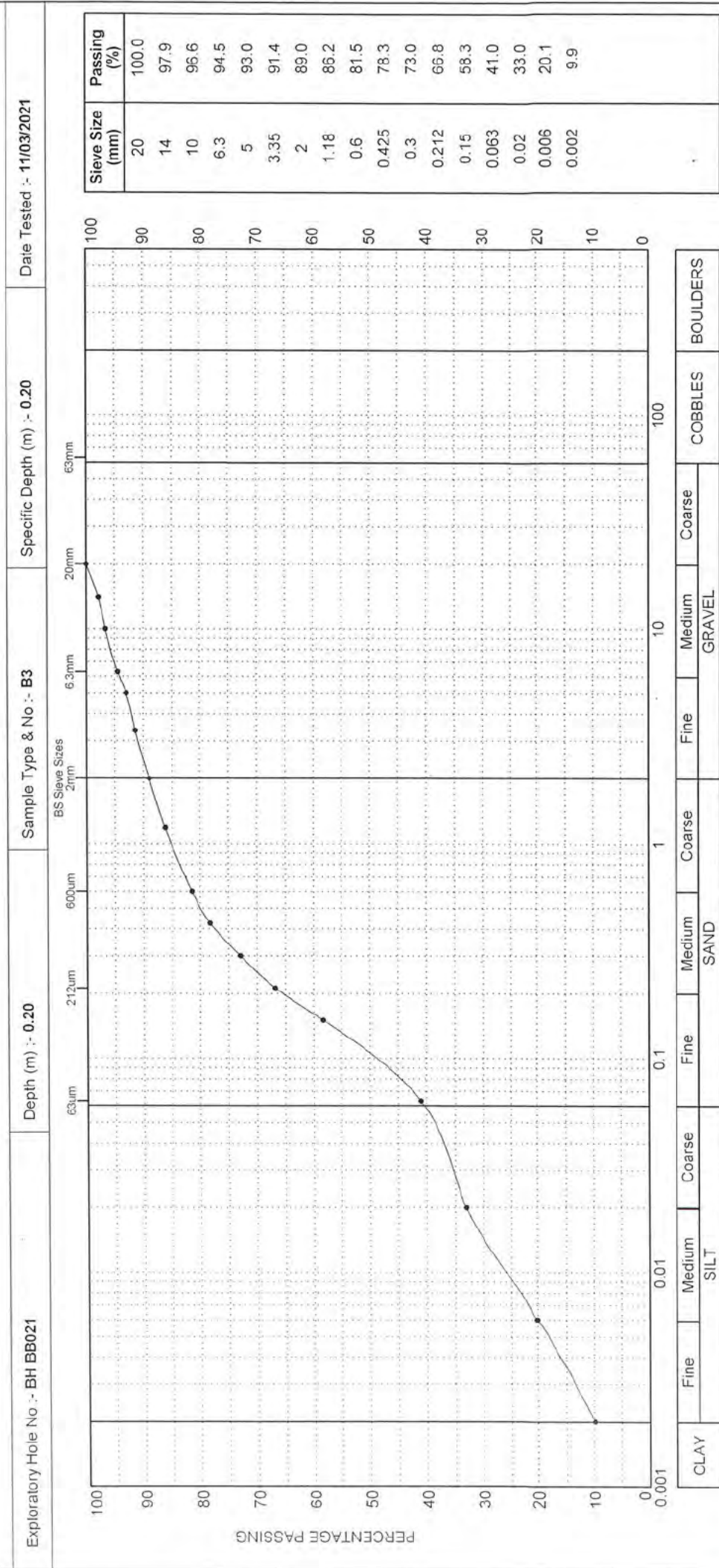


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cell Industrial Estate, Pelton Fall, Chesterside-Sherwood, Co. Durham, DL4 2JG. Tel: 0161 887 4700 Fax: 0161 367 4710  
 Regional Office: Unit 20, Business Development Centre, Easingwold, East Yorkshire, YO21 2JG. Tel: 01752 735 300 Fax: 01752 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/BH BB021/B3/0.20	Sign: <span style="background-color: black; color: black;">[Redacted]</span>
Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7		AEG Contract No :- 4322C
			Page 1 of 1

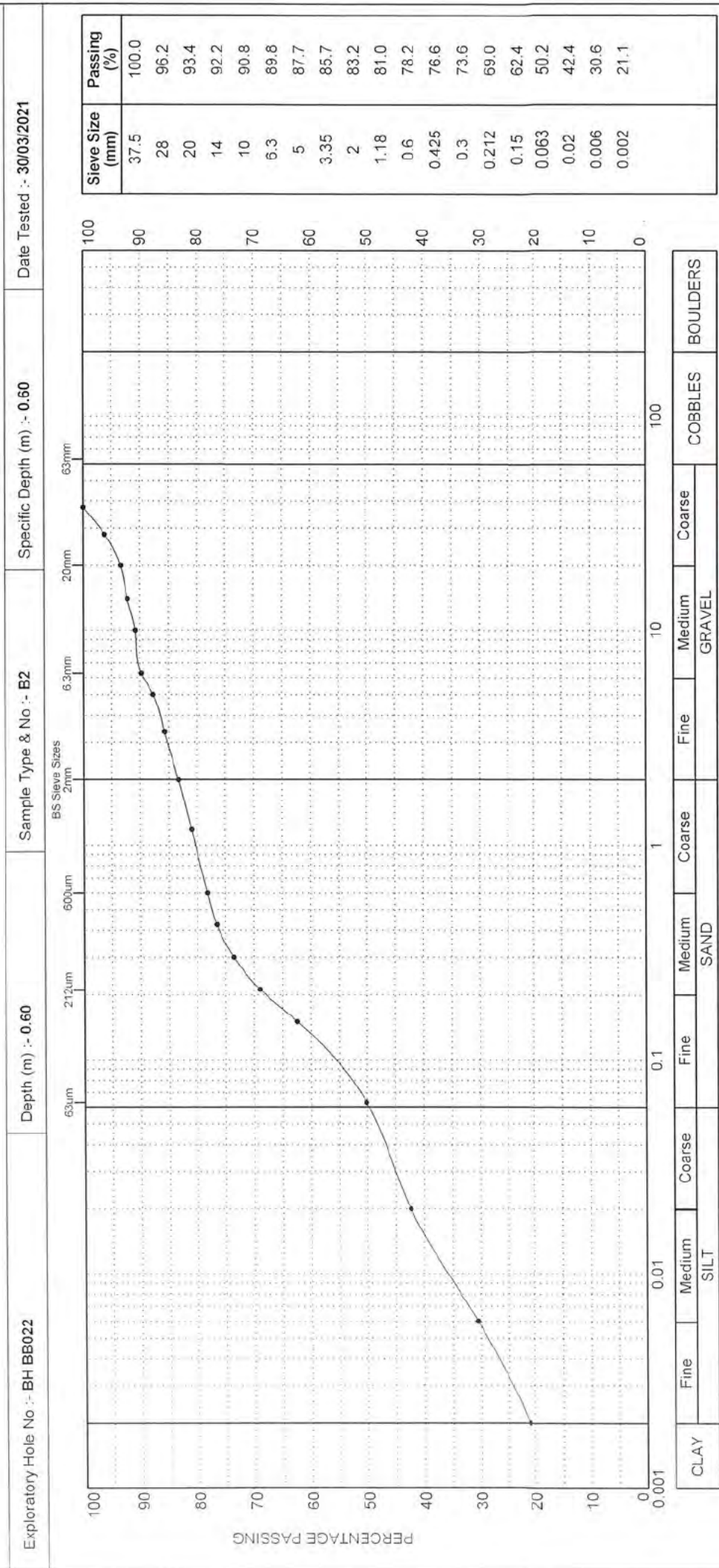


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stella Gill Industrial Estate, Felton Park, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eansam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/BH BB022/B2/0.60	Signed
Client :- AMEY OW Limited	Contract Title :-	

Page 1 of 1  
G Contract No :-  
4322C



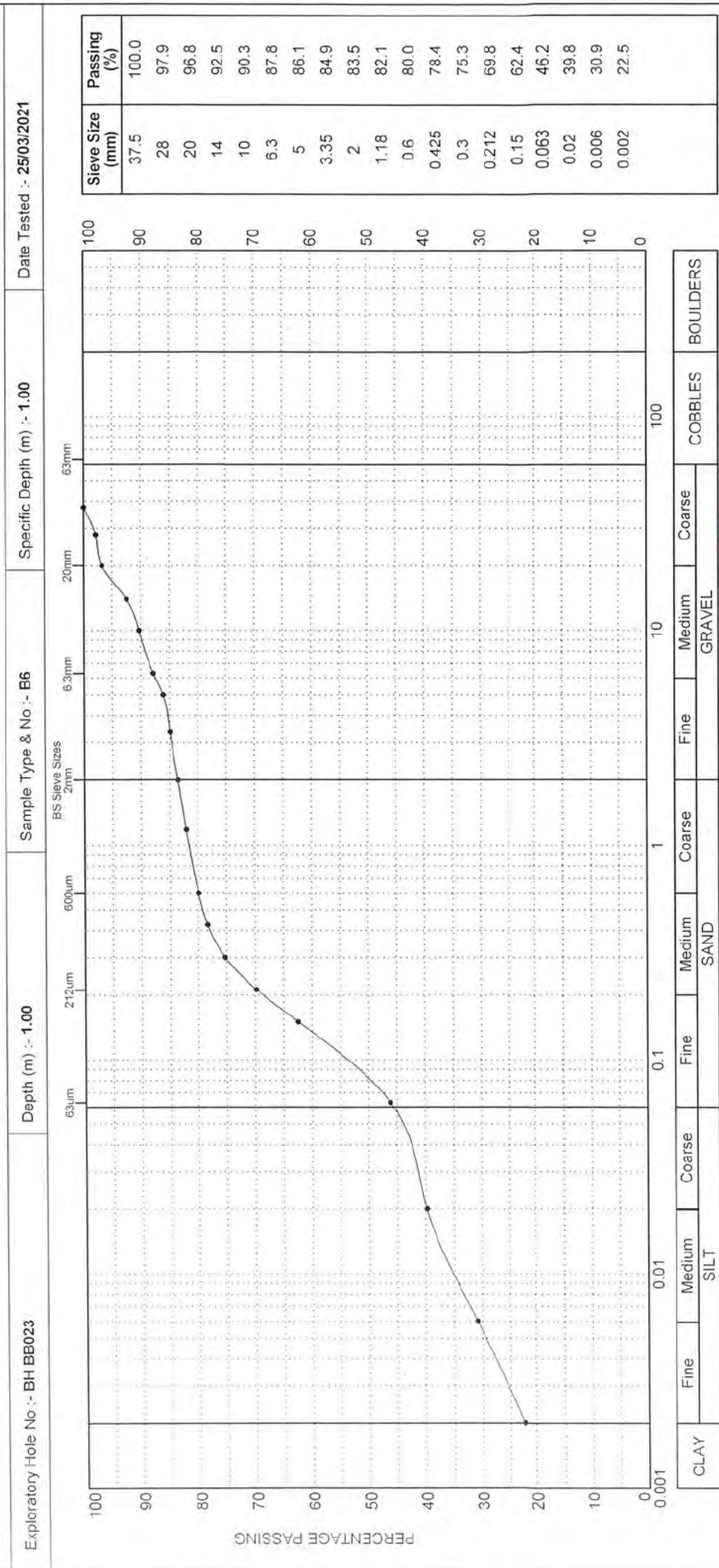


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Steels, Gill Industrial Estate, Peabro, Fife, Chesterle-Street, Co. Durham, DH2 3RG. Tel: 0191 487 4700 Fax: 0191 397 4710  
 Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



	
Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/BH BB023/B6/1.00
Client :- AMEY OW Limited	Contract Title :- [REDACTED]
Page 1 of 1	G Contract No :- 4322C

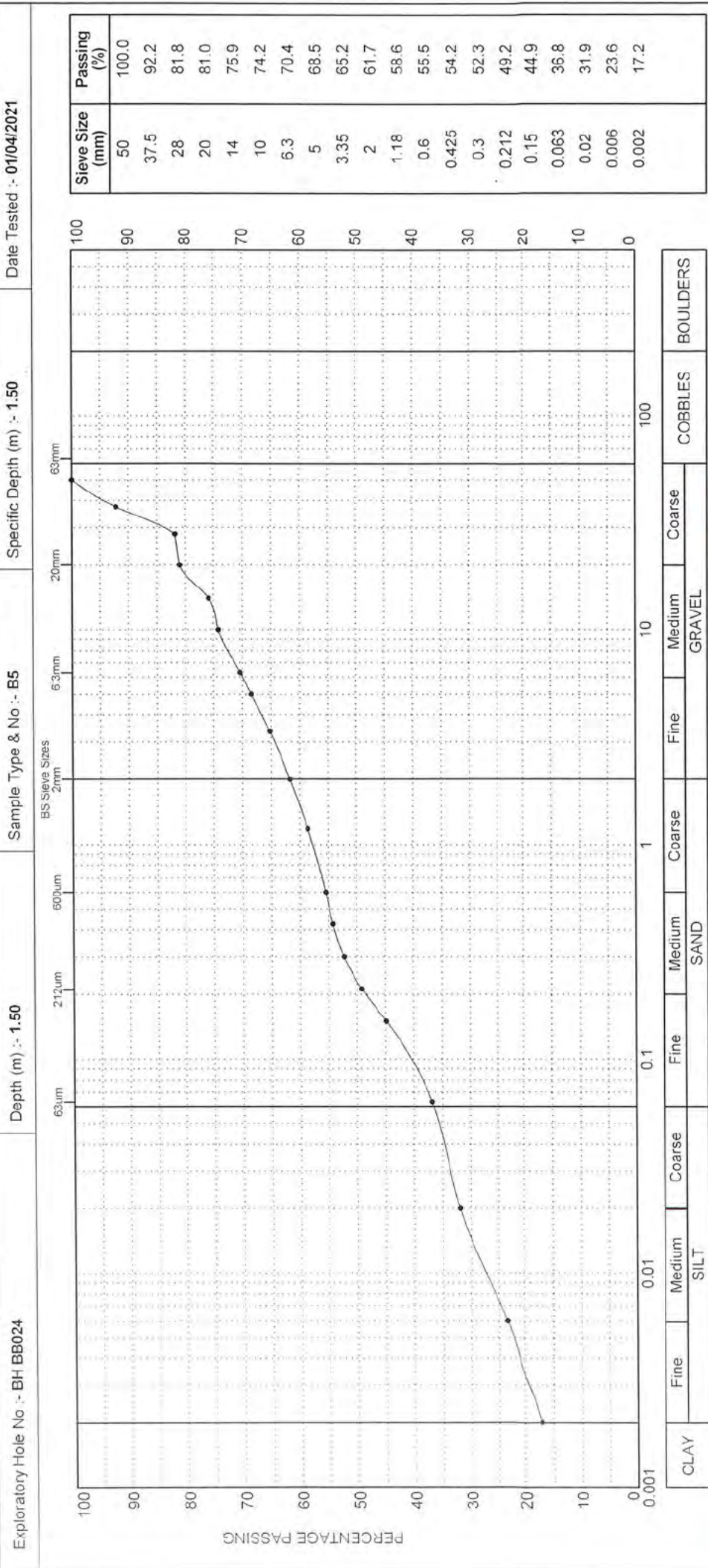
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Steels Gill Industrial Estate, Panton Hill, Chester-le-Street, Co. Durham, DH2 3JG. Tel: 0191 387 4700 Fax: 0191 367 4710  
 Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



Exploratory Hole No :- BH BB024      Depth (m) :- 1.50      Sample Type & No :- B5      Specific Depth (m) :- 1.50      Date Tested :- 01/04/2021

For description of sample please refer to the Laboratory Sample Description Sheet

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SAND			GRAVEL							

Date of issue :- 21/04/2021      Certificate No :- PSD/4322C/BH BB024/BS/1.50      Signed : [Redacted]

Client :- AMEY OW Limited      Contract Title :- [Redacted]      Contract No :- 4322C

Page 1 of 1      UKAS TESTING 1367



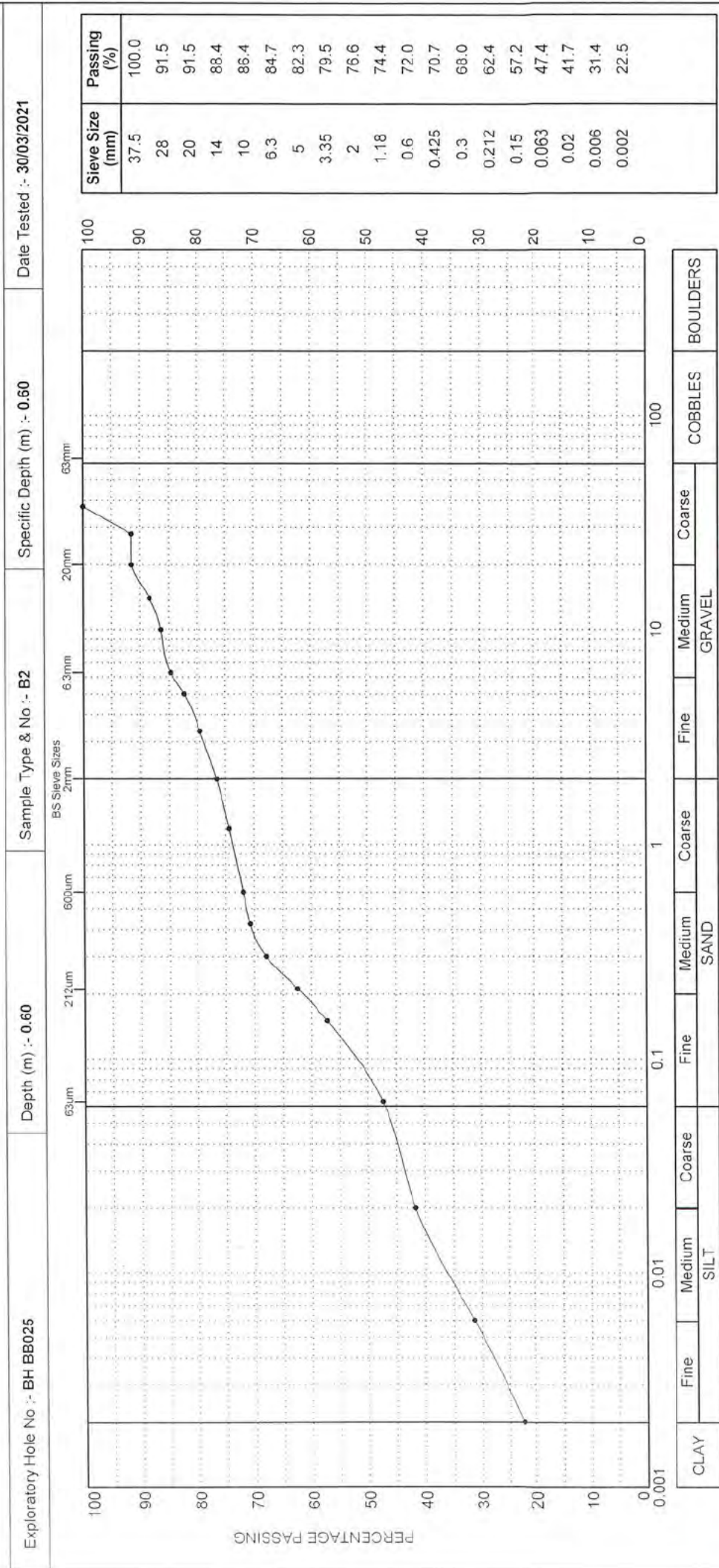


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Steels, Gill Industrial Estate, Felton Fall, Cheshire-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/BH BB025/B2/0.60	Signed	Page 1 of 1
Client :- AMEY OW Limited		Contract Title :-	
		G Contract No :- 4322C	

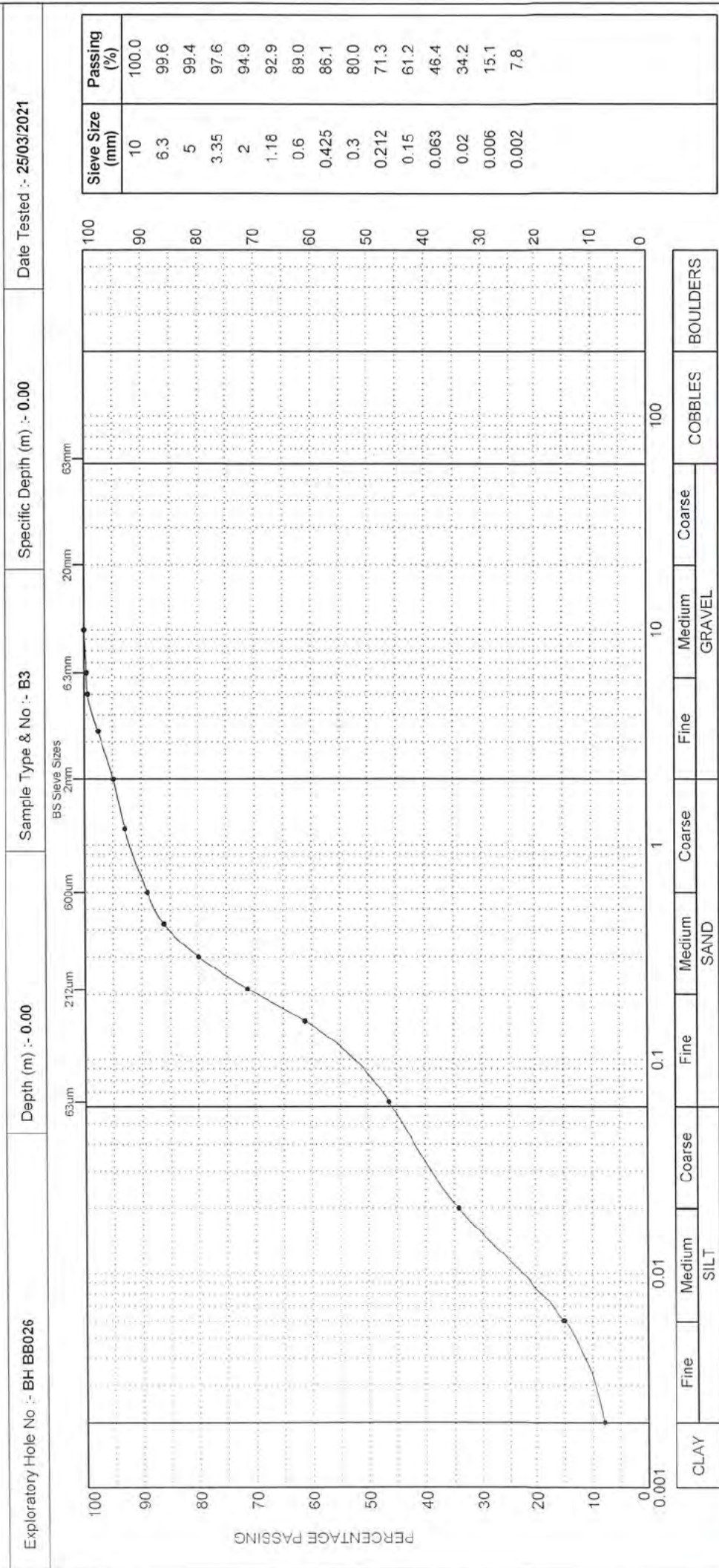
1367

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stella Gill Industrial Estate, Peaton Foll, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/BH BB026/B3/0.00	Signed	
Client :- AMEY OW Limited	Contract Title :-		

1367

Page 1 of 1

G Contract No :-  
4322C

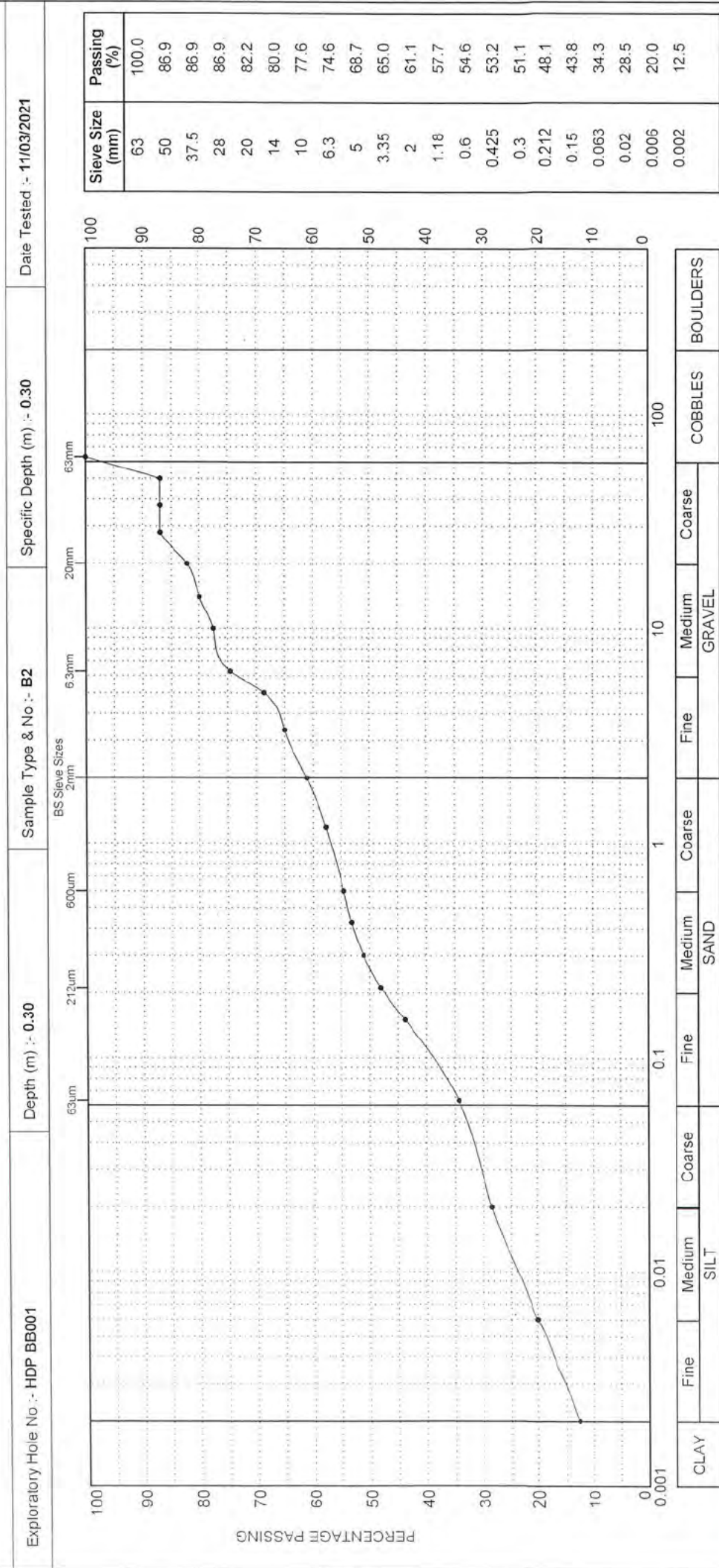


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cill Industrial Estate, Pelton Hill, Chester-le-Street Co. Durham, DH2 2JG. Tel: 0191 387 3700 Fax: 0191 387 4710  
Regional Office: Unit 30 Business Development Centre, Farham Wharf, Blaydon, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

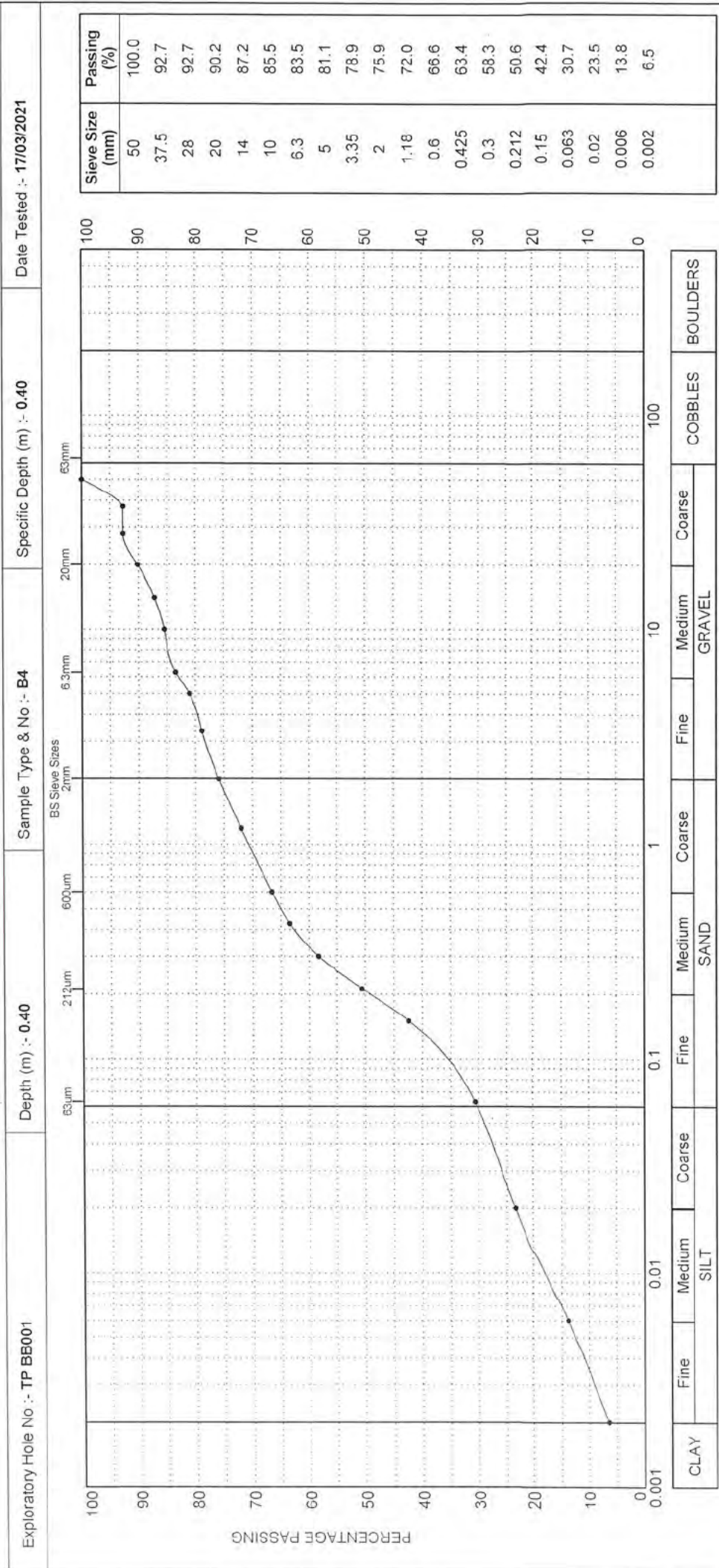
	Date of issue :- 25/03/2021	Certificate No. :- PSD/4322C/HDP BB001/B2/0.30	Signed :-
	Client :- AMEY OW Limited	Contract Title :-	
Page 1 of 1		EG Contract No. :- 4322C	
1367			

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Paton Fall, Chester-le-Street, Co. Durham DH2 2JG - Tel: 0191 267 4700 Fax: 0191 267 4710  
 Regional Office: Unit 20, Business Development Centre, Easing Wharf, Bishopburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 865

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 25/03/2021	Certificate No. :- PSD/4322C/TP BB001/B4/0.40	Sig	
Client :- AMEY OW Limited	Contract Title :-		

Page 1 of 1  
Contract No :- 4322C



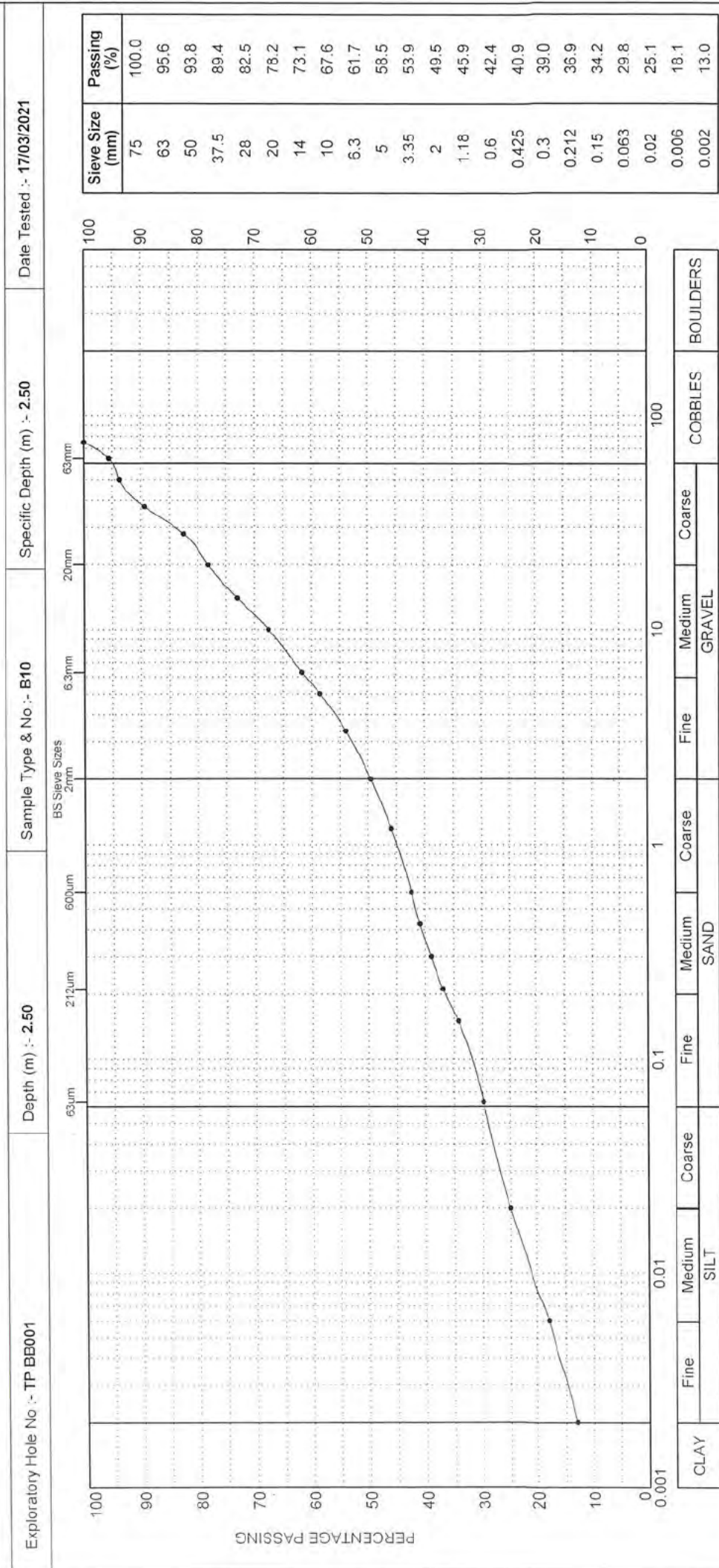


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stella Court Industrial Estate, Pease Fold, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4100 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Easingham Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

<b>Date of issue :-</b> 30/03/2021	<b>Certificate No :-</b> PSD/4322C/TP BB001/B10/2.50	<b>Page 1 of 1</b>	 1367
<b>Client :-</b> AMEY OW Limited	<b>Contract Title :-</b> [REDACTED]	<b>Contract No :-</b> 4322C	



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cill Industrial Estate, Peton Hill, Chester-le-Street, Co. Durham, DH8 3JG. Tel: 0191 387 7700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Earham Works, Backburn, BB1 3BL - Tel: 01752 735 300 Fax: 01752 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

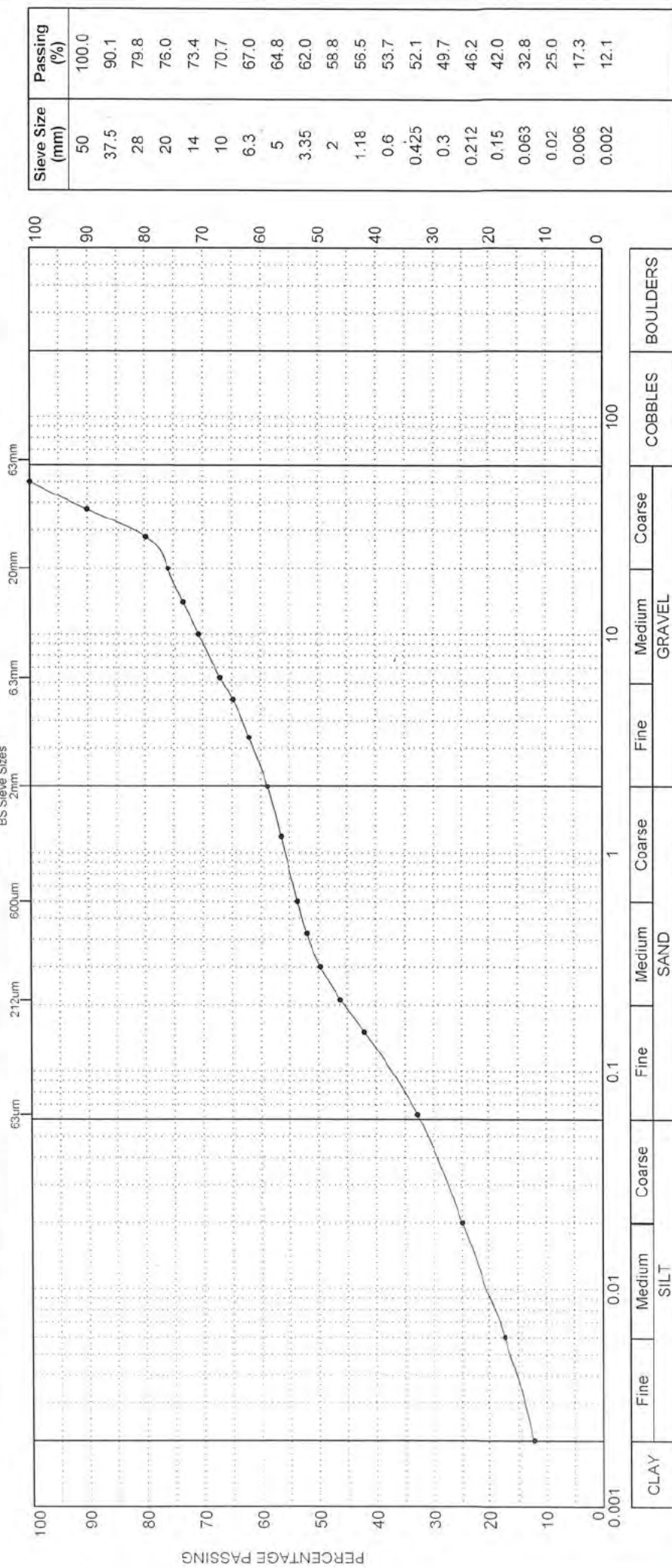
Exploratory Hole No :- TP BB002

Depth (m) :- 0.75

Sample Type & No :- B5

Specific Depth (m) :- 0.75

Date Tested :- 17/03/2021



Date of issue :-  
25/03/2021

Certificate No :-  
PSD/4322C/TP BB002/B5/0.75

For description of sample, please refer to the Laboratory Sample Description Sheet

Client :-  
AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

REG Contract No :-  
4322C

Page 1 of 1



1367

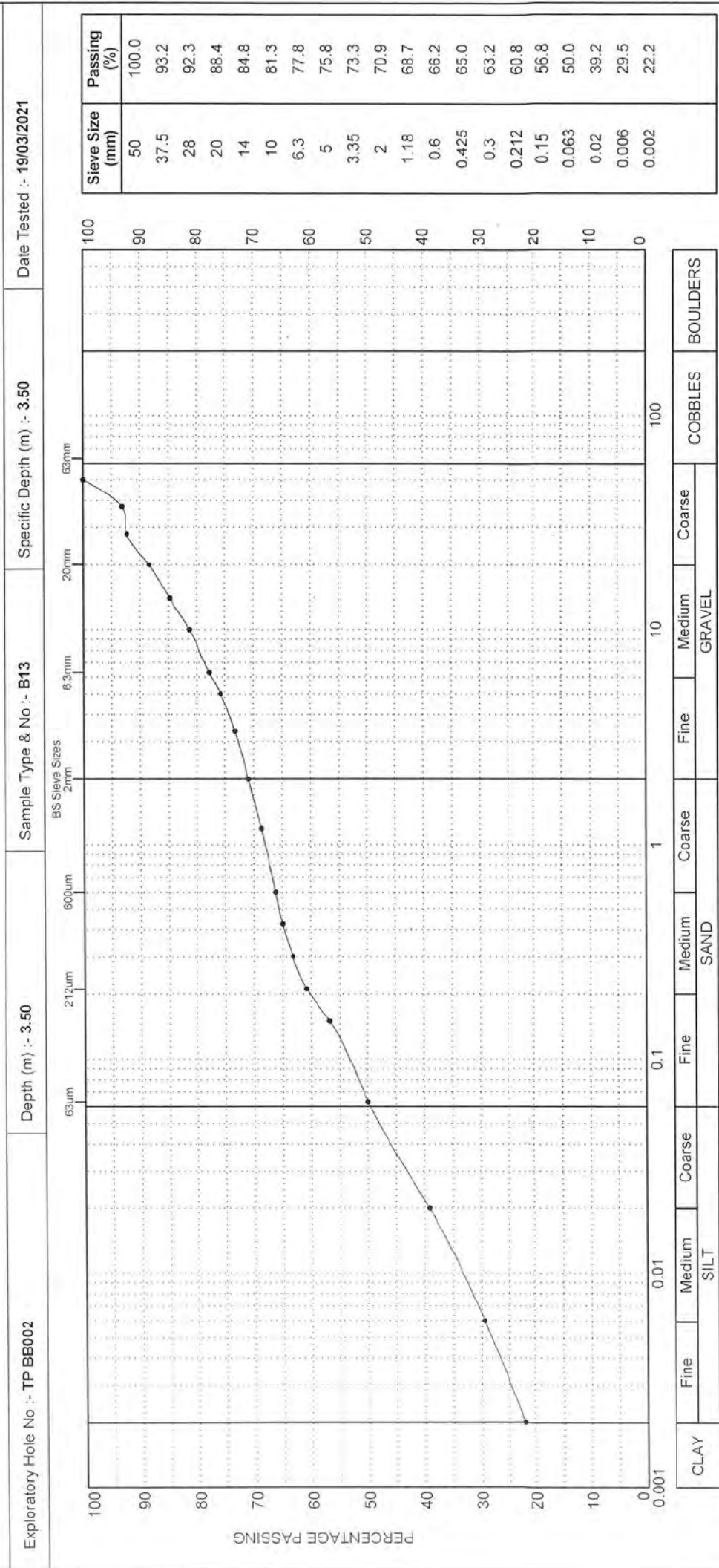


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Steels Gill Industrial Estate, Felton Hill, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/TP BB002/B13/3.50	Signed	Page 1 of 1
Client :- AMEY OW Limited		EG Contract No :- 4322C	





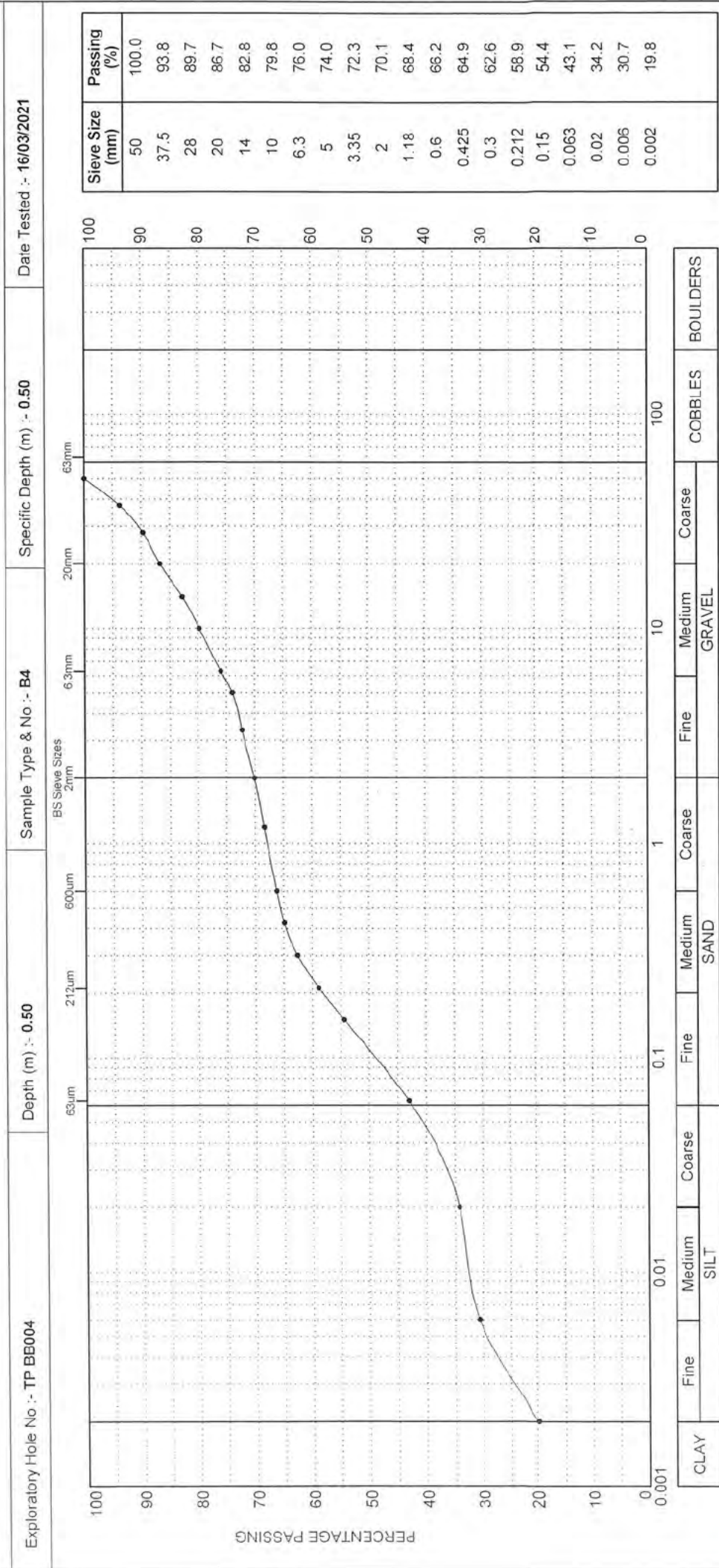


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Salford City Industrial Estate, Palfrey Fold, Chester-le-Street, Co. Durham, DH1 2RG. Tel: 0191 387 4700 Fax: 0191 367 4770  
Regional Office: Unit 20, Business Development Centre, Easingham Wharf, Blockbarn, EBBW SBL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

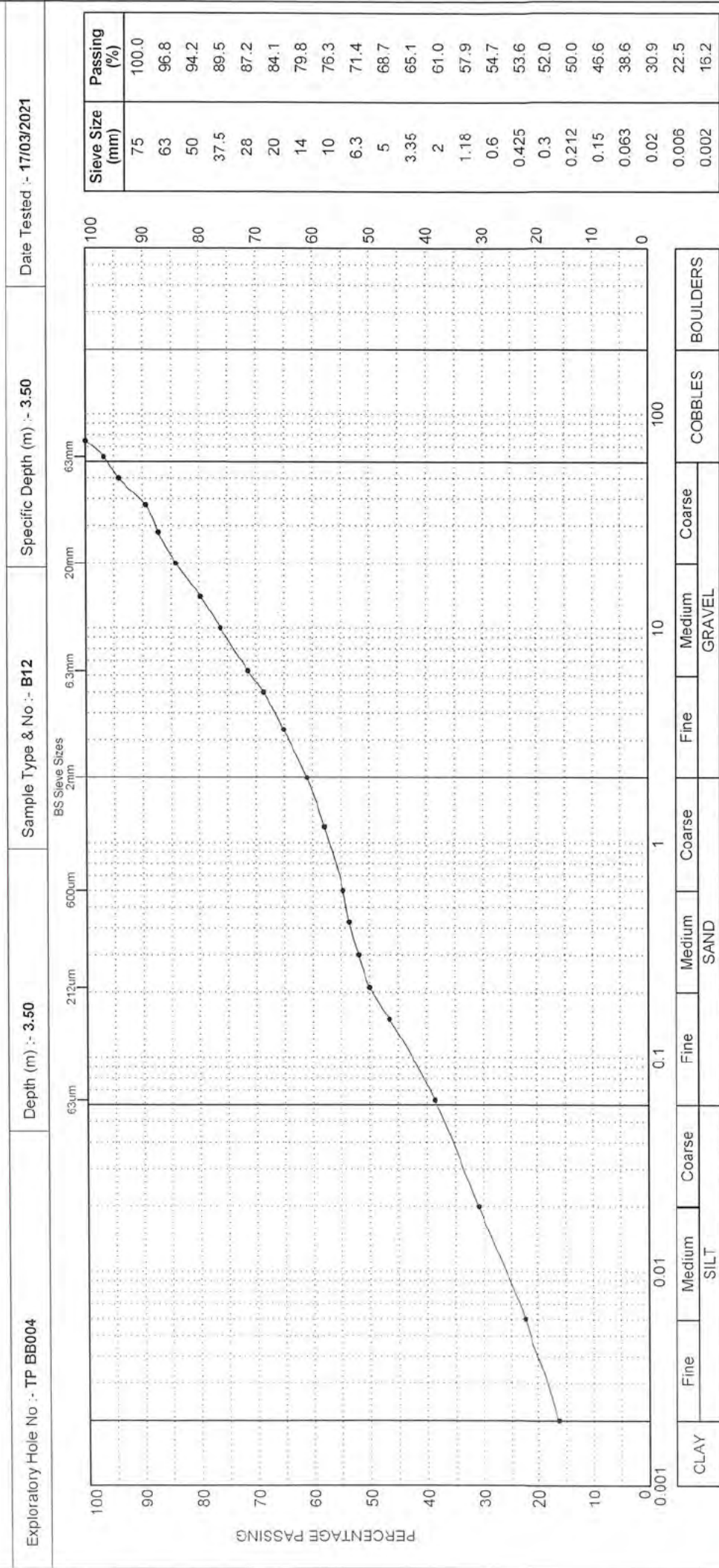
	Date of issue :- 30/03/2021 Certificate No :- PSD/4322C/TP BB004/B4/0.50 Sign	Page 1 of 1	
Client :- AMEY OW Limited	Contract Title :-	EG Contract No :- 4322C	1367
A66 North Trans Pennine Scheme D Section 7			

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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB004/B12/3.50	Signed
Client :- AMEY OW Limited	Contract Title :-		
Page 1 of 1		EG Contract No :- 4322C	
		1367	

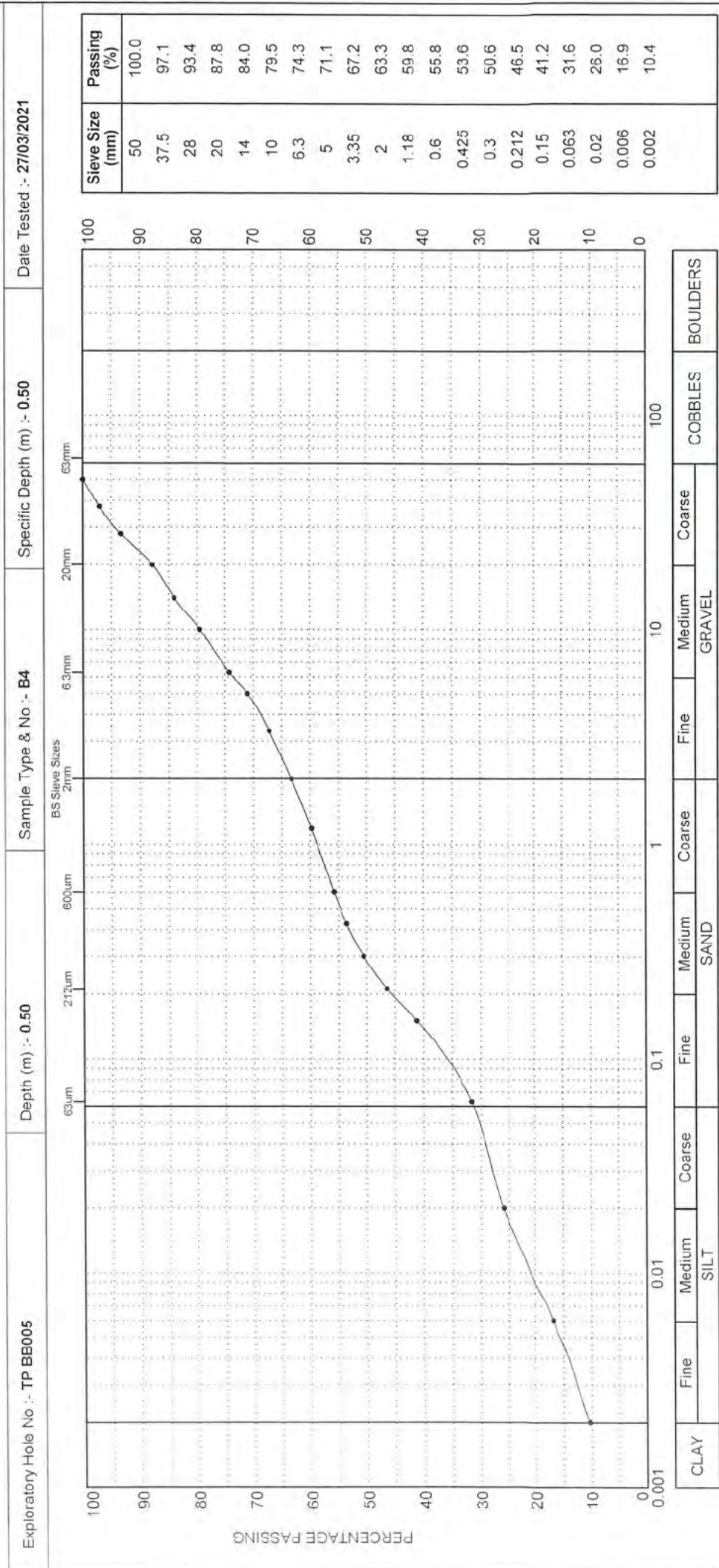


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Head Office: Unit 25 Stella Cill Industrial Estate, Felton Fall, Cheshire-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 367 4710  
 Regional Office: Unit 20, Business Development Centre, Easingham Wharf, Blockbourn, BBI 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/TP BB005/B4/0.50	Signed :-	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :-		Contract No :- 4322C

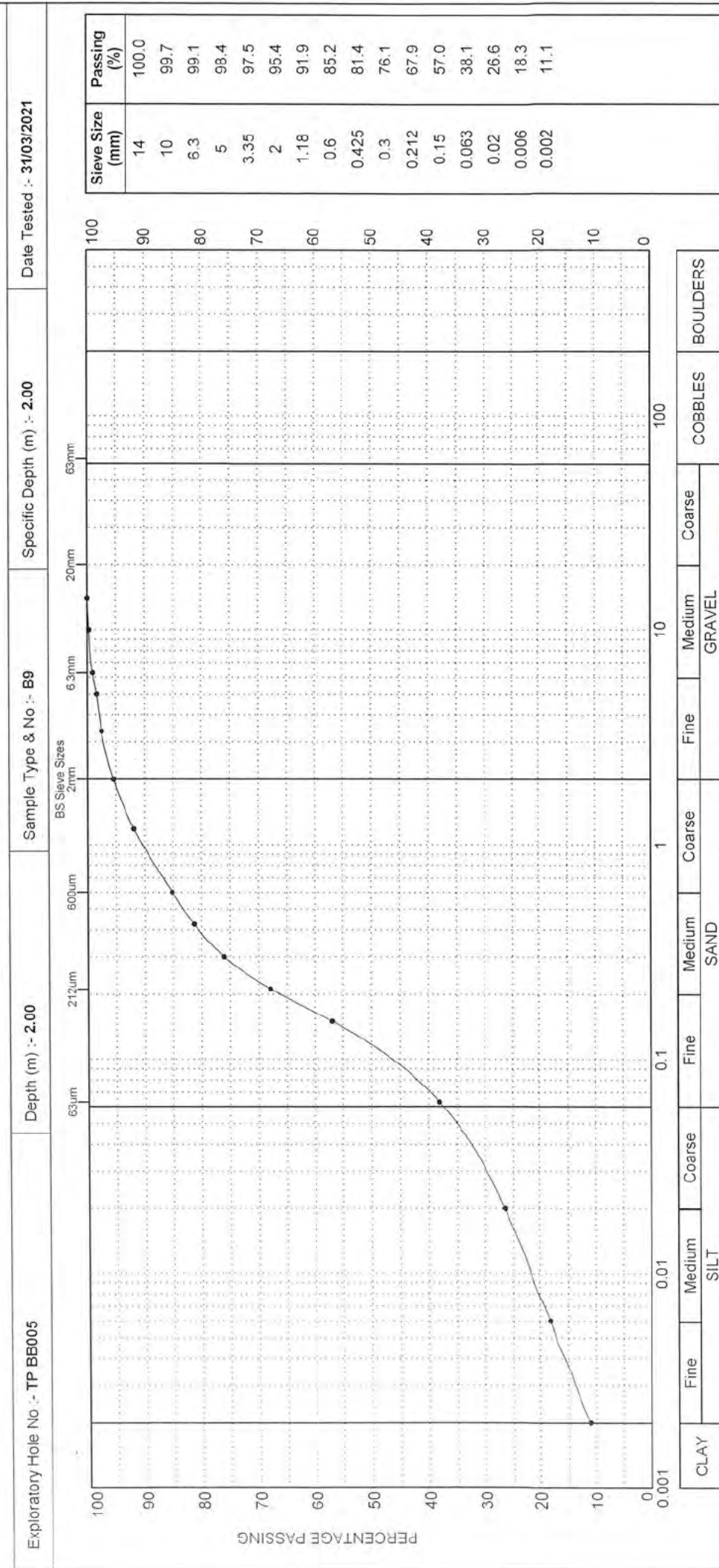
1367

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Regional Office: Unit 20 Business Development Centre, Ebanham Wharf, Backburn, BB1 3BL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 20/04/2021	Certificate No. :- PSD/4322C/TP BB005/B9/2.00	Sig	Page 1 of 1
Client :- AMEY OW Limited		Contract No. :- 4322C	

1367



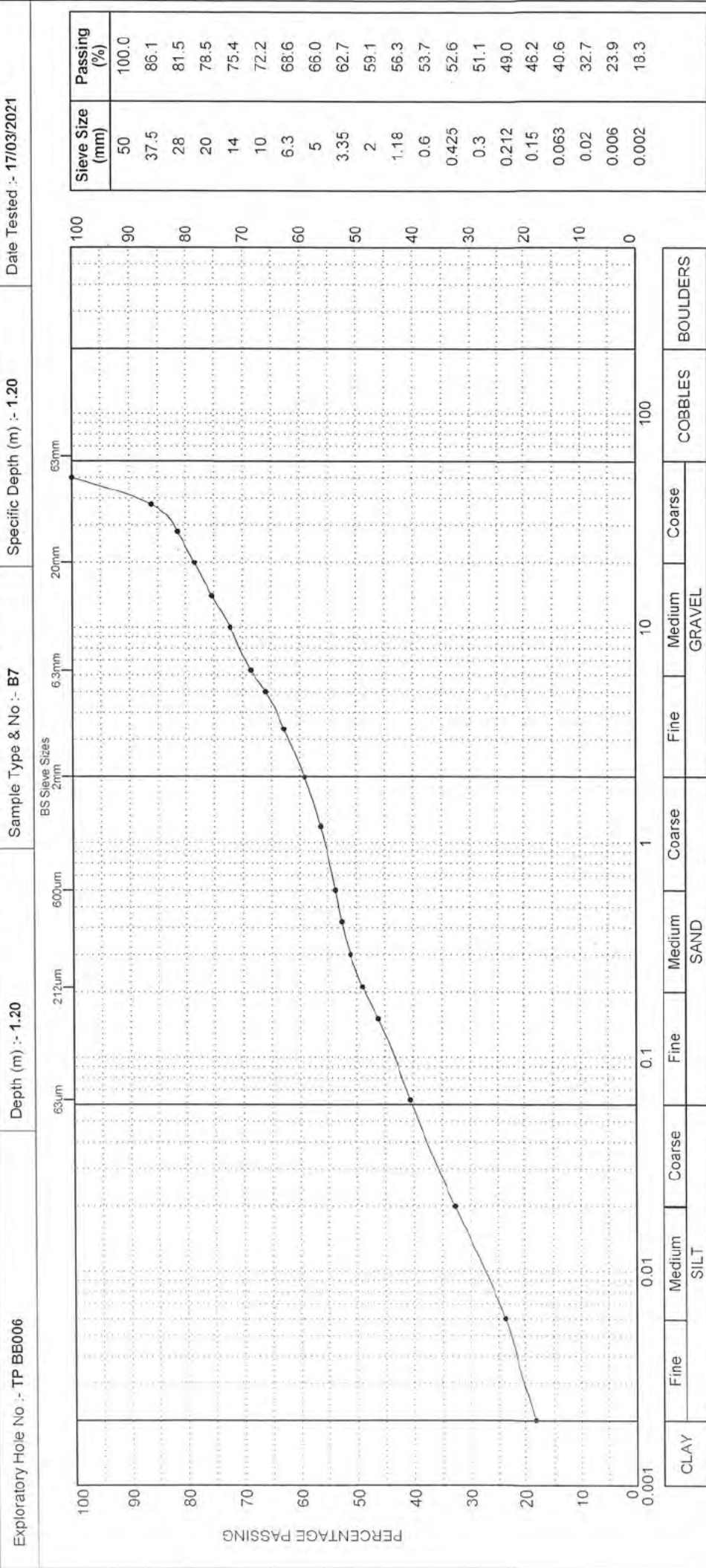
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cell Industrial Estate, Felton Hill, Cheshire-Stret, Co. Durham, DH2 2RG. Tel: 0161 837 4700 Fax: 0161 387 4710  
Regional Office: Unit 20, Business Development Centre, Farnham Wharf, Blackburn, BB1 3BL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB006/B7/1.20	Page 1 of 1	
	Client :- AMEY OW Limited			

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cill Industrial Estate, Pelton Hill, Chester-le-Street, Co. Durham, DH2 3JG. Tel: 0191 387 5200 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easingwold, York, YO21 3JL. Tel: 01752 135 300 Fax: 01752 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

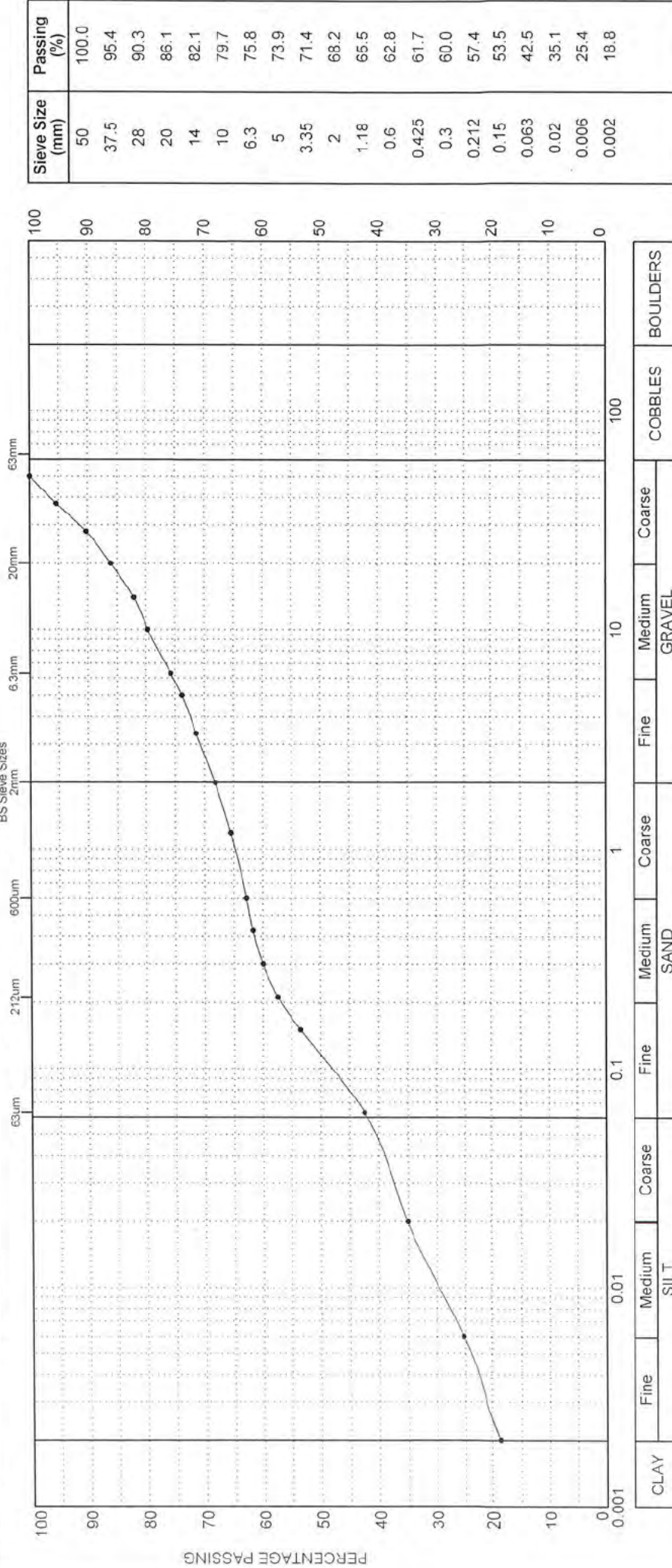
Exploratory Hole No :- TP BB006

Depth (m) :- 2.20

Sample Type & No :- B10

Specific Depth (m) :- 2.20

Date Tested :- 16/03/2021



Date of issue :-  
25/03/2021

Certificate No :-  
PSD/4322C/TP BB006/10/2.20

For description of sample please refer to the Laboratory Sample Description Sheet

Client :-  
AMEY OW Limited

Contract Title :-

[Redacted Contract Title]

AEG Contract No :-  
4322C

Page 1 of 1



1367

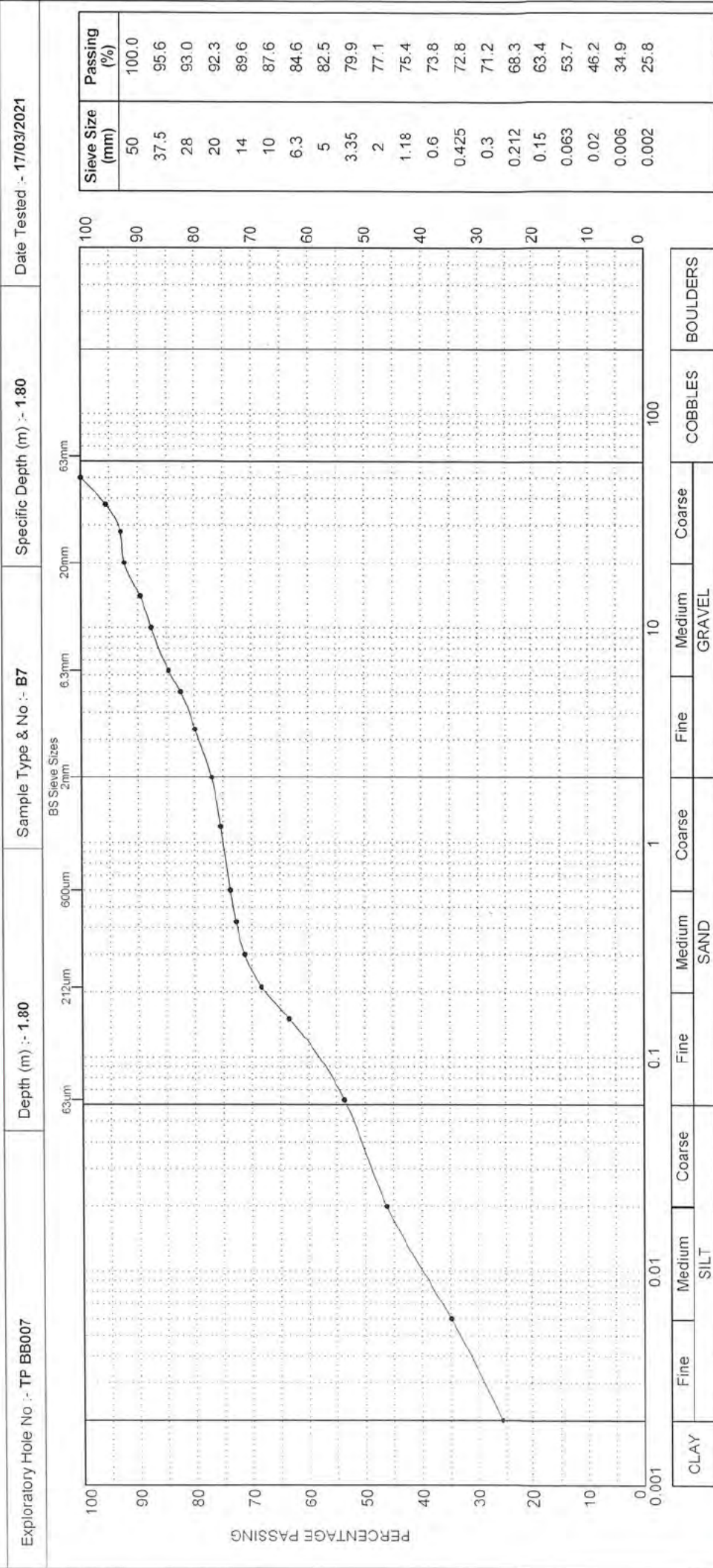


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Oil Industrial Estate, Pelton Hill, Chestle-Street, Co. Durham, DH4 2EG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Earmah Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

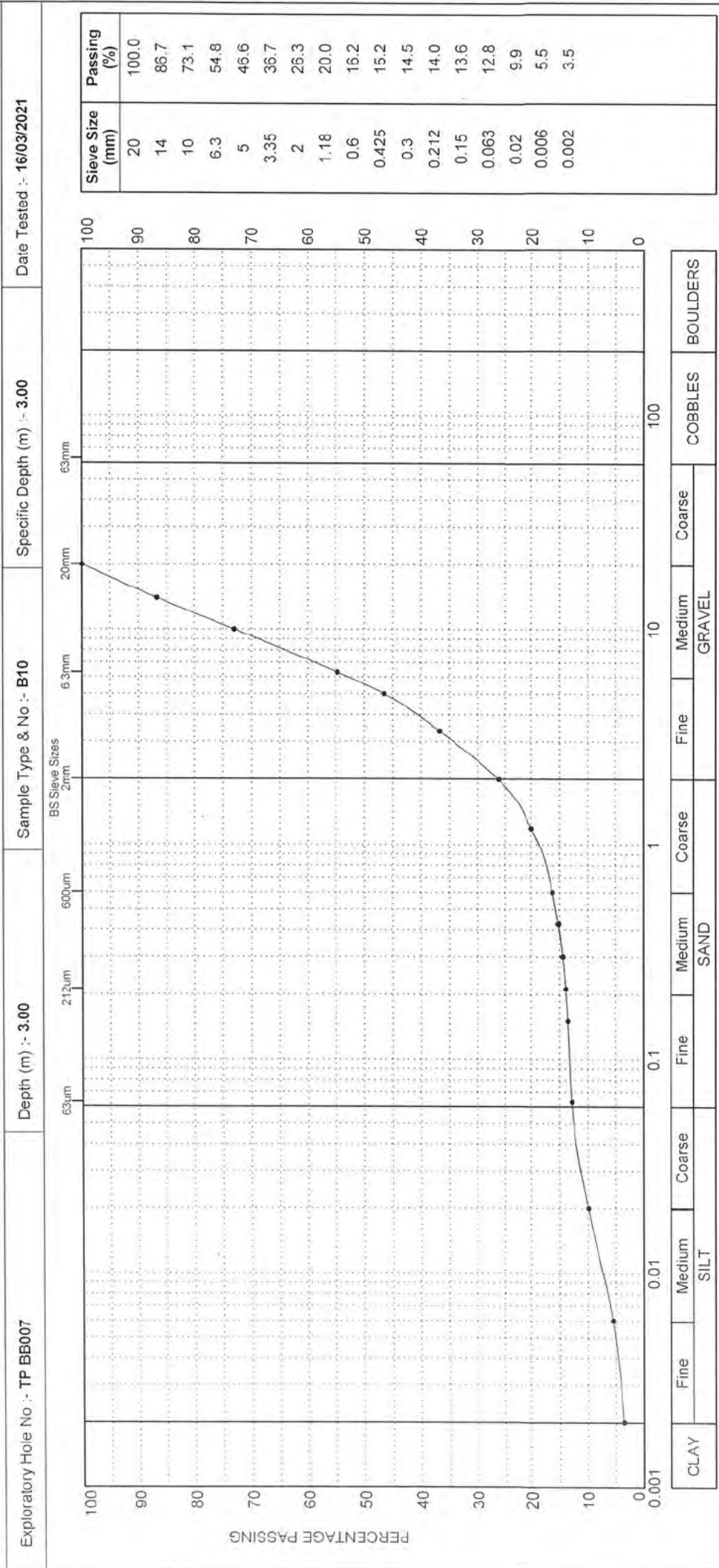
	Date of Issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB007/B7/1.80	Signe 
Client :- AMEY OW Limited	Contract Title :-		
Page 1 of 1		UKAS TESTING 1367	
		UK Contract No :- 4322C	

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Cell Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 3JG - Tel: 0191 387 4700 Fax: 0191 387 4770  
 Regional Office: Unit 26, Business Development Centre, Earham Wharf, Blackburn, BB1 5R1 - Tel: 01712 735 300 Fax: 01712 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



 1367	Page 1 of 1 AEG Contract No :- 4322C	A66 North Trans Pennine Scheme D Section 7
Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB007/B10/3.00	For description of sam
Client :- AMEY OW Limited	Contract Title :-	



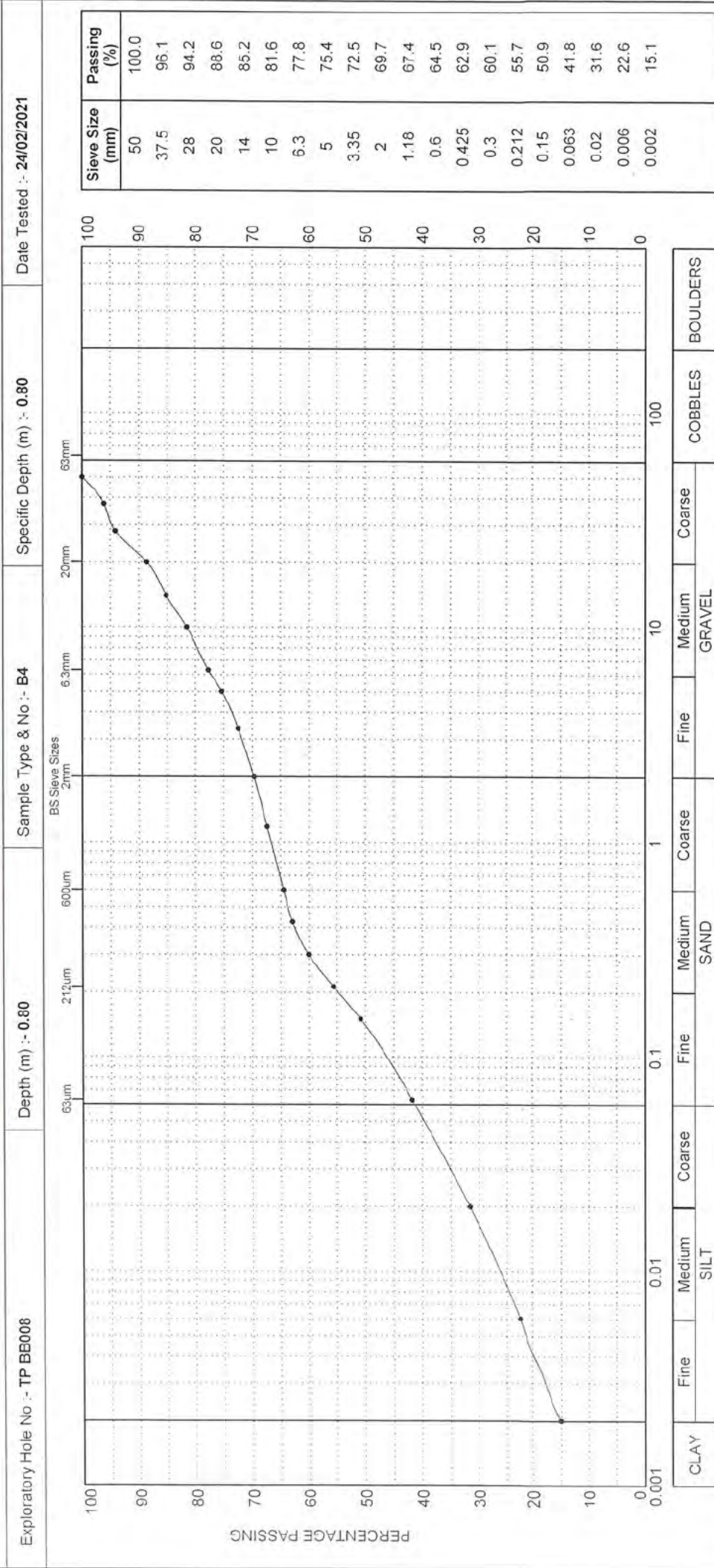


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Felton Park, Chester-le-Street, Co. Durham, DL2 2RG - Tel: 0191 367 4000 Fax: 0191 367 4710  
Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Blackburn, BB1 3BL - Tel: 01772 736 300 Fax: 01772 736 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

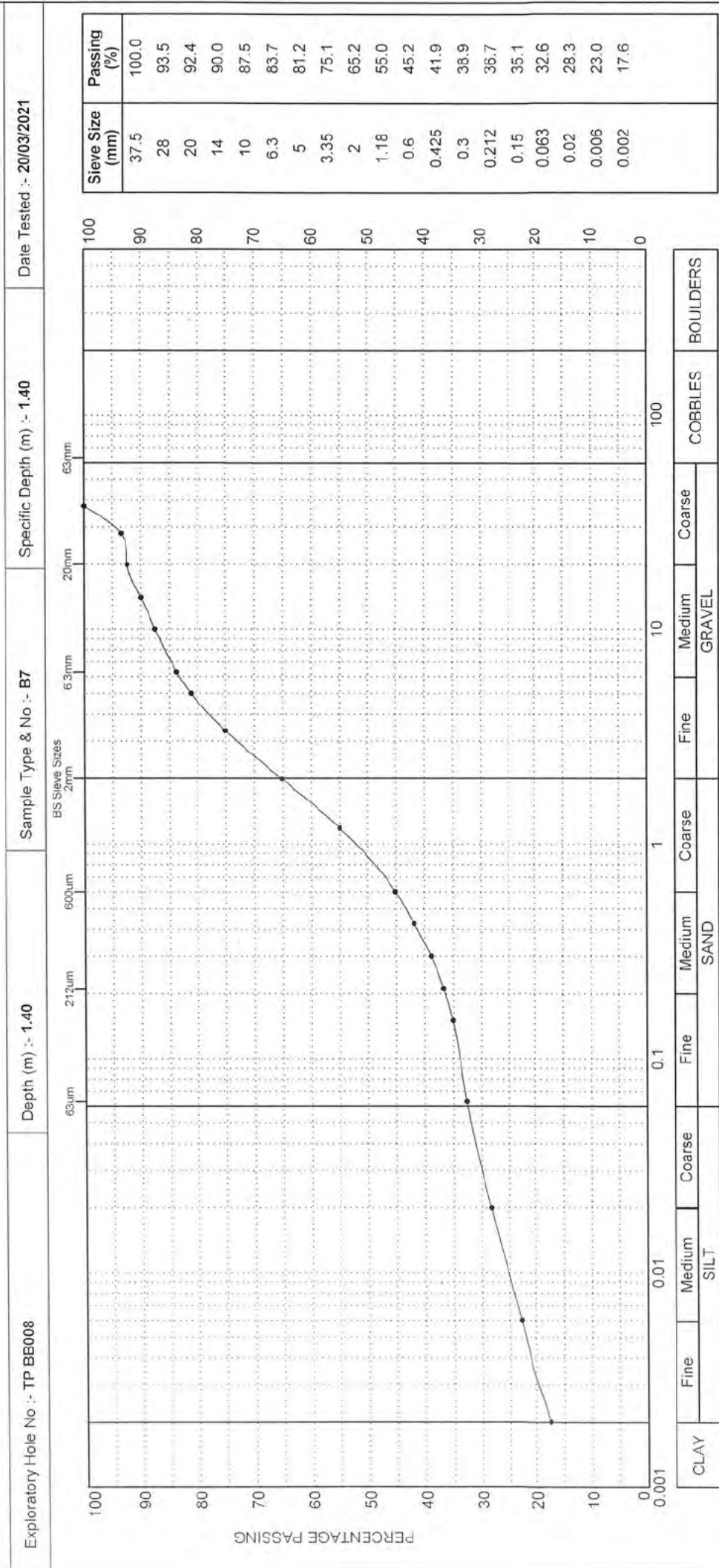
	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB008/B4/0.80	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :-		Contract No :- 4322C

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Salford Mill Industrial Estate, Palace Road, Salford, Greater Manchester, M6 6PU. Tel: 0161 387 4700 Fax: 0161 367 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/TP BB008/B7/1.40	Signed 	Page 1 of 1
Client :- AMEY OW Limited		Contract Title :- 		
G Contract No :- 4322C				1367

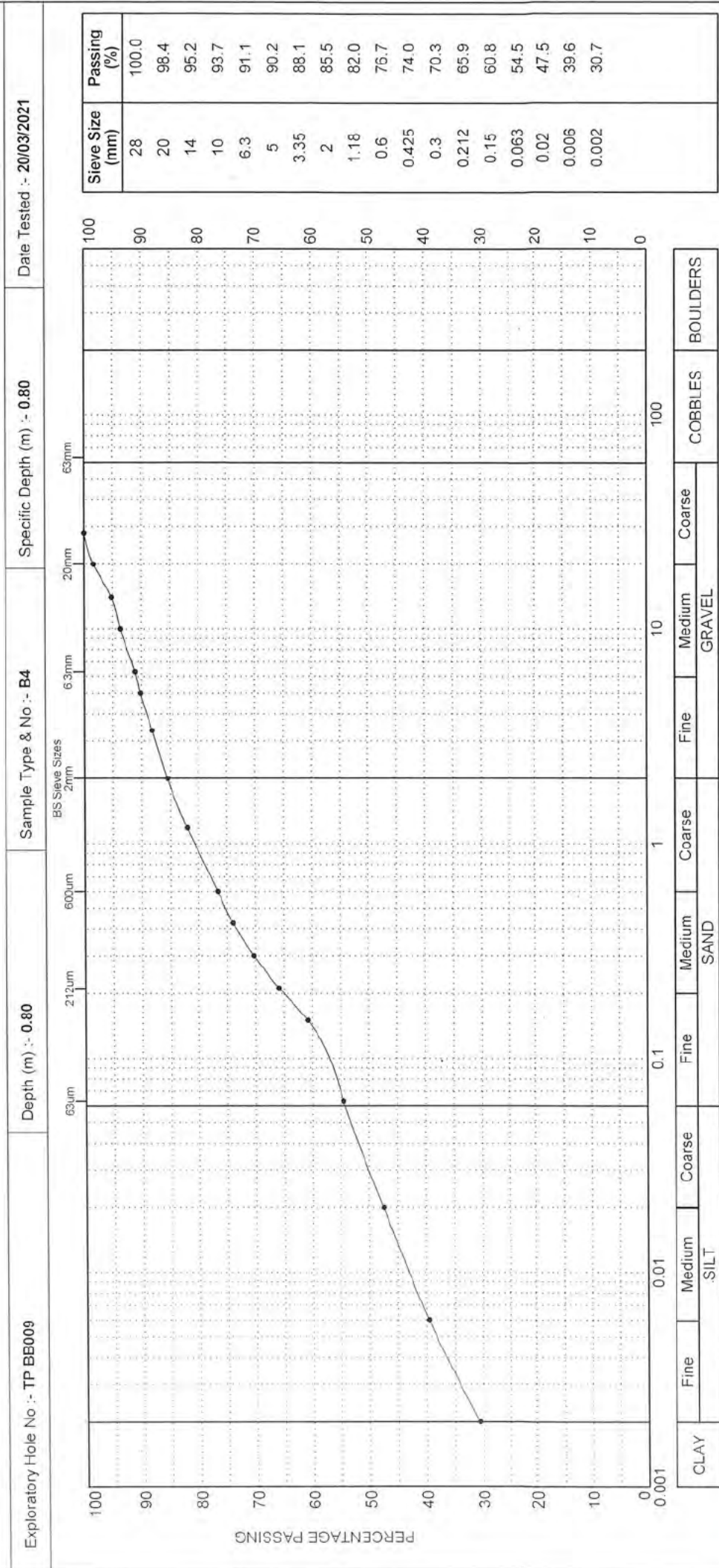


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Head Office: Unit 25, Salford, Mill Industrial Estate, Parkside Park, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 367 4770  
 Regional Office: Unit 20, Business Development Centre, Eanan Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/TP BB009/B4/0.80	Sig	Page 1 of 1
Client :- AMEY OW Limited		REG Contract No :- 4322C	
A66 North Trans Pennine Scheme D Section 7			

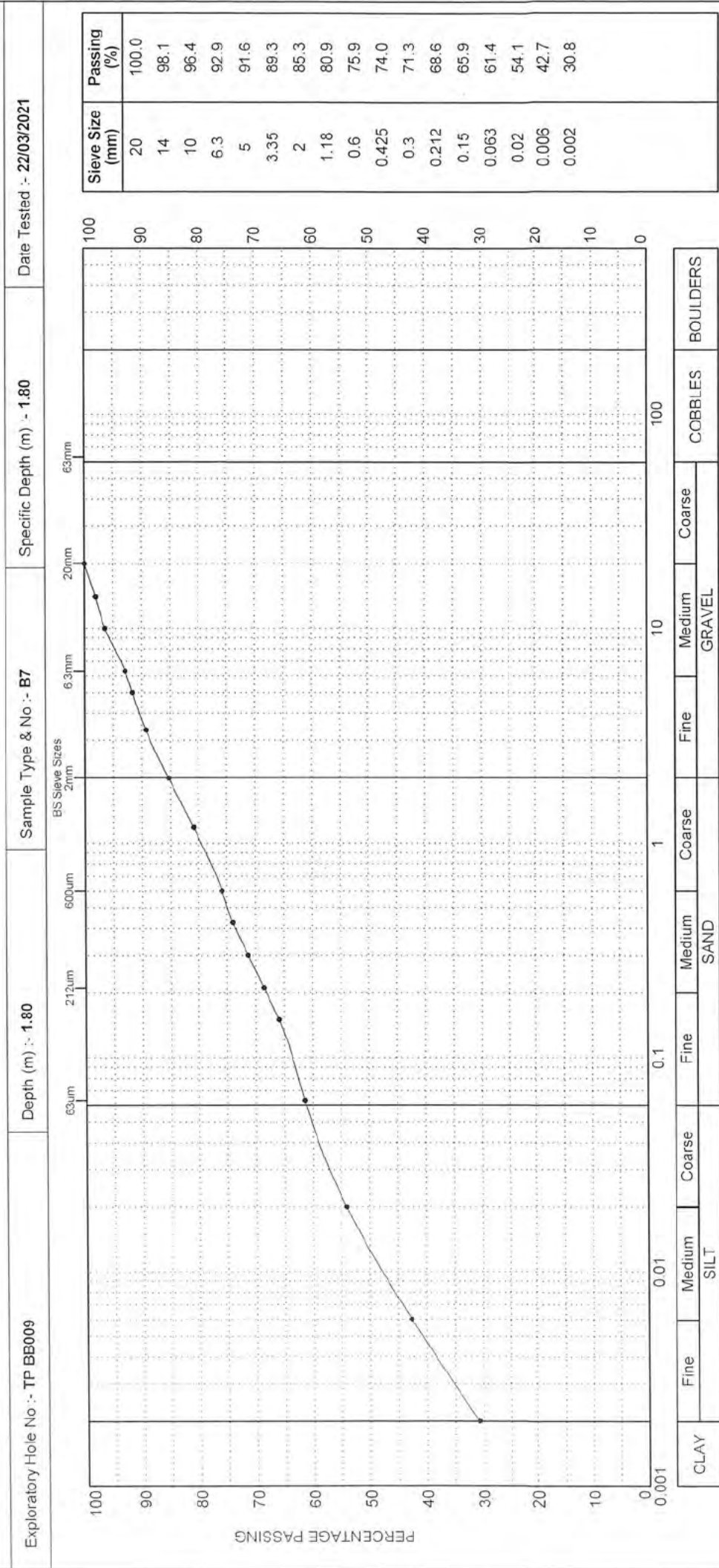


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Salford, Call Industrial Estate, Parkroyal, Chester-le-Street, Co. Durham, DH1 1BA. Tel: 0191 387 4700 Fax: 0191 387 4770  
 Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blaydon, BBL 1 5BL. Tel: 01772 735 500 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/TP BB009/B7/1.80	Signed :-
Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322C

A65 North Trans Pennine Scheme D Section 7

Page 1 of 1

UKAS TESTING 1367

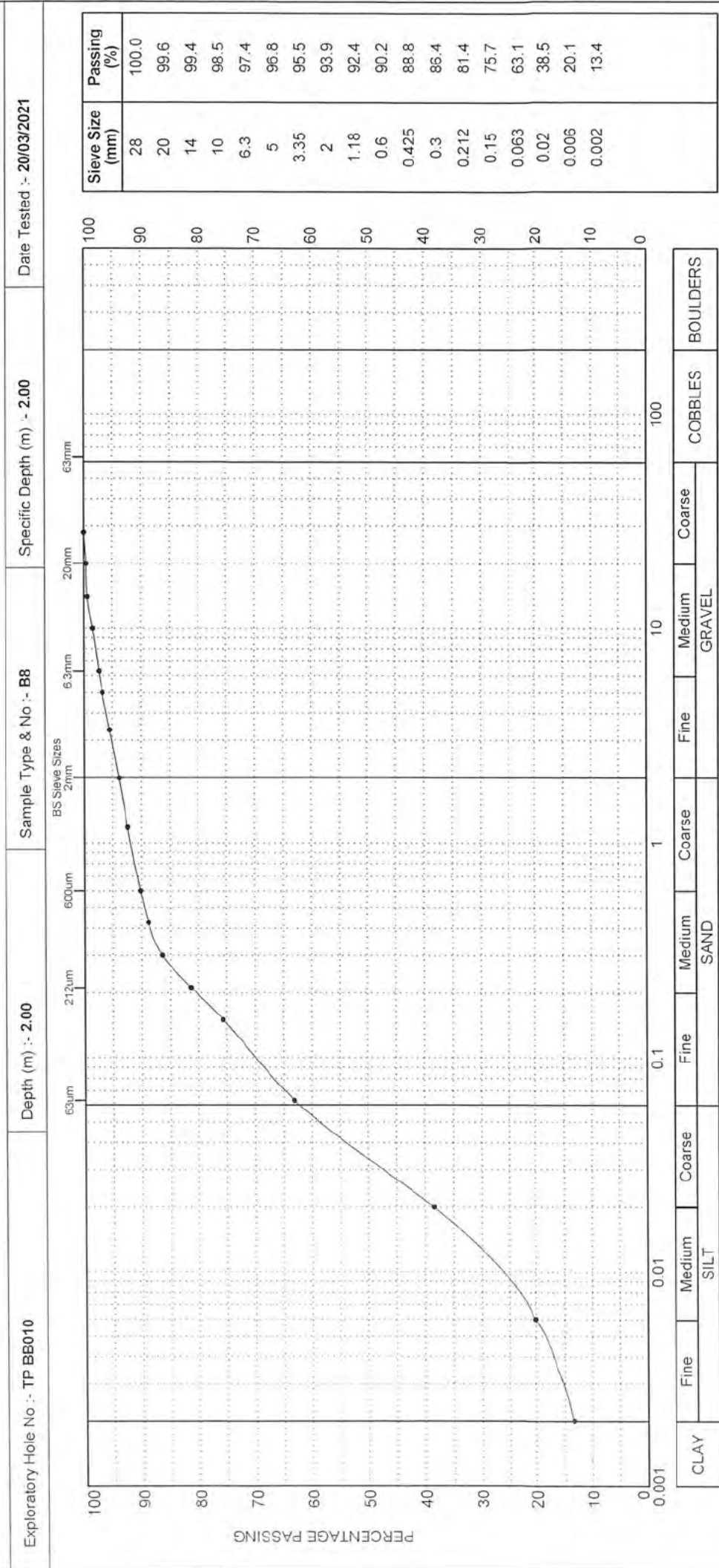


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Salford Industrial Estate, Pinfold Fold, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4770  
 Regional Office: Unit 20, Business Development Centre, Eannaam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



Exploratory Hole No :- TP BB010      Depth (m) :- 2.00      Sample Type & No :- B8      Specific Depth (m) - 2.00      Date Tested :- 20/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SAND			GRAVEL							

Date of issue :- 30/03/2021      Certificate No :- PSD/4322C/TP BB010/B8/2.00      Signe

Client :- AMEY OW Limited      Contract Title :- A66 North Trans Pennine Scheme D Section 7      AEG Contract No :- 4322C

Page 1 of 1



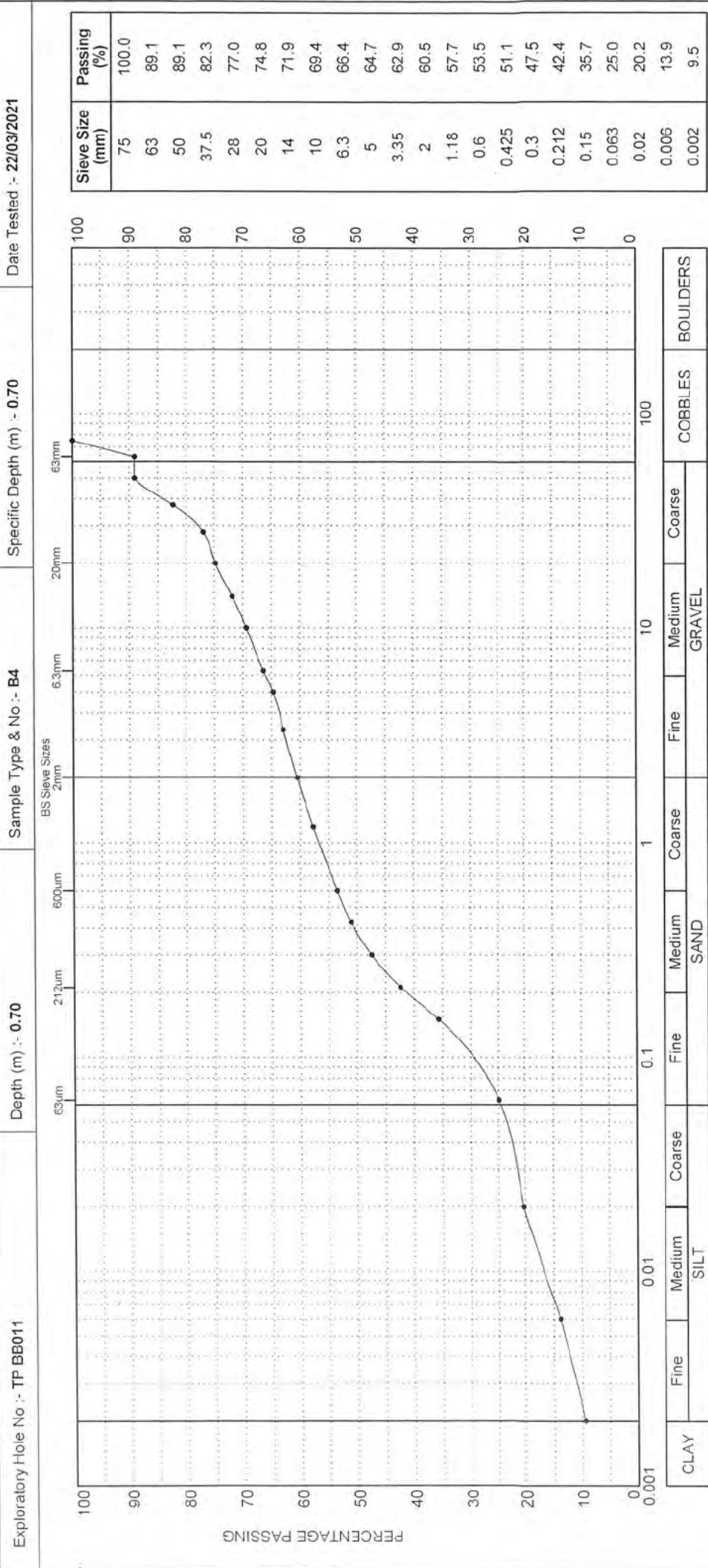
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Salford City Industrial Estate, Pinfold Park, Chester Road, Salford, Greater Manchester, M6 6PU. Tel: 0161 387 4700 Fax: 0161 387 4710  
 Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blakesburg, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



Exploratory Hole No :- TP BB011	Depth (m) :- 0.70	Sample Type & No :- B4	Specific Depth (m) - 0.70	Date Tested :- 22/03/2021
For description of sample please refer to the Laboratory Sample Description Sheet				
Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/TP BB011/B4/0.70	Signed :-	Page 1 of 1	
Client :- AMEY OW Limited	Contract Title :-	AEG Contract No :- 4322C		
AMEY		A65 North Trans Pennine Scheme D Section 7		
		UKAS TESTING 1367		

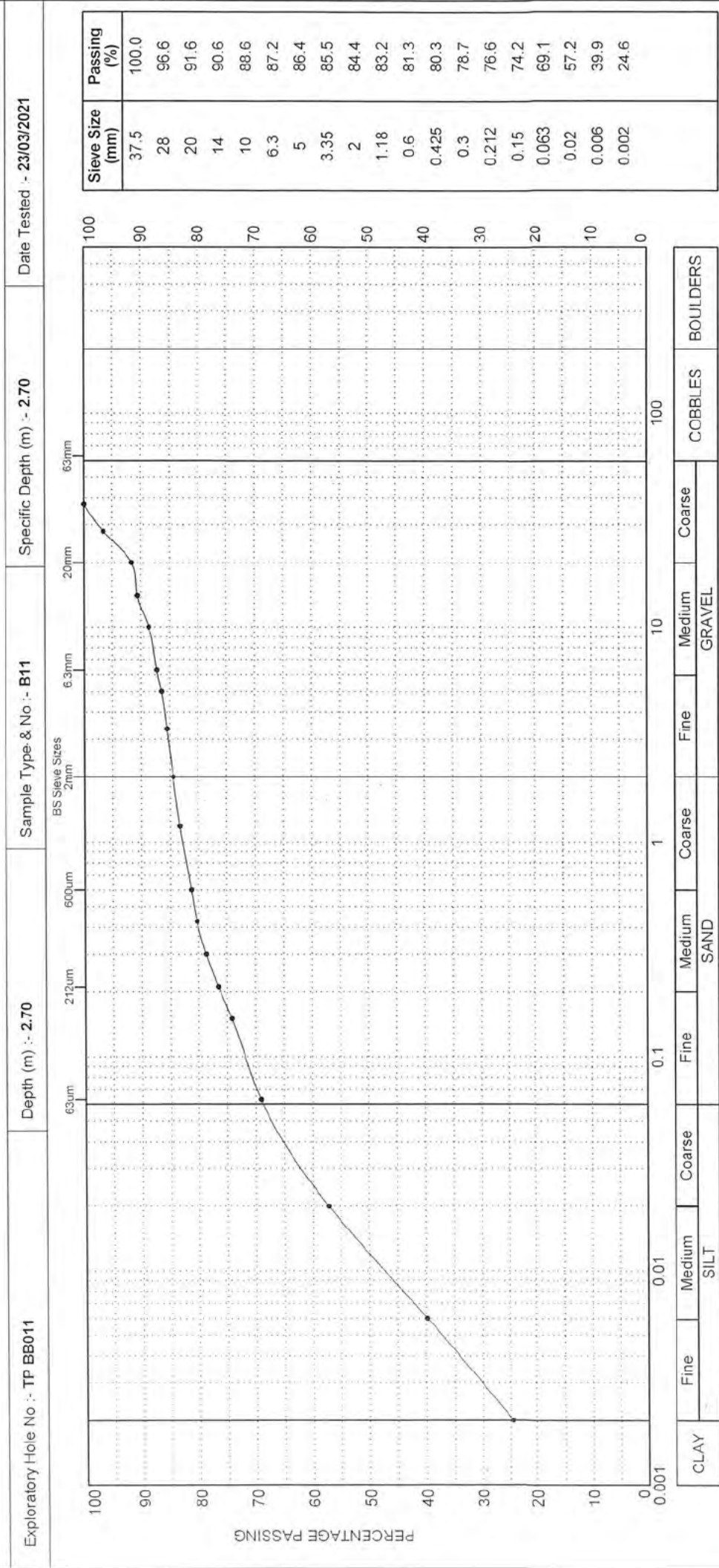


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Salford City Industrial Estate, Redfern Road, Salford, Greater Manchester, M6 6PU. Tel: 0161 387 4700 Fax: 0161 387 4710  
 Regional Office: Unit 20, Business Development Centre, Ennals Wharf, Blackburn, BB1 5BL. Tel: 01752 735 300 Fax: 01752 735 599

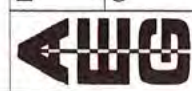
## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the test report, Certificate, Descriptive Sheet

Date of issue :- 30/03/2021	Certificate No :- PSD/4322C/TP BB011/B11/2.70	Signed :-
Client :- AMEY OW Limited	Contract Title :- A65 North Trans Pennine Scheme D Section 7	Page 1 of 1
		AEG Contract No :- 4322C

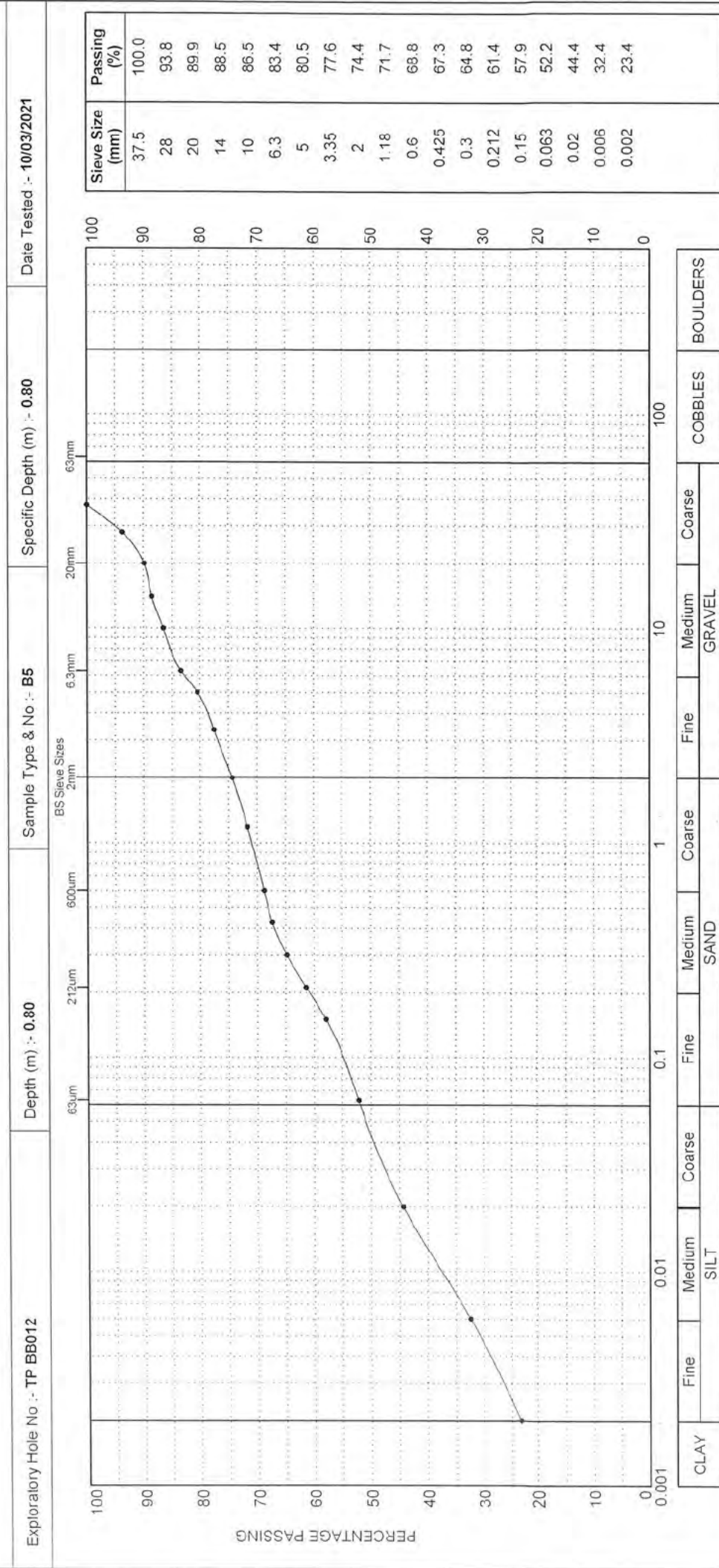


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Head Office: Unit 25 Shello Oil Industrial Estate, Pelton Hill, Chesterton Street, Co. Down, D49 2FG. Tel: 0181 867 4700 Fax: 0181 387 4710  
Regional Office: Unit 20, Business Development Centre, Farrah Way, Blackburn, BB1 5BL. Tel: 01772 735 360 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



Exploratory Hole No :- TP BB012	Depth (m) :- 0.80	Sample Type & No :- B5	Specific Depth (m) :- 0.80	Date Tested :- 10/03/2021
<p>For description of sample please refer to the Laboratory Sample Description Sheet</p>				
Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB012/B5/0.80	Signed :-	Page 1 of 1	
Client :- AMEY OW Limited	Contract Title :-	AEG Contract No :- 4322C		
AMEY		A66 North Trans Pennine Scheme D Section 7		
		UKAS TESTING 1367		

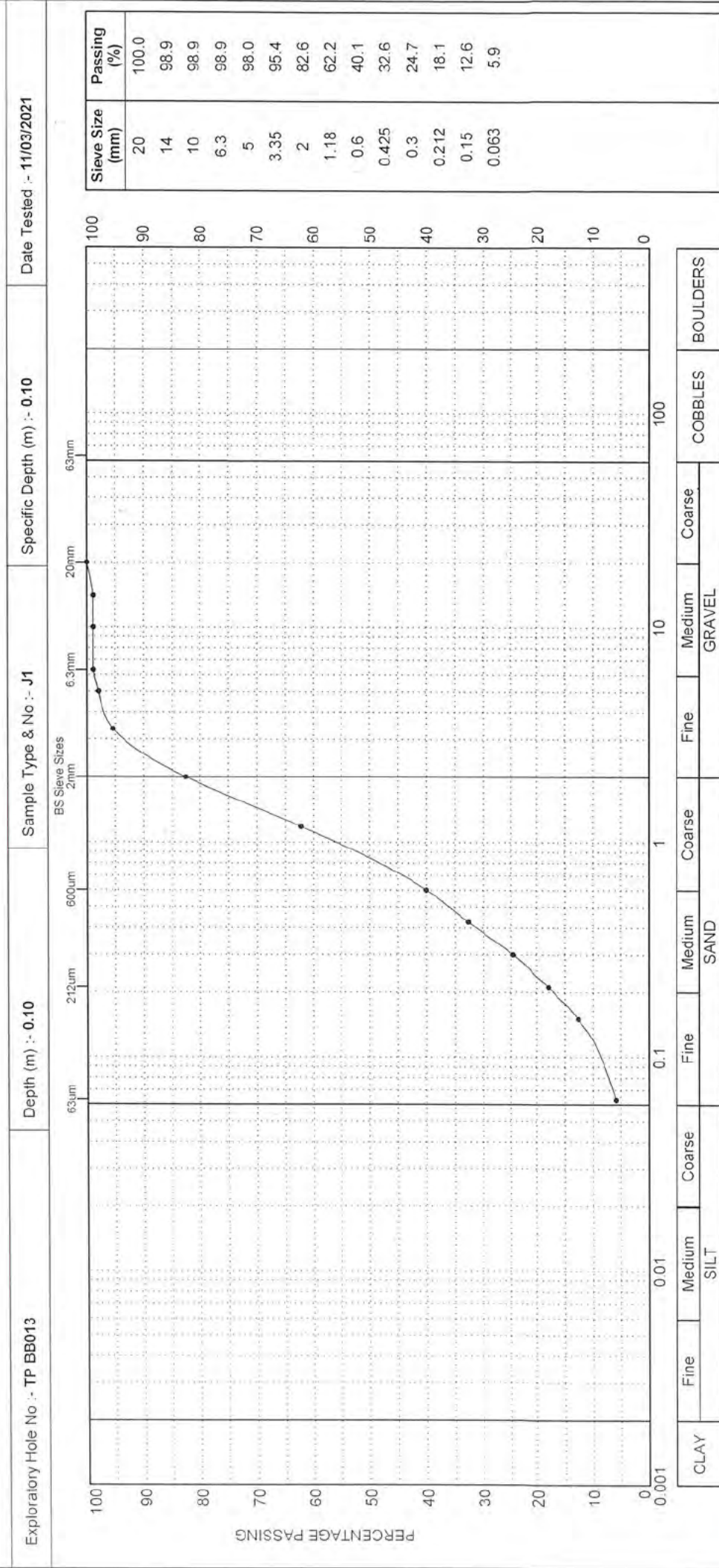


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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 25/03/2021	Certificate No :- PSD/4322C/TP BB013/J1/0.10	Signed :-	Page 1 of 1
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	Contract No :- 4322C	AEG Contract No :- 4322C



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Head Office: Unit 25 Steels Gill Industrial Estate, Pillion Hill, Chesley Street Co. Durham, DH4 2PG. Tel: 0181 387 4700 Fax: 0181 387 4710  
Regional Office: Unit 20 Business Development Centre, Easton Wharf, Bishopscote, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

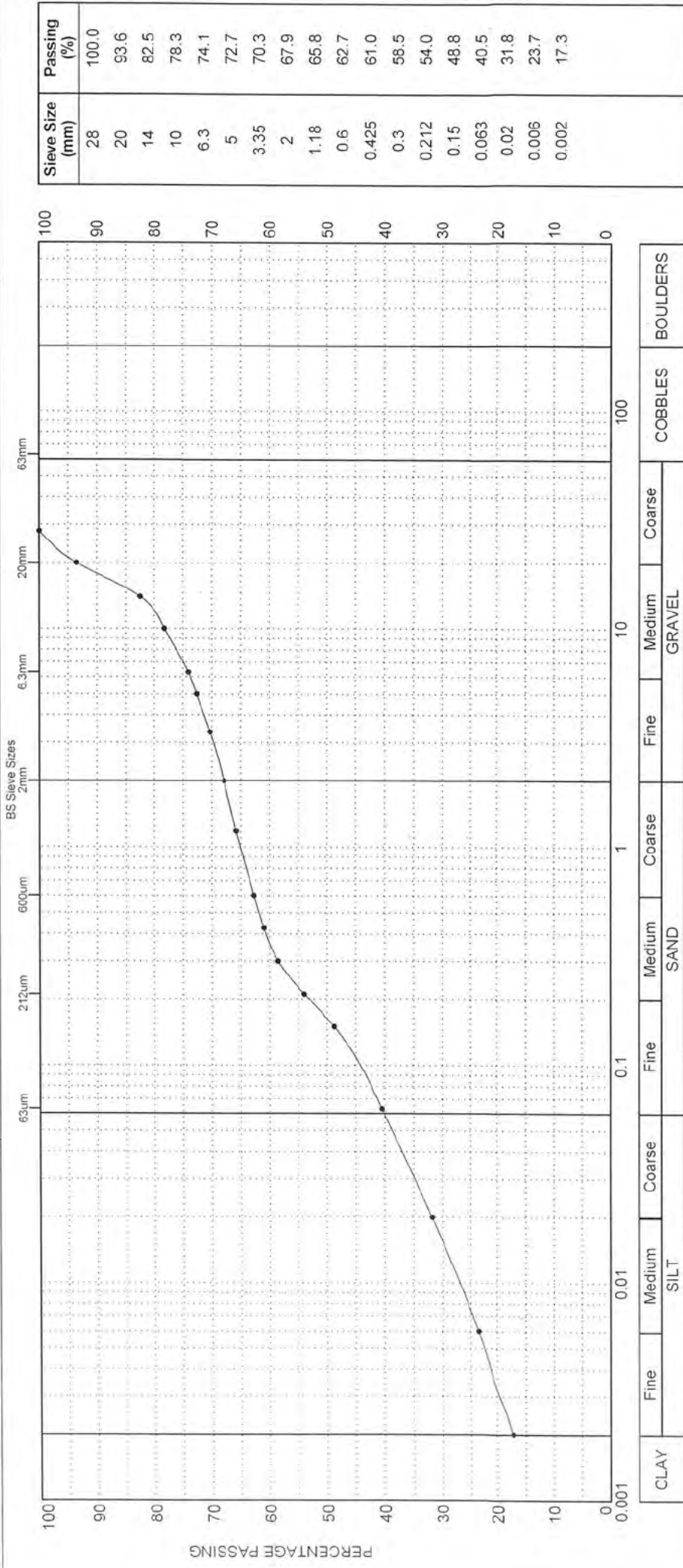
Exploratory Hole No :- TP BB013

Depth (m) :- 0.55

Sample Type & No :- J4

Specific Depth (m) :- 0.55

Date Tested :- 11/03/2021



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :-  
25/03/2021

Certificate No :-  
PSD/4322C/TP BB013/J4/0.55

Signed :-



Client :-  
AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

AEG Contract No :-  
4322C

Page 1 of 1





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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

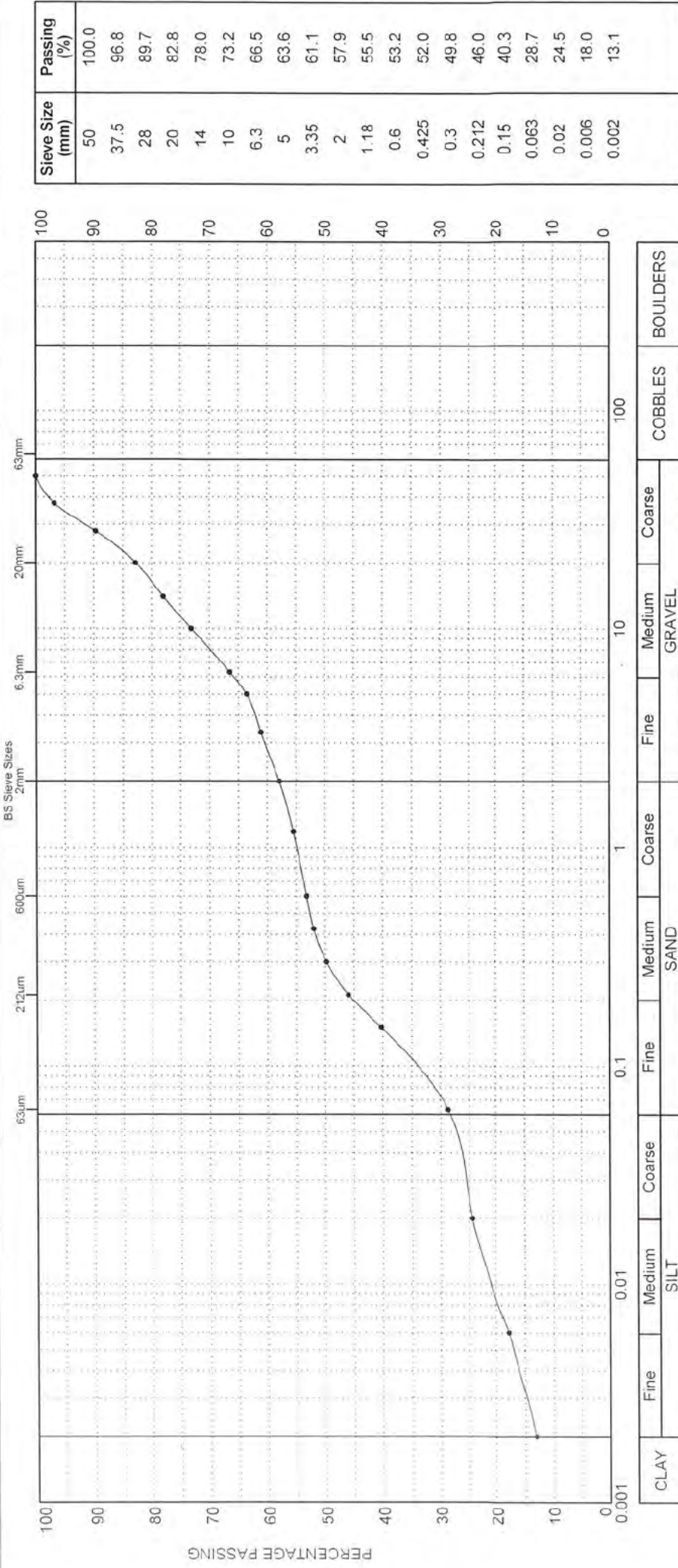
Exploratory Hole No :- TP BB014

Depth (m) :- 1.70

Sample Type & No :- B8

Specific Depth (m) :- 1.70

Date Tested :- 25/03/2021



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 21/04/2021	Certificate No :- PSD/4322C/TP BB014/B8/1.70	Signed 	Page 1 of 1
	Client :- AMEY OW Limited			Contract Title :- A66 North Trans Pennine Scheme D Section 7

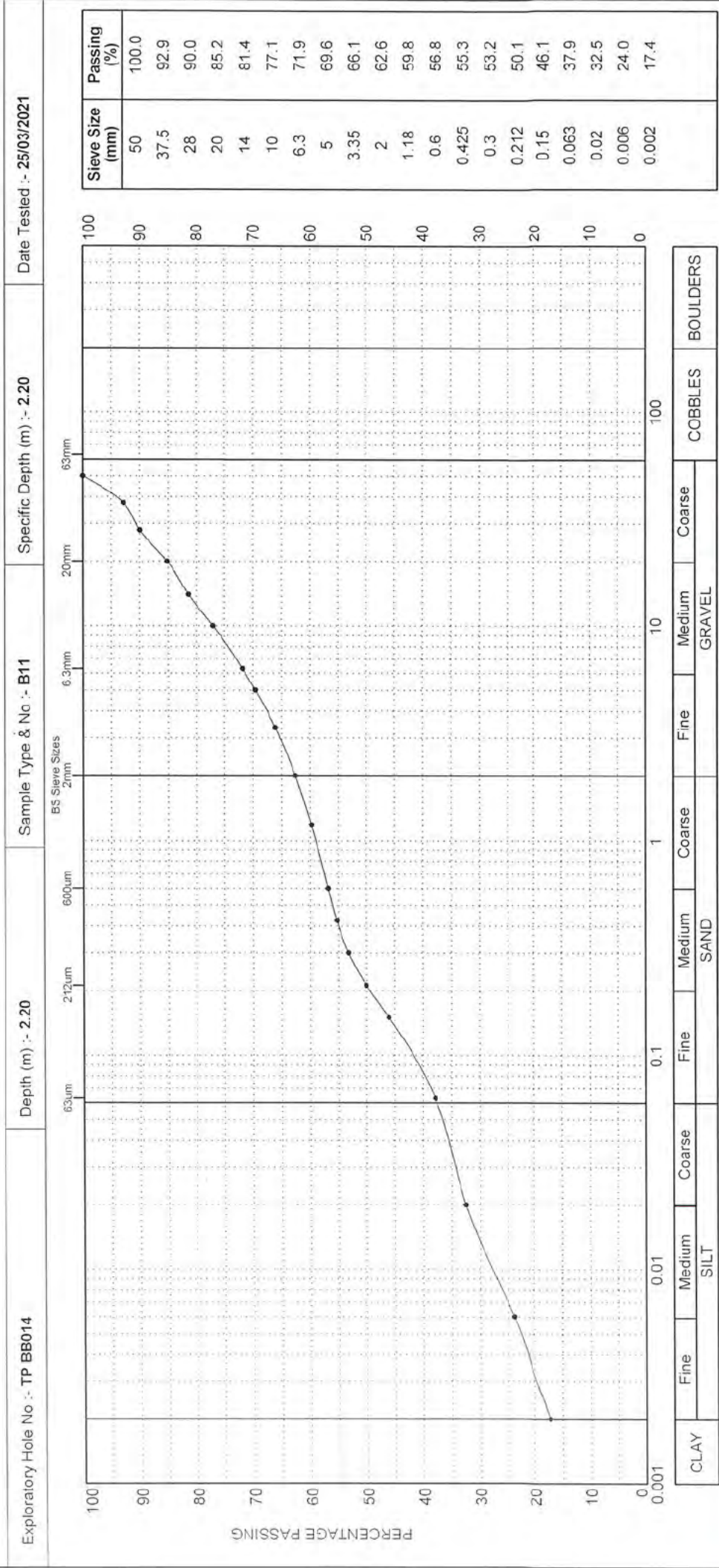


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Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Emsayn Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :-	Certificate No :-	
	21/04/2021	PSD/4322C/TP BB014/B11/2.20	
Client :-	AMEY OW Limited	Contract Title :-	A66 North Trans Pennine Scheme D Section 7
		Signed :-	REG Contract No :- 4322C
			Page 1 of 1



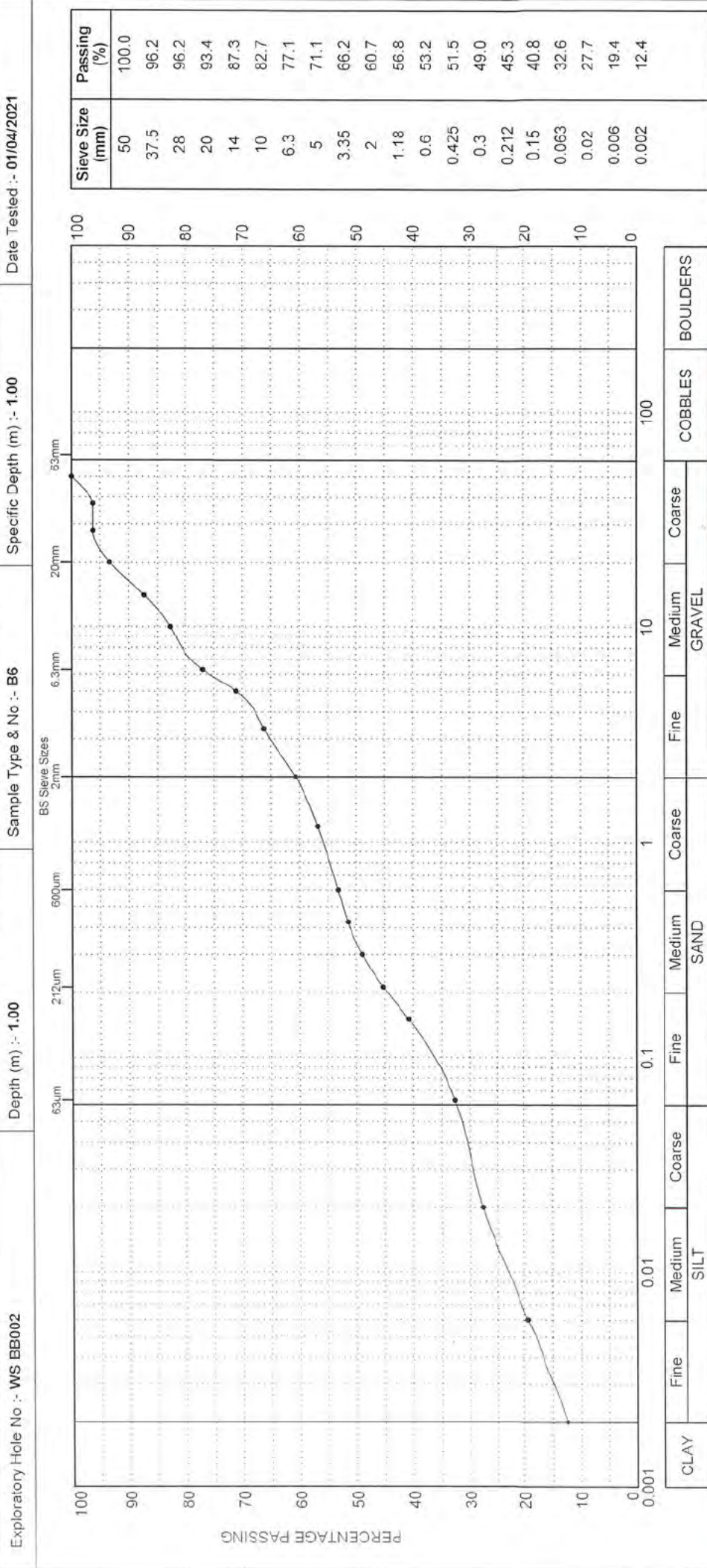
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Sellafield Industrial Estate, Pelter Hill, Cockerham Street, Cockerham, DH7 2BG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 23, Business Development Centre, Easton Wharf, Blackburn, BB1 5EL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 21/04/2021	Certificate No. :- PSD/4322C/WS BB002/B6/1 00	
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	

**Determination of Chloride, Total Sulphur, Sulphate and pH  
(Tested Externally)**







## Certificate of Analysis

*Certificate Number* 21-07320

*Issued:* 15-Apr-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-07320

*Client Reference* 4322C

*Order No* LA2488

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 35 Soil samples.

*Date Received* 08-Apr-21

*Date Started* 08-Apr-21

*Date Completed* 15-Apr-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





# Summary of Chemical Analysis Soil Samples

Our Ref 21-07320

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1828511	1828512	1828513	1828514	1828515	1828516	1828517	1828518	1828519	1828520	1828521
Sample ID	BH BB003	BH BB003	BH BB004	BH BB004	BH BB005	BH BB005	BH BB005	BH BB006	BH BB006	BH BB007	BH BB007
Depth	2.50	4.50	0.70	1.20	1.20	3.00	4.00	1.20	3.50	2.40	4.20
Other ID	8	11	2	6	8	11	14	7	14	8	14
Sample Type	J	J	J	J	B	J	B	J	J	J	J
Sampling Date	03/02/2021	03/02/2021	17/02/2021	17/02/2021	18/02/2021	18/02/2021	18/02/2021	19/02/2021	19/02/2021	09/02/2021	09/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test Method LOD Units

Test	Method	LOD	Units
Inorganics			
pH	DETSC 2008#	7.9	pH
Chloride Aqueous Extract	DETSC 2055	1	mg/l
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l
Sulphur as S, Total	DETSC 2320	0.01	%
Sulphate as SO4, Total	DETSC 2321#	0.01	%





# Summary of Chemical Analysis Soil Samples

Our Ref 21-07320

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1828522	1828523	1828524	1828525	1828526	1828527	1828528	1828529	1828530	1828531	1828532
.Sample ID	BH BB008	BH BB009	BH BB009	BH BB010	BH BB011	BH BB012	BH BB013	BH BB013	BH BB015	BH BB017	BH BB018
Depth	1.20	3.50	4.20	2.50	1.70	2.50	2.00	5.00	1.00	1.00	2.90
Other ID	5	11	13	13	7	10	10	21	8	6	6
Sample Type	ES	J	J	C	C	C	J	J	ES	ES	C
Sampling Date	08/02/2021	10/02/2021	10/02/2021	16/02/2021	12/02/2021	09/02/2021	09/02/2021	11/02/2021	08/02/2021	09/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test LOD Method Units

Test	LOD	Method	Units
Inorganics			
pH	6.8	DETSC 2008#	pH
Chloride Aqueous Extract	1	DETSC 2055	mg/l
Sulphate Aqueous Extract as SO4	10	DETSC 2076#	mg/l
Sulphur as S, Total	0.01	DETSC 2320	%
Sulphate as SO4, Total	0.01	DETSC 2321#	%



# Summary of Chemical Analysis Soil Samples

Our Ref 21-07320

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1828533	1828534	1828535	1828536	1828537	1828538	1828539	1828540	1828541	1828542	1828543
Sample ID	BH BB023	BH BB023	BH BB024	TP BB001	TP BB001	TP BB002	TP BB002	TP BB004	TP BB004	TP BB004	TP BB009
Depth	3.50	5.00	2.50	0.30	3.10	1.50	2.30	1.00	2.30	4.30	2.40
Other ID	12	15	8	3	11	6	9	5	8	13	8
Sample Type	J	J	J	J	J	J	J	ES	J	J	ES
Sampling Date	15/02/2021	15/02/2021	23/02/2021	01/02/2021	01/02/2021	02/02/2021	02/02/2021	03/02/2021	03/02/2021	03/02/2021	05/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units
Inorganics			
pH	DETSC 2008#		pH
Chloride Aqueous Extract	DETSC 2055	1	mg/l
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l
Sulphur as S, Total	DETSC 2320	0.01	%
Sulphate as SO4, Total	DETSC 2321#	0.01	%





# Summary of Chemical Analysis Soil Samples

Our Ref 21-07320

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1828544	1828545
Sample ID	BH BB006	TP BB005
Depth	2.50	2.00
Other ID	12	9
Sample Type	B	B
Sampling Date	19/02/2021	18/02/2021
Sampling Time	n/s	n/s

Test	Method	LOD	Units
<b>Inorganics</b>			
pH	DETSC 2008#		pH
Chloride Aqueous Extract	DETSC 2055	1	mg/l
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l
Sulphur as S, Total	DETSC 2320	0.01	%
Sulphate as SO4, Total	DETSC 2321#	0.01	%

## Information in Support of the Analytical Results

Our Ref 21-07320

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date		Containers Received	Holding time exceeded for tests	Inappropriate container for tests
		Sampled				
1828511	BH BB003 2.50 SOIL	03/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828512	BH BB003 4.50 SOIL	03/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828513	BH BB004 0.70 SOIL	17/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828514	BH BB004 1.20 SOIL	17/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828515	BH BB005 1.20 SOIL	18/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828516	BH BB005 3.00 SOIL	18/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828517	BH BB005 4.00 SOIL	18/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828518	BH BB006 1.20 SOIL	19/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828519	BH BB006 3.50 SOIL	19/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828520	BH BB007 2.40 SOIL	09/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828521	BH BB007 4.20 SOIL	09/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828522	BH BB008 1.20 SOIL	08/02/21		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828523	BH BB009 3.50 SOIL	10/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828524	BH BB009 4.20 SOIL	10/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828525	BH BB010 2.50 SOIL	16/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828526	BH BB011 1.70 SOIL	12/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	



## Information in Support of the Analytical Results

Our Ref 21-07320

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Date		Containers Received	Holding time exceeded for tests	Inappropriate container for tests
		Sampled				
1828527	BH BB012 2.50 SOIL	09/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828528	BH BB013 2.00 SOIL	09/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828529	BH BB013 5.00 SOIL	11/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828530	BH BB015 1.00 SOIL	08/02/21		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828531	BH BB017 1.00 SOIL	09/02/21		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828532	BH BB018 2.90 SOIL	19/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828533	BH BB023 3.50 SOIL	15/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828534	BH BB023 5.00 SOIL	15/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828535	BH BB024 2.50 SOIL	23/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828536	TP BB001 0.30 SOIL	01/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828537	TP BB001 3.10 SOIL	01/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828538	TP BB002 1.50 SOIL	02/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828539	TP BB002 2.30 SOIL	02/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828540	TP BB004 1.00 SOIL	03/02/21		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828541	TP BB004 2.30 SOIL	03/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828542	TP BB004 4.30 SOIL	03/02/21		PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828543	TP BB009 2.40 SOIL	05/02/21		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	

## Information in Support of the Analytical Results

Our Ref 21-07320

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

1828544	BH BB006 2.50 SOIL	19/02/21	PT 500ml	Anions 2:1 (30 days)
1828545	TP BB005 2.00 SOIL	18/02/21	PT 500ml	Anions 2:1 (30 days)

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

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

End of Report



## Determination of Dry Density/Moisture Content Relationship

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- BH BB003

Depth (m) :- 1.00

Sample Type & No :- B5

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 12

Particle Density (Measured) = 2.66

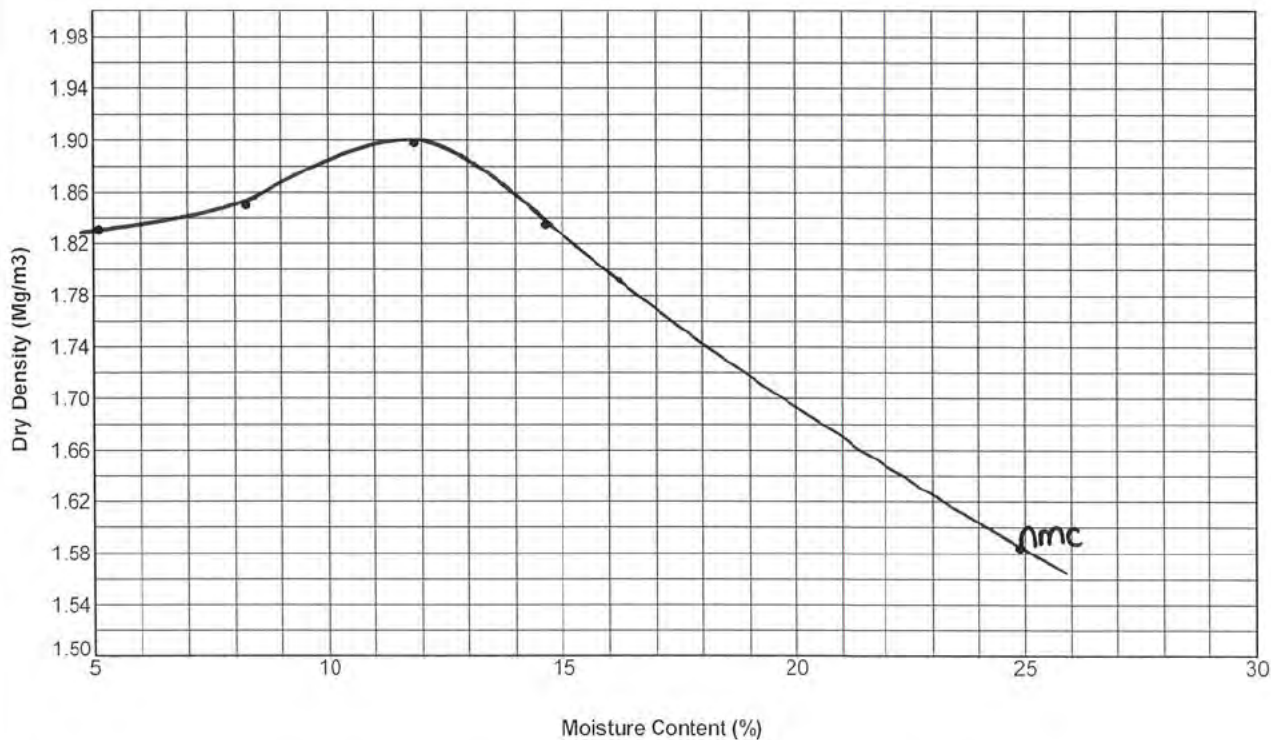
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.90

Retained on 20mm Sieve (%) = 20.1

Date Tested = 13/04/2021

Retained on 37.5mm Sieve (%) = 9.9

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :-

Date of issue

22/04/2021

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- **BH BB006**

Depth (m) :- **2.50**

Sample Type & No :- **B12**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **12**

Particle Density (Assumed) = **2.65**

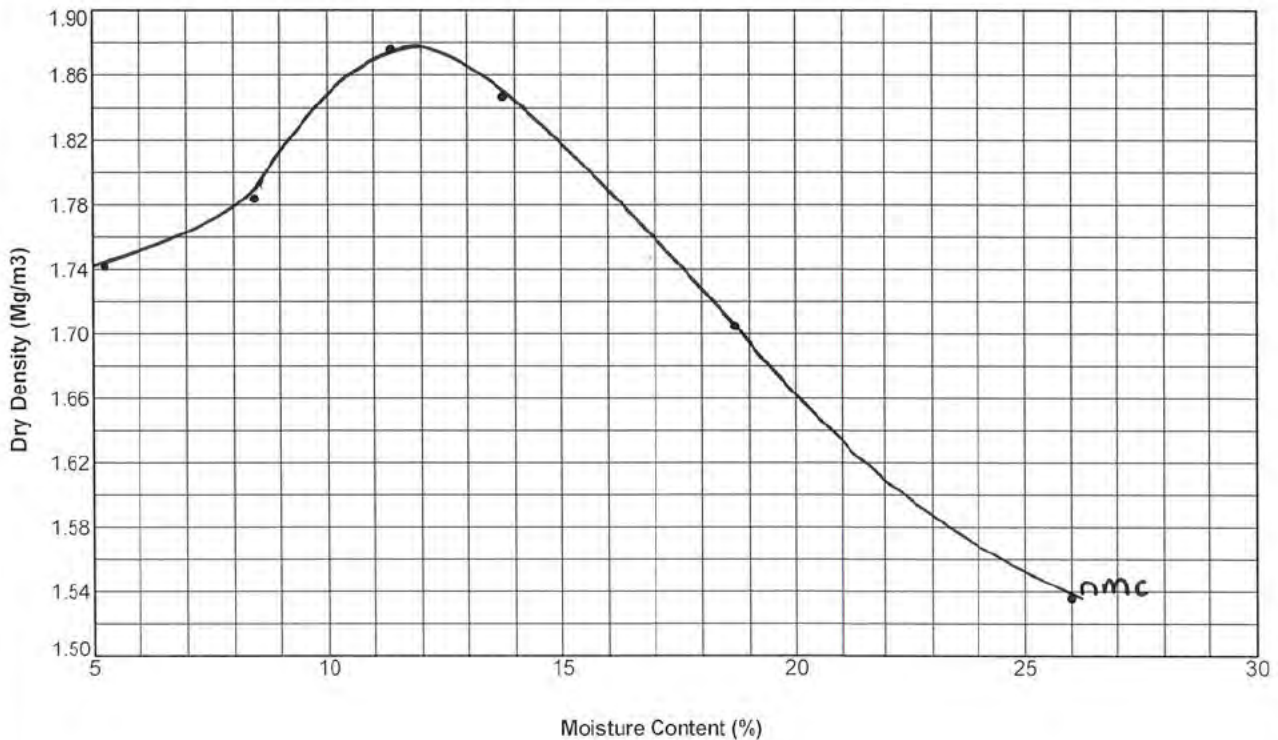
Maximum Dry Density (Mg/m<sup>3</sup>) = **1.88**

Retained on 20mm Sieve (%) = **11.6**

Date Tested = **25/03/2021**

Retained on 37.5mm Sieve (%) = **6.8**

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :-

Date of issue :-

20/04/2021

Certificate No :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- BH BB007

Depth (m) :- 1.50

Sample Type & No :- B6

### Test Method

4.5kg Compaction

Separate Samples

### Test Results

Optimum Moisture Content (%) = 14

Particle Density (Measured) = 2.61

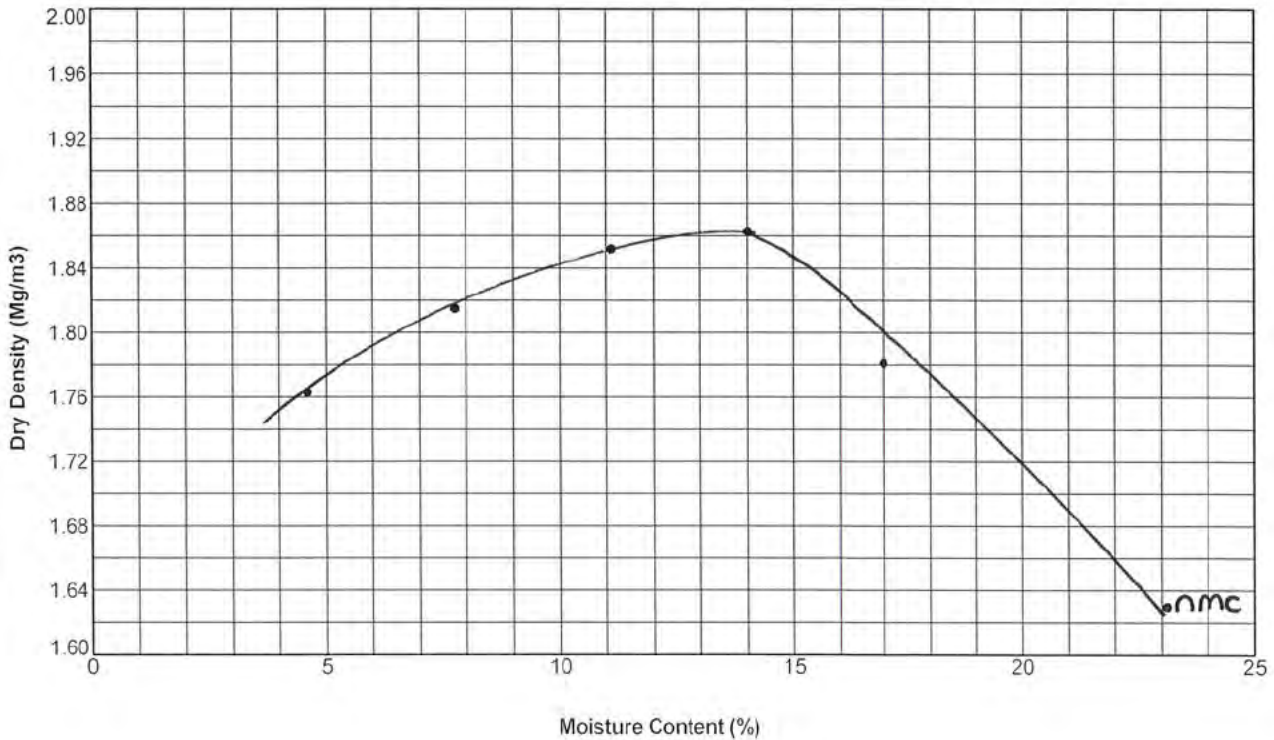
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.86

Retained on 20mm Sieve (%) = 5.8

Date Tested = 29/03/2021

Retained on 37.5mm Sieve (%) = 2.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

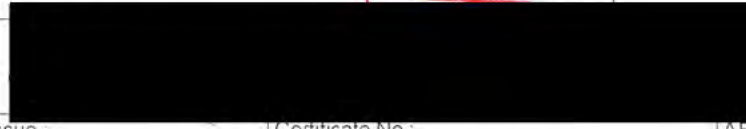
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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- **BH BB009**

Depth (m) :- **3.20**

Sample Type & No :- **B10**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **10**

Particle Density (Measured) = **2.65**

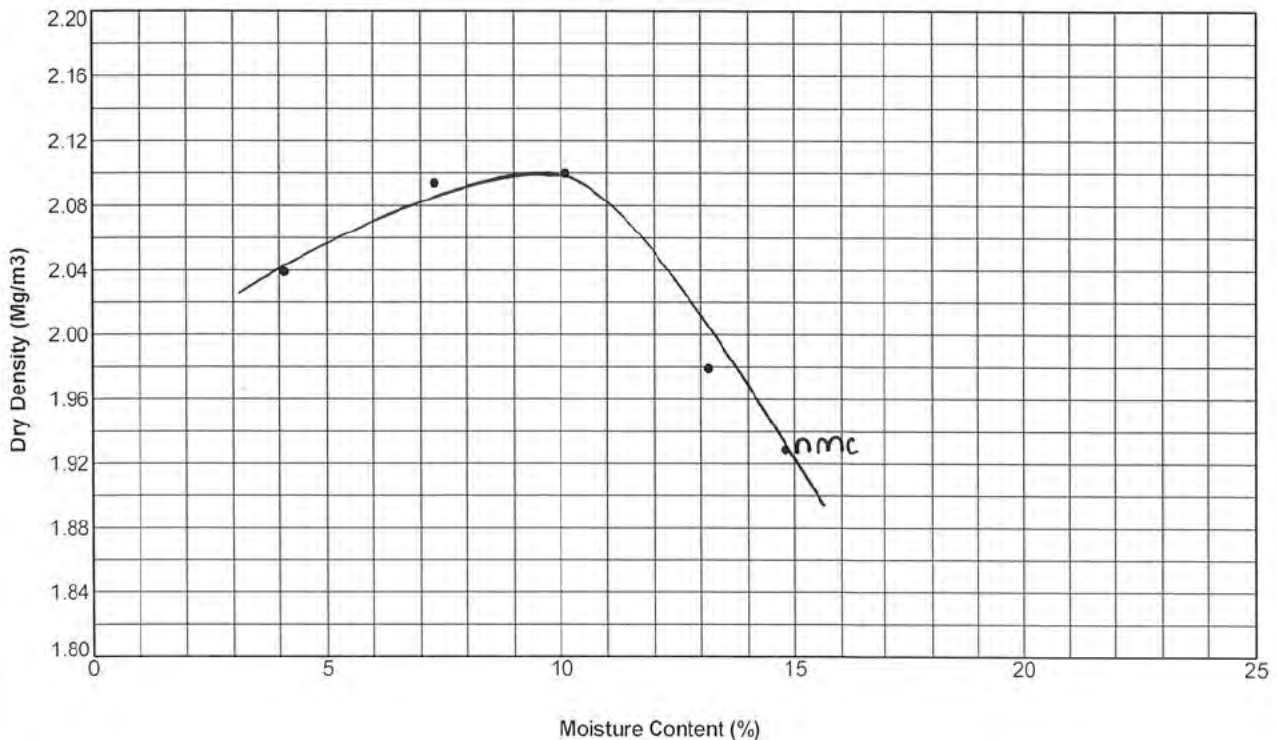
Maximum Dry Density (Mg/m<sup>3</sup>) = **2.10**

Retained on 20mm Sieve (%) = **12.3**

Date Tested = **12/03/2021**

Retained on 37.5mm Sieve (%) = **6.4**

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signature: [Redacted]  
 Date of Issue: 20/04/2021  
 Contract No. :- 4322C

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB001

Depth (m) :- 1.50

Sample Type & No :- B7

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 12

Particle Density (Measured) = 2.54

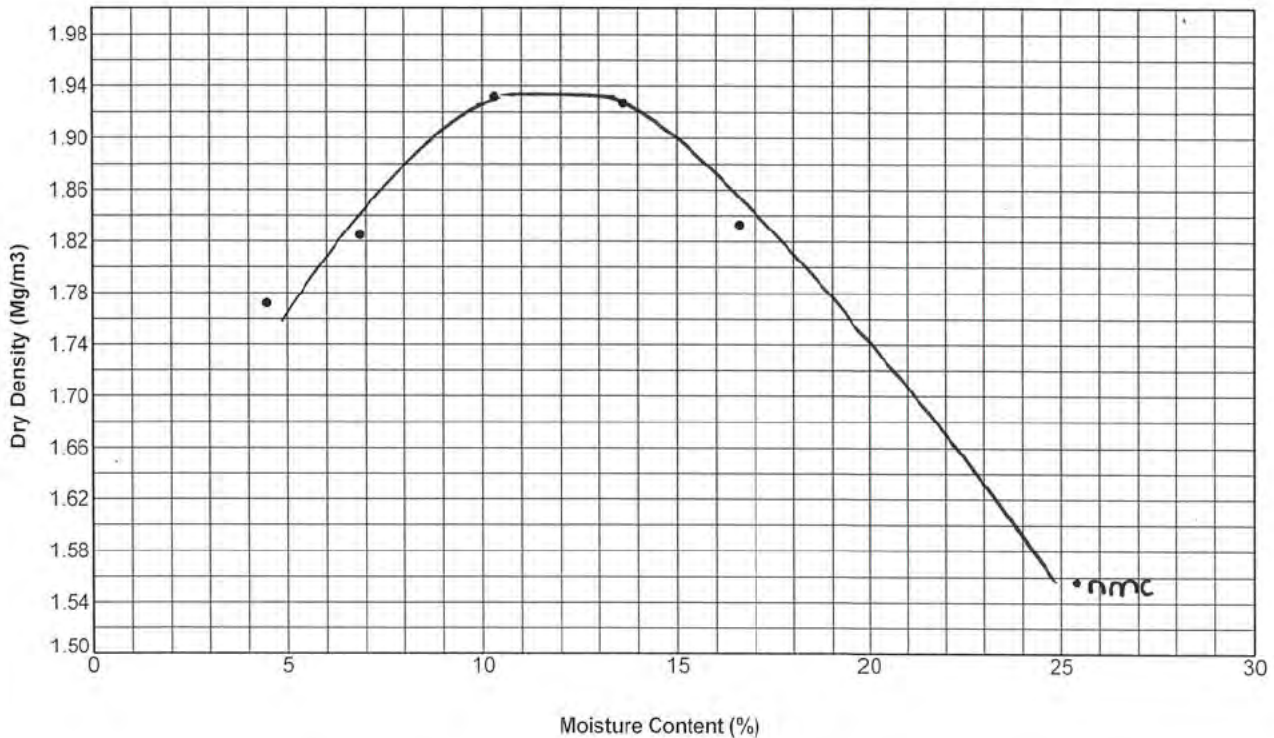
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.93

Retained on 20mm Sieve (%) = 17.2

Date Tested = 17/03/2021

Retained on 37.5mm Sieve (%) = 8.1

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB002

Depth (m) :- 1.75

Sample Type & No :- B7

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 11

Particle Density (Assumed) = 2.70

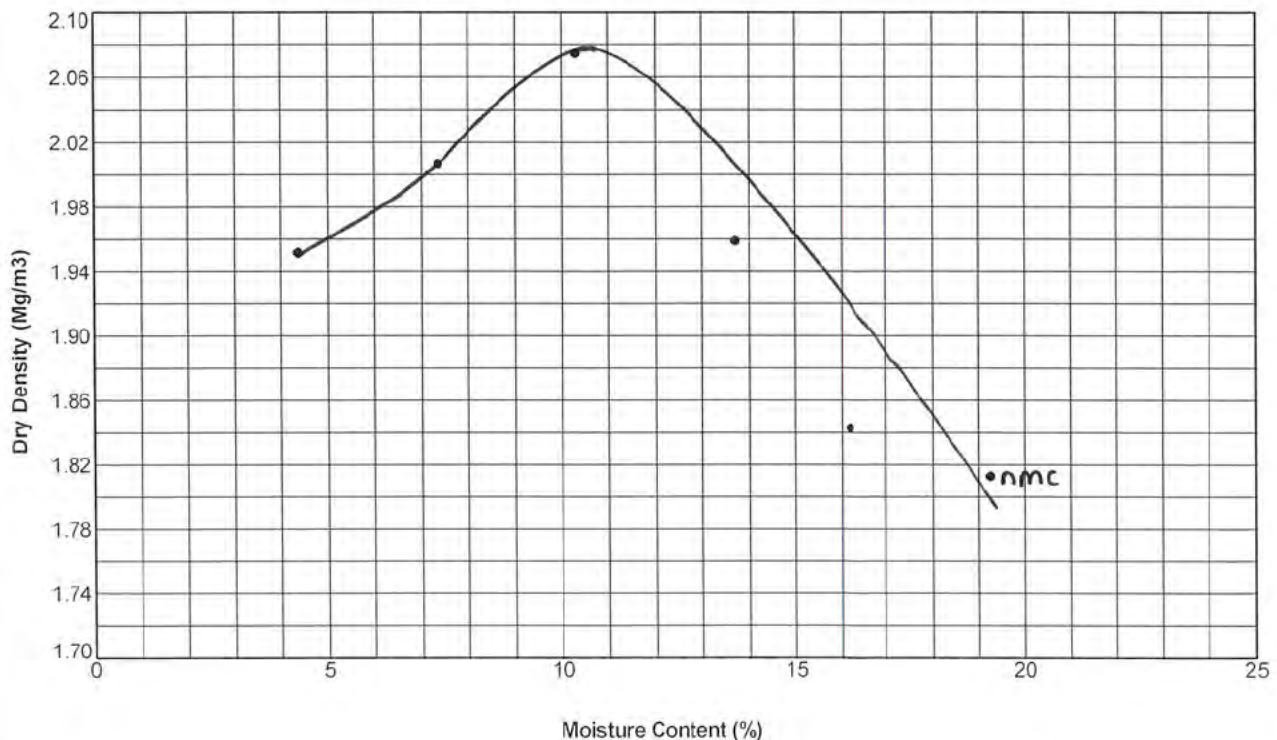
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.08

Retained on 20mm Sieve (%) = 19.2

Date Tested = 19/03/2021

Retained on 37.5mm Sieve (%) = 8.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB002

Depth (m) :- 4.50

Sample Type & No :- B15

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 9.5

Particle Density (Assumed) = 2.70

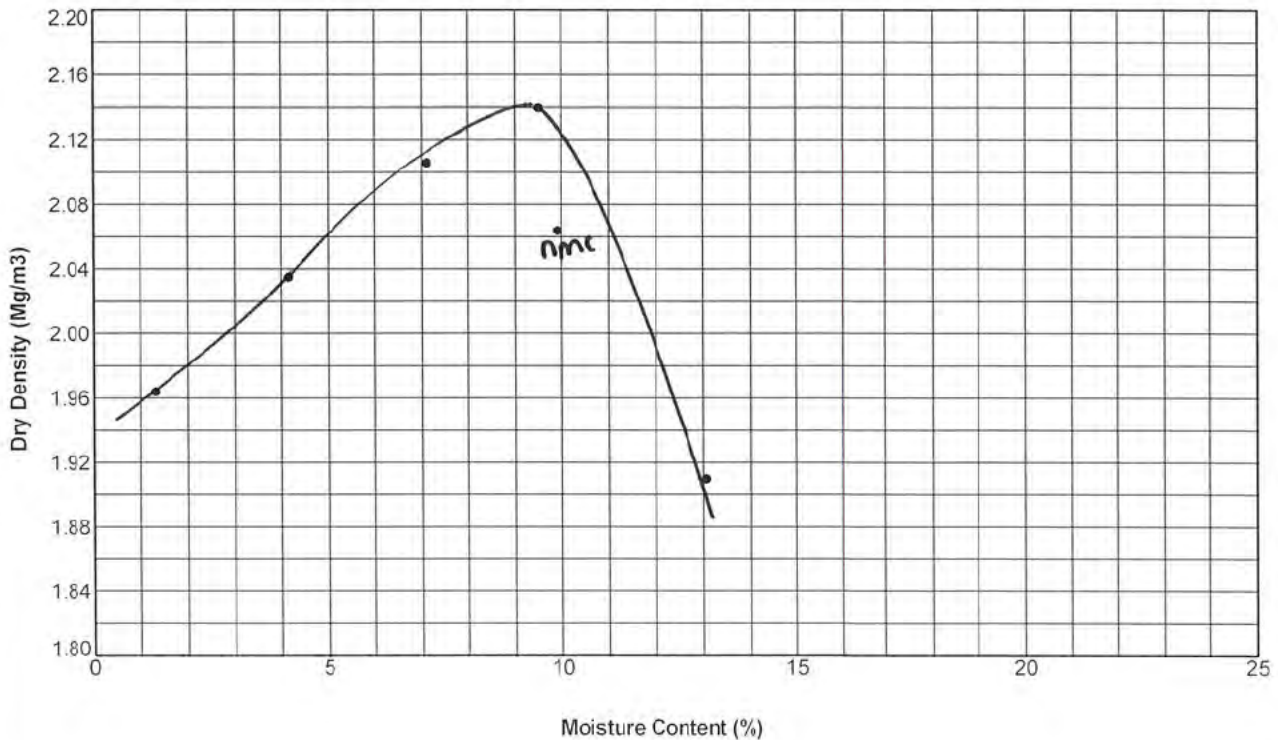
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.14

Retained on 20mm Sieve (%) = 7.1

Date Tested = 18/03/2021

Retained on 37.5mm Sieve (%) = 1.7

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

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Date of

20/04/2021

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB003

Depth (m) :- 0.20

Sample Type & No :- B3

### Test Method

4.5kg Compaction

Separate Samples

### Test Results

Optimum Moisture Content (%) = 18

Particle Density (Measured) = 2.45

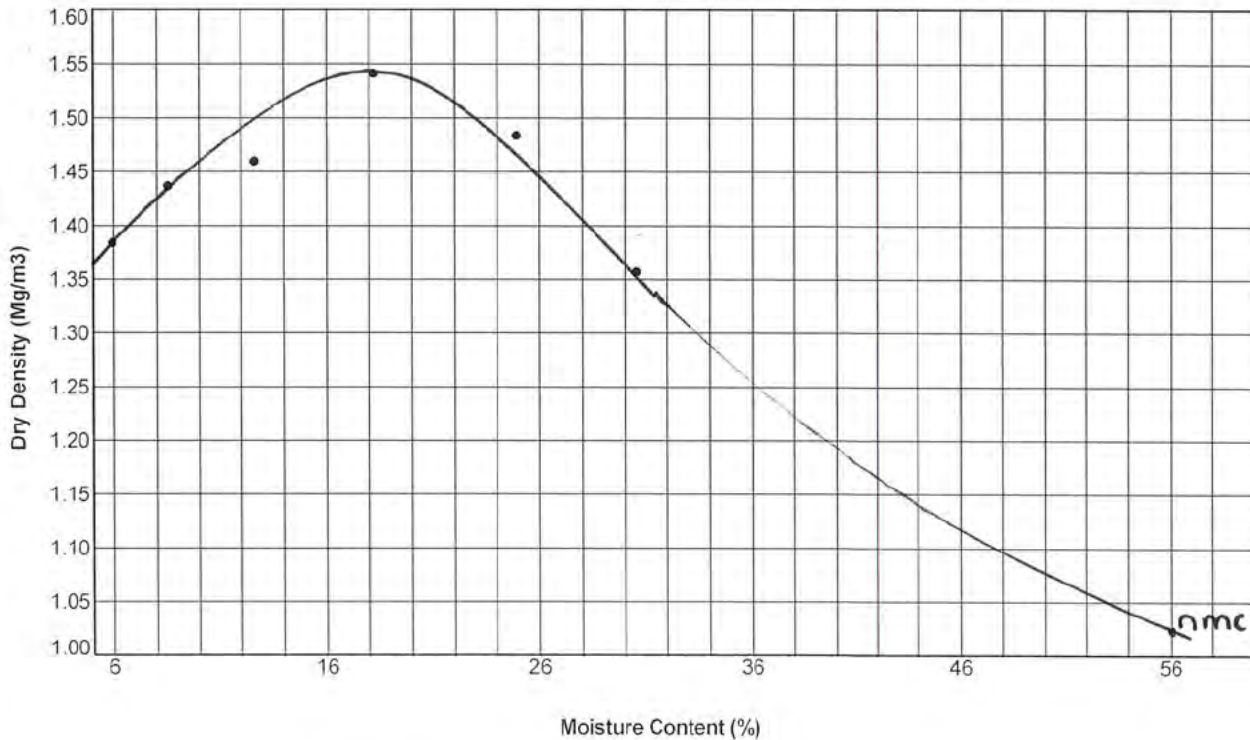
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.54

Retained on 20mm Sieve (%) = 13.0

Date Tested = 24/03/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

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Sign

Date

20/04/2021

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB004

Depth (m) :- 1.50

Sample Type & No :- B7

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 11

Particle Density (Measured) = 2.65

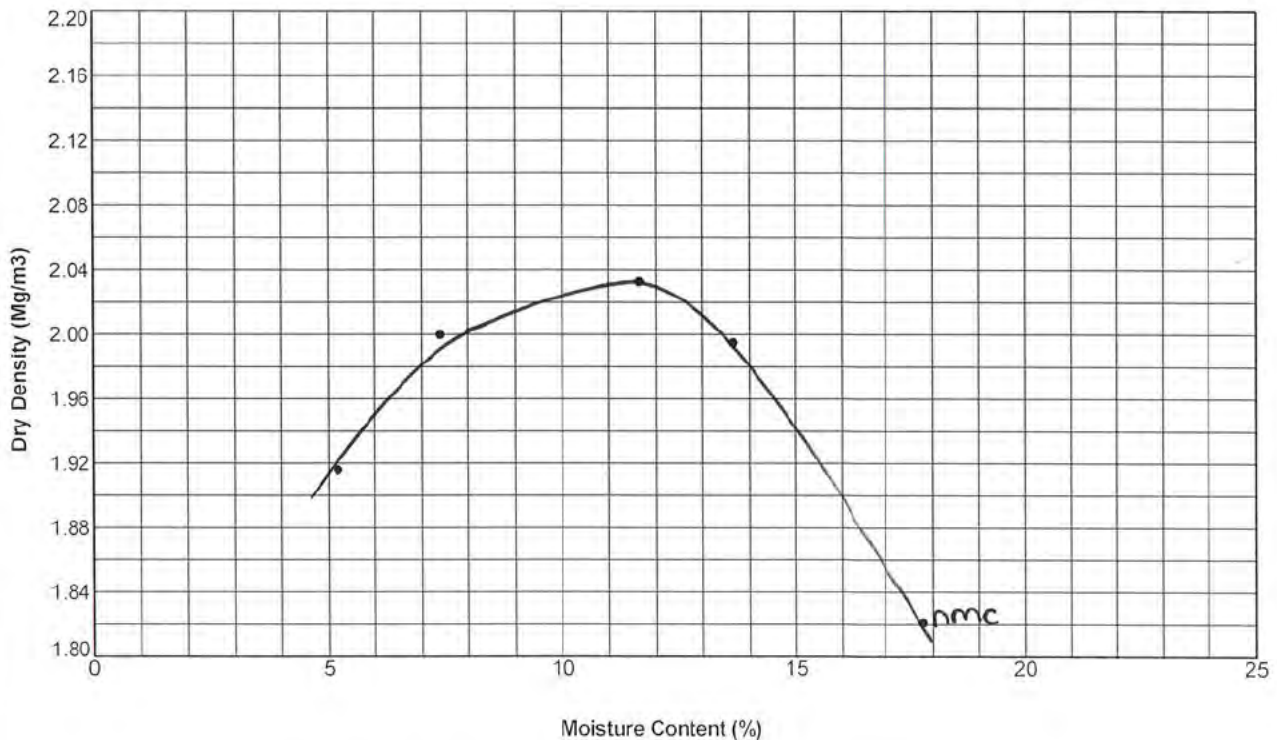
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.03

Retained on 20mm Sieve (%) = 20.2

Date Tested = 13/03/2021

Retained on 37.5mm Sieve (%) = 14.2

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet.

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed

Date of

20/04/2021

COMP/4322C/1

Contract No. :-

4322C

Page 1 of 1



1367



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- **TP BB004**

Depth (m) :- **2.50**

Sample Type & No :- **B9**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **7.0**

Particle Density (Measured) = **2.67**

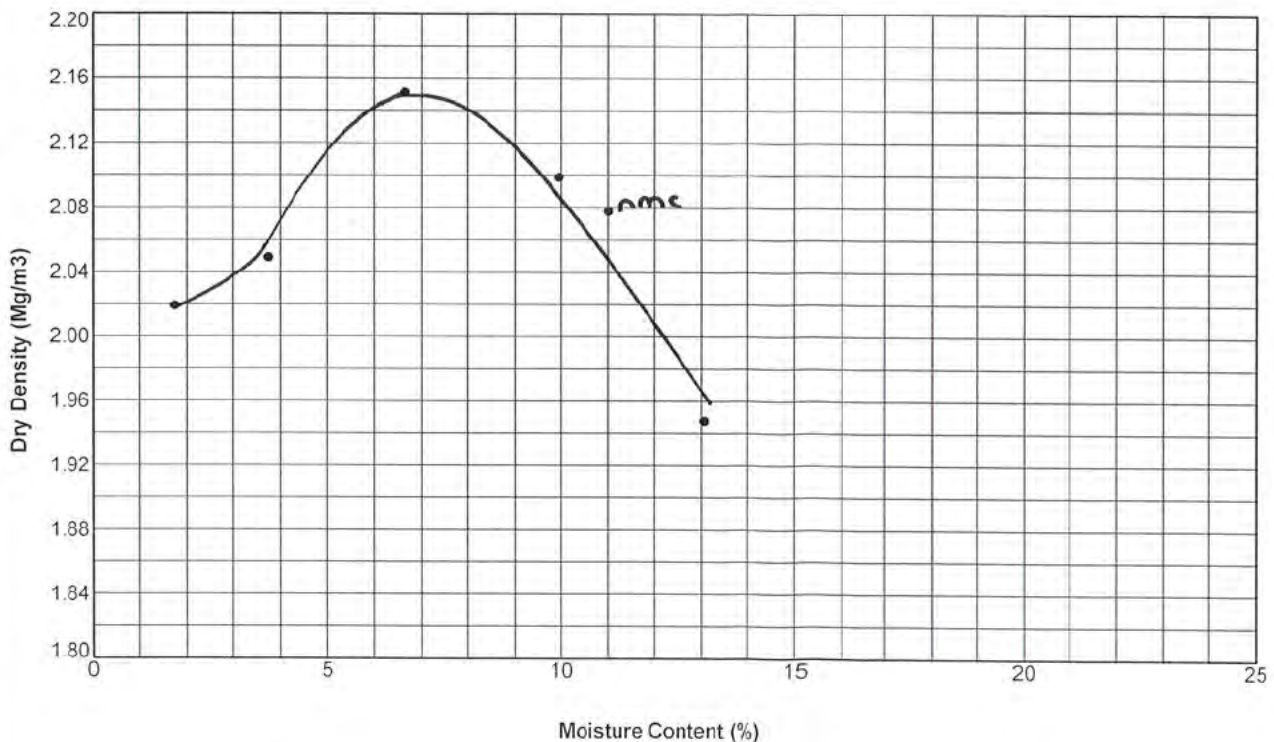
Maximum Dry Density (Mg/m<sup>3</sup>) = **2.15**

Retained on 20mm Sieve (%) = **17.4**

Date Tested = **15/03/2021**

Retained on 37.5mm Sieve (%) = **11.9**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

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Date of issue :-

20/04/2021

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB005

Depth (m) :- 2.00

Sample Type & No :- B9

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 15

Particle Density (Assumed) = 2.65

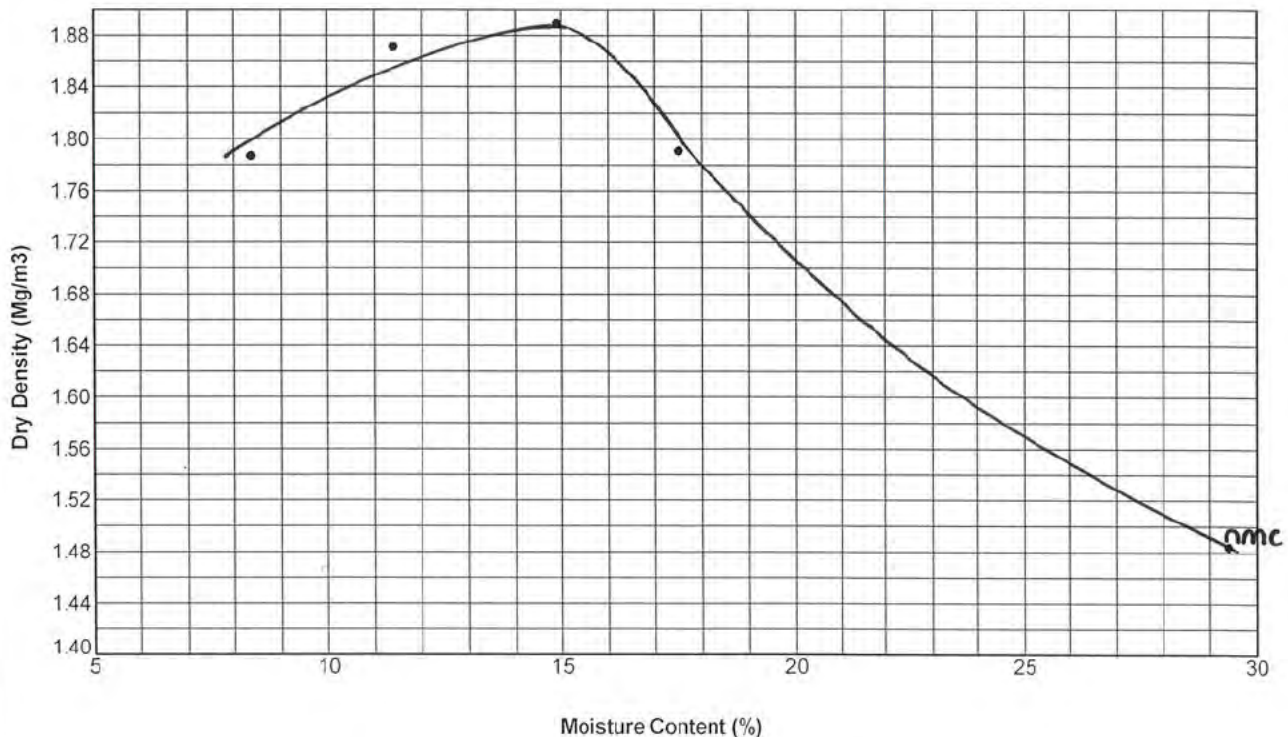
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.89

Retained on 20mm Sieve (%) = 0.0

Date Tested = 26/03/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of Issue :-

20/04/2021

Certificate No. :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- **TP BB007**

Depth (m) :- **0.80**

Sample Type & No :- **B4**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **12**

Particle Density (Assumed) = **2.70**

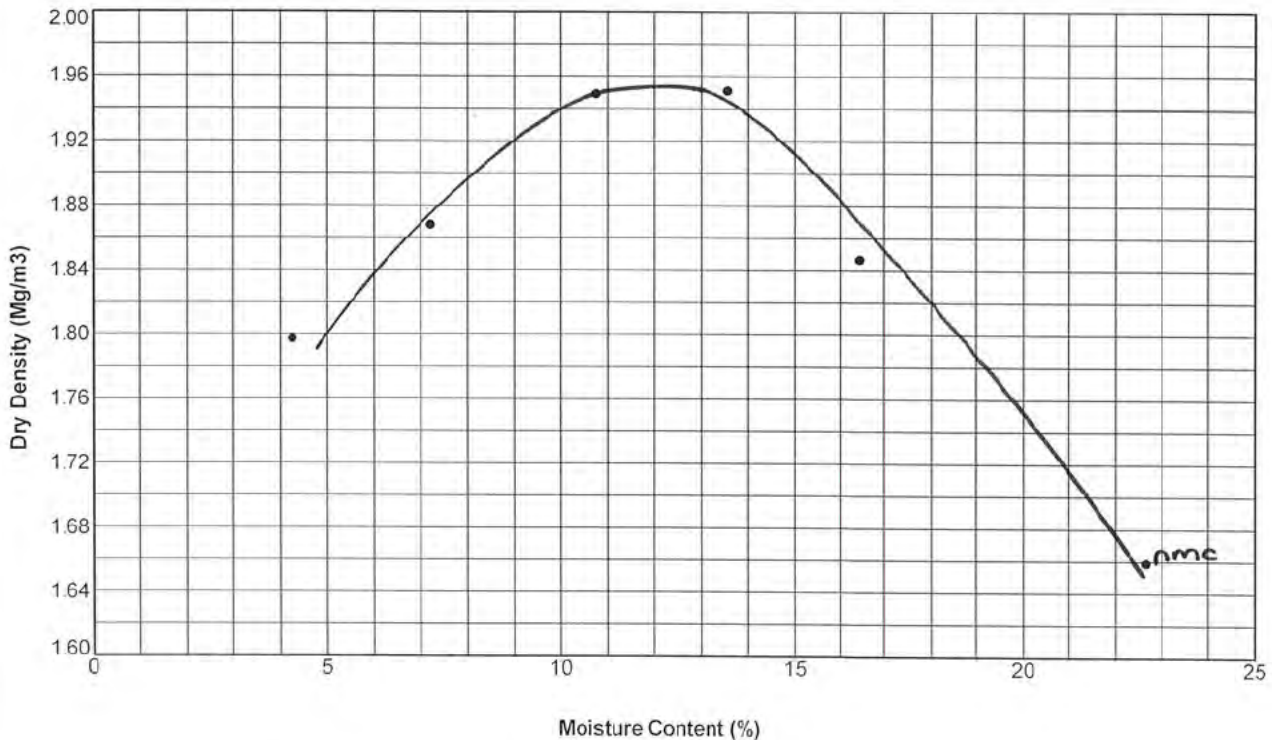
Maximum Dry Density (Mg/m<sup>3</sup>) = **1.95**

Retained on 20mm Sieve (%) = **1.9**

Date Tested = **25/02/2021**

Retained on 37.5mm Sieve (%) = **0.0**

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of issue :-

27/03/2021

Certificate No :-

COMP/4322C/1

AEG Contract No. :-

4322C

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB009

Depth (m) :- 0.80

Sample Type & No :- B4

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 17

Particle Density (Measured) = 2.61

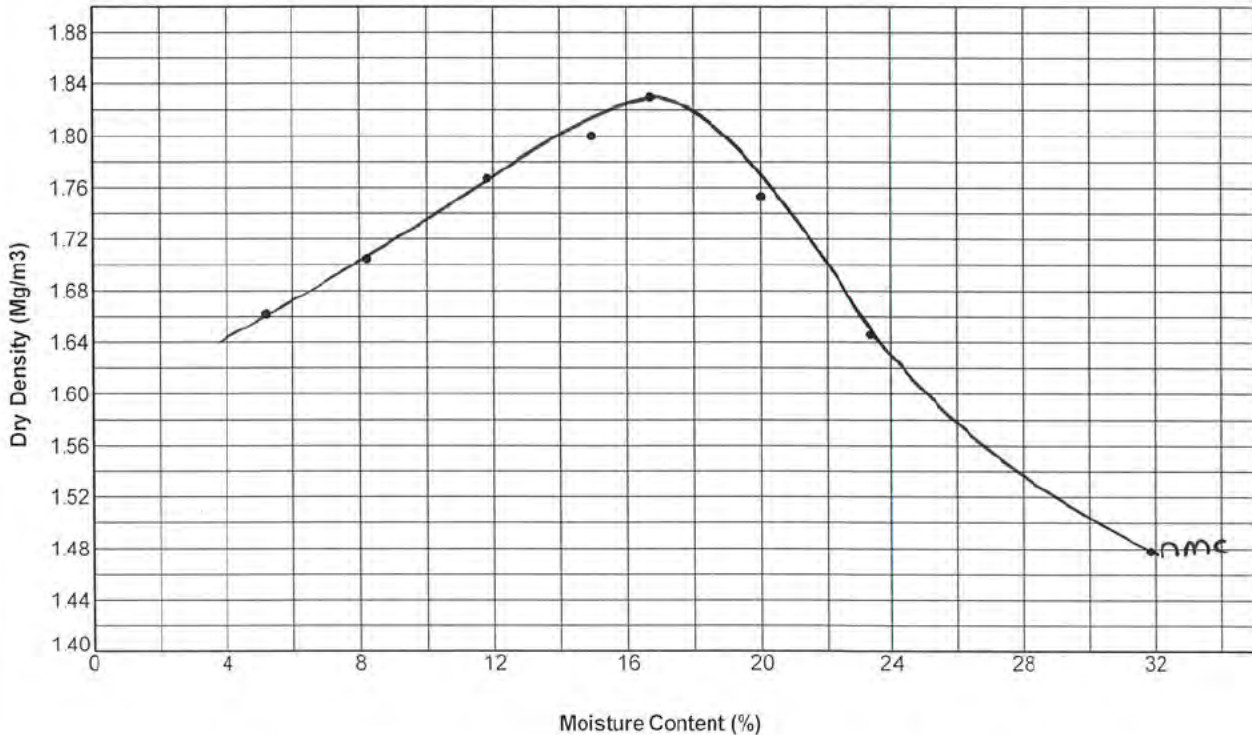
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.83

Retained on 20mm Sieve (%) = 2.0

Date Tested = 20/03/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of Issue :-

31/03/2021

Certificate No :-

COMP/4322C/1

AEG Contract No. :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP BB009

Depth (m) :- 1.80

Sample Type & No :- B7

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 20

Particle Density (Measured) = 2.67

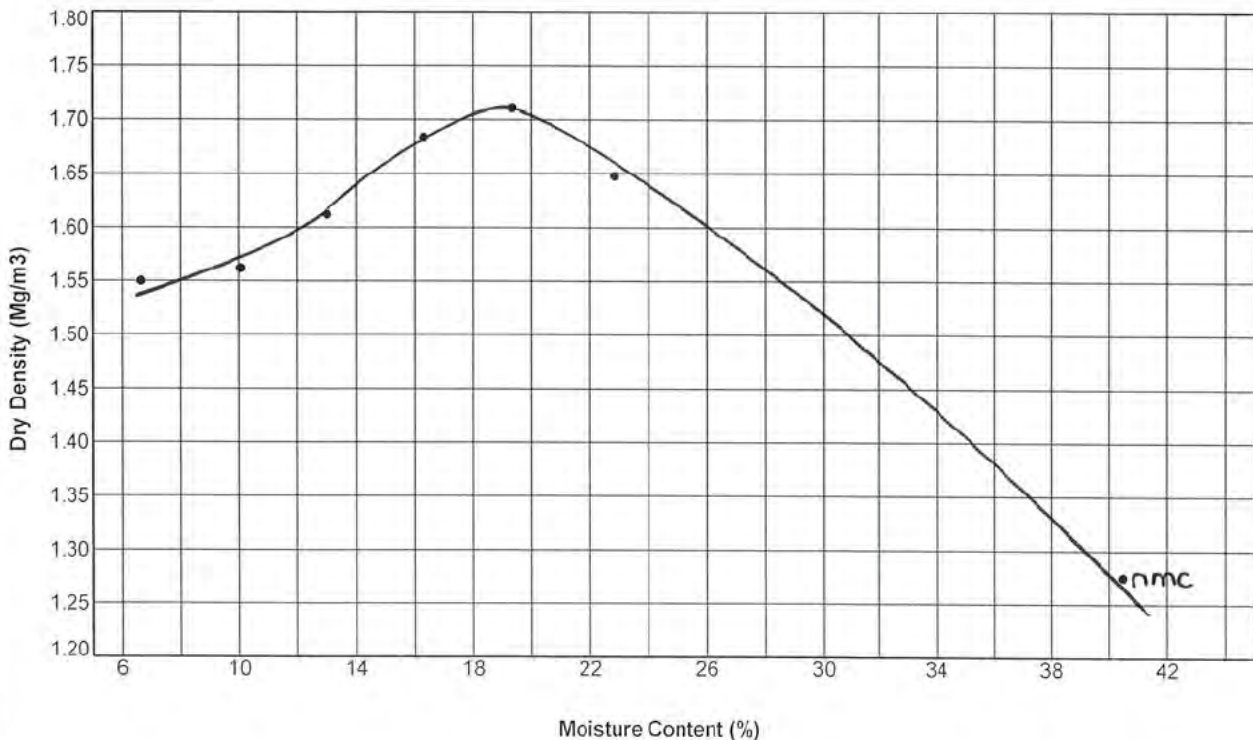
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.71

Retained on 20mm Sieve (%) = 0.0

Date Tested = 22/03/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signature

Date

21/04/2021

COMP/4322C/1

Contract No. :-

4322C

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

**Specimen Identification**

Exploratory Hole No :- **TP BB011**

Depth (m) :- **1.70**

Sample Type & No :- **B7**

**Test Method**

4.5kg Compaction

Single Sample

**Test Results**

Optimum Moisture Content (%) = **12**

Particle Density (Measured) = **2.65**

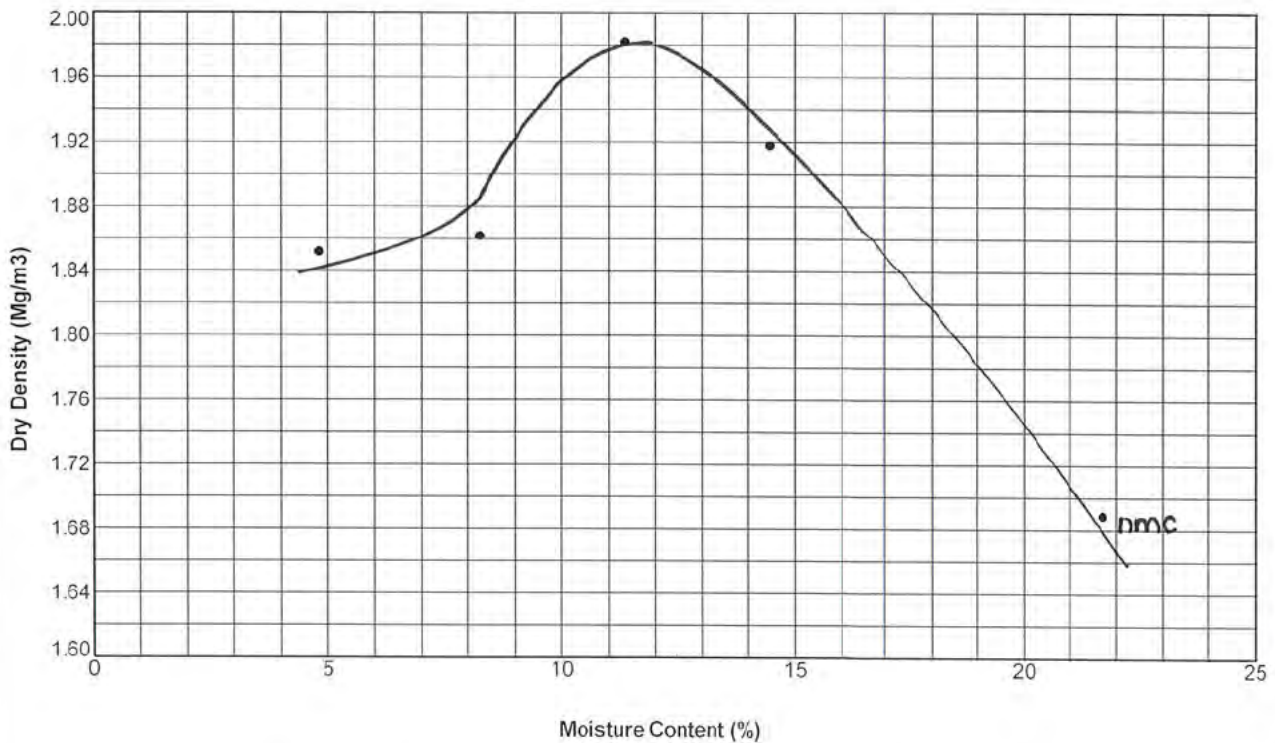
Maximum Dry Density (Mg/m<sup>3</sup>) = **1.98**

Retained on 20mm Sieve (%) = **7.4**

Date Tested = **20/04/2021**

Retained on 37.5mm Sieve (%) = **1.5**

Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of

06/05/2021

COMP/4322C/1

AMEG Contract No. :-  
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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990 (Test deviated from standard due to excessive coarse material)

### Specimen Identification

Exploratory Hole No :- **TP BB013**

Depth (m) :- **0.80**

Sample Type & No :- **B6**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **9.0**

Particle Density (Measured) = **2.63**

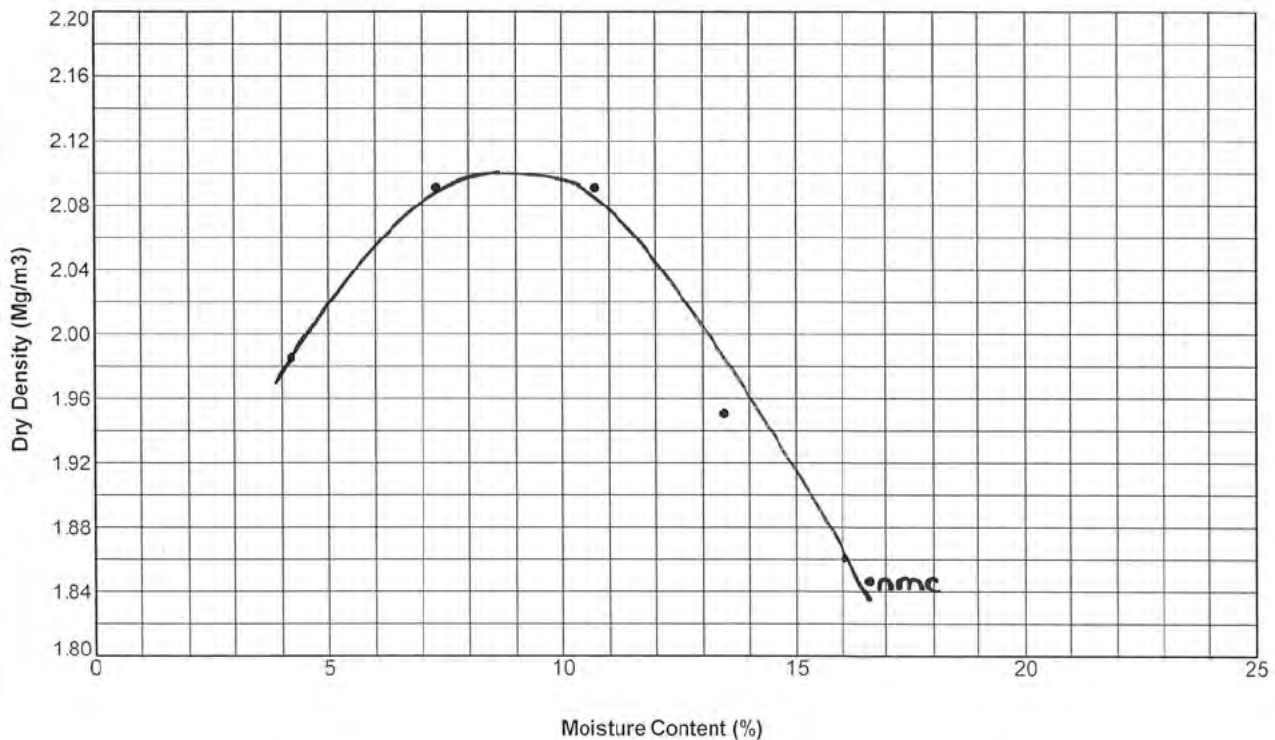
Maximum Dry Density (Mg/m<sup>3</sup>) = **2.10**

Retained on 20mm Sieve (%) = **23.4**

Date Tested = **25/02/2021**

Retained on 37.5mm Sieve (%) = **16.7**

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of

30/03/2021

COMP/4322C/1

Contract No. :-

4322C

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- **TP BB014**

Depth (m) :- **0.80**

Sample Type & No :- **B5**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **10**

Particle Density (Measured) = **2.64**

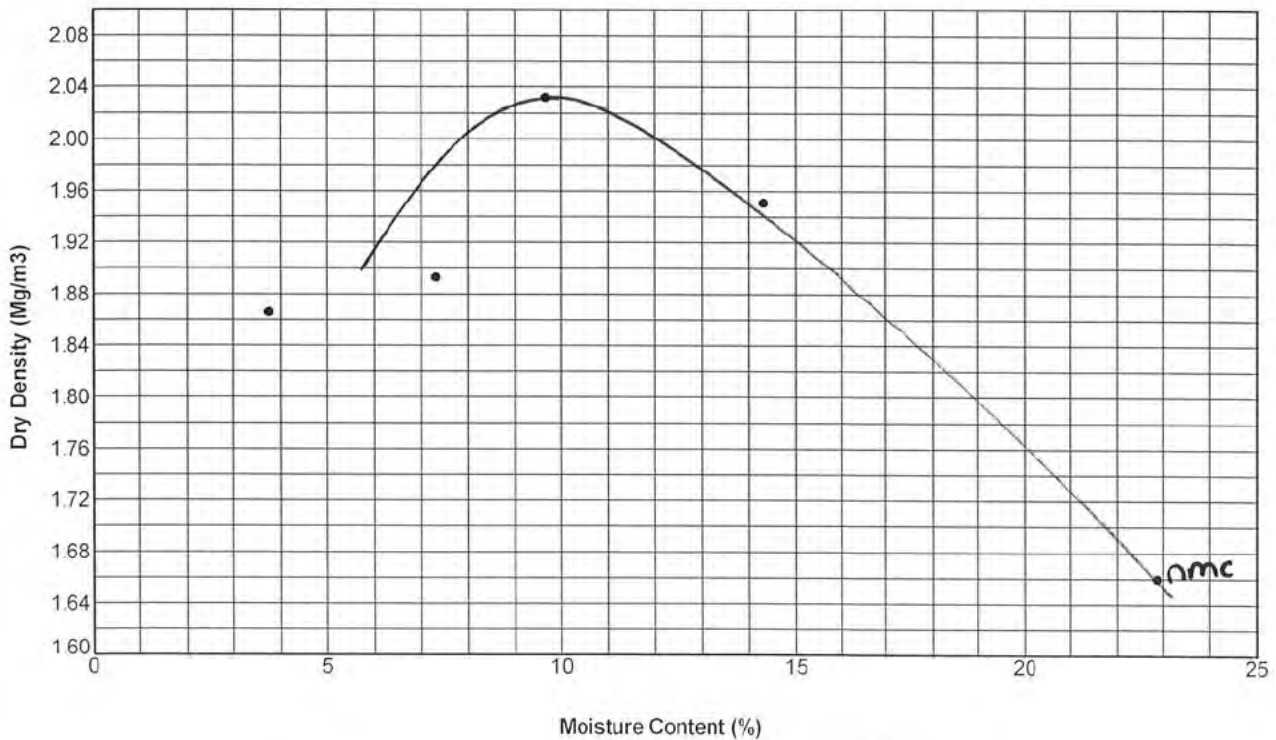
Maximum Dry Density (Mg/m<sup>3</sup>) = **2.04**

Retained on 20mm Sieve (%) = **12.2**

Date Tested = **29/03/2021**

Retained on 37.5mm Sieve (%) = **4.9**

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signature

Date

20/04/2021

COMP/4322C/1

Contract No. :-

4322C

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## Determination of Moisture Condition Value



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

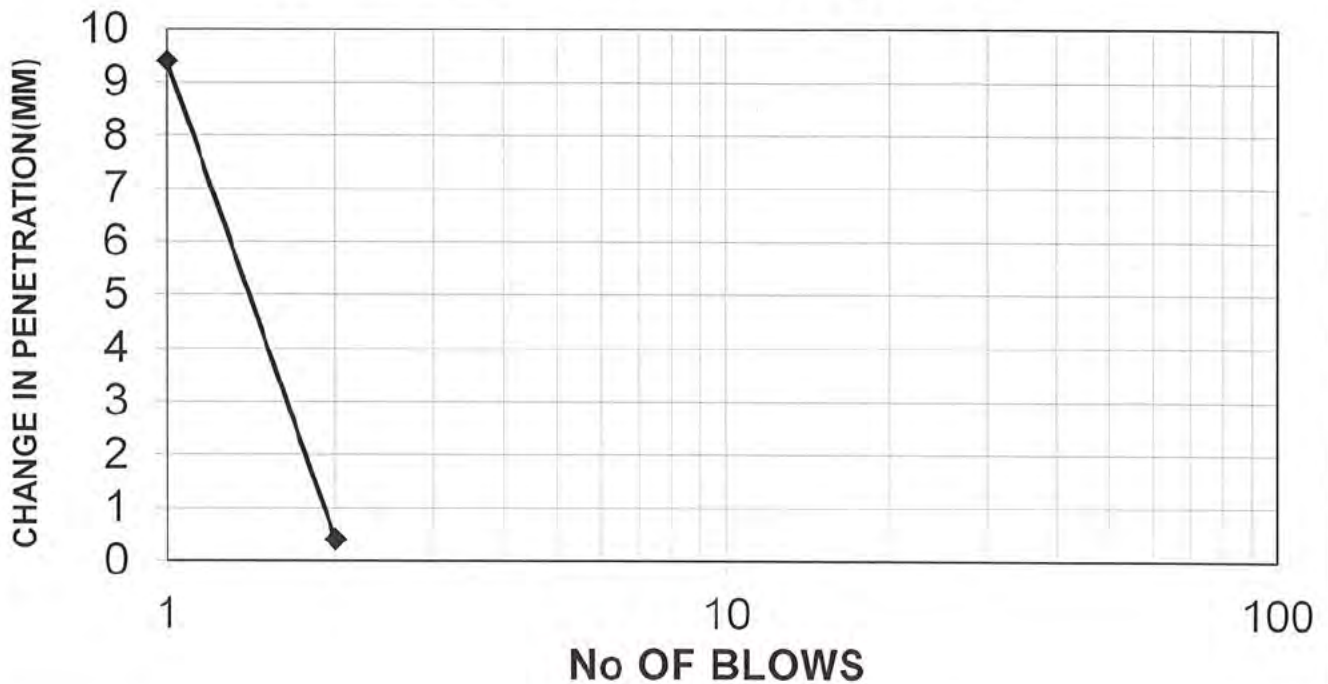


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	1.00m
<b>Sample No:</b>	BH BB005 B6	<b>Specific Depth:</b>	N/A

**For sample description please refer to sample description sheet.**

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	1.6
M.C.(%)	31
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 17.1% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk





**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

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 a UKAS Testing Laboratory No.1367



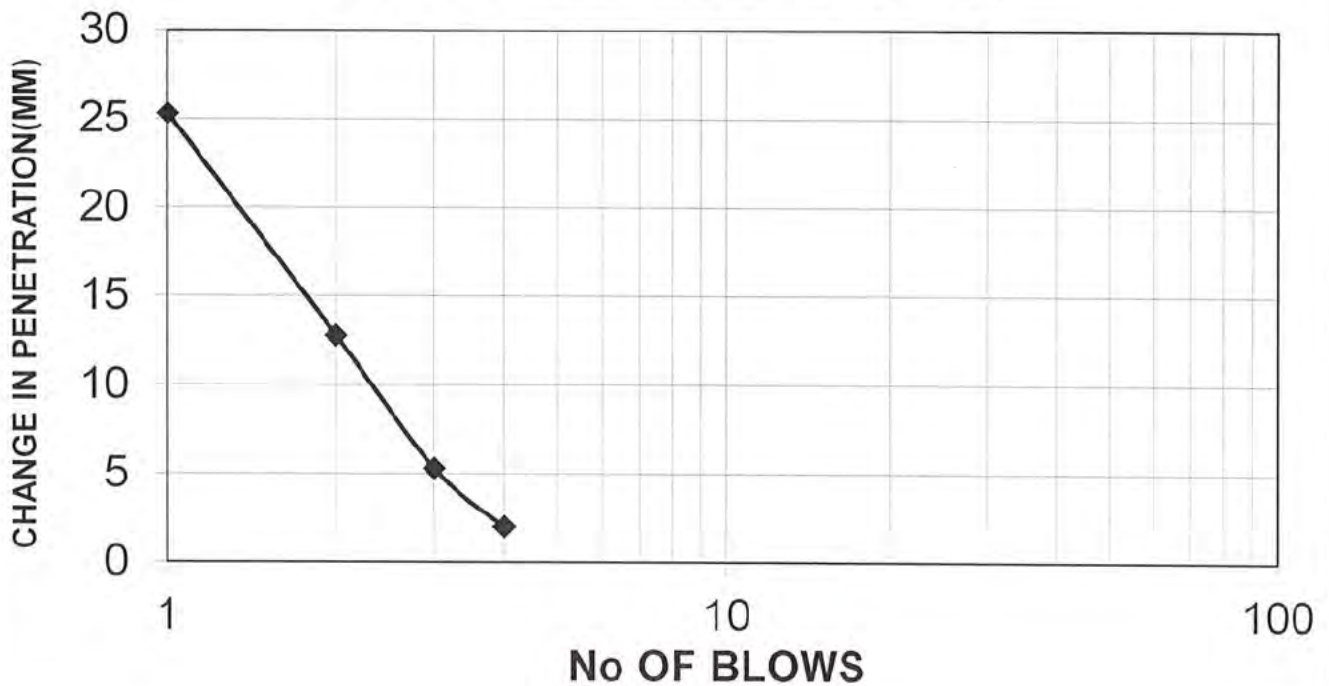
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.00m  
**Sample No:** BH BB006 B6      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	NAT
MCV	5.0
M.C.(%)	24
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 10.7% Retained on 20mm sieve

DATE TESTED: 31/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:



NAME: Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

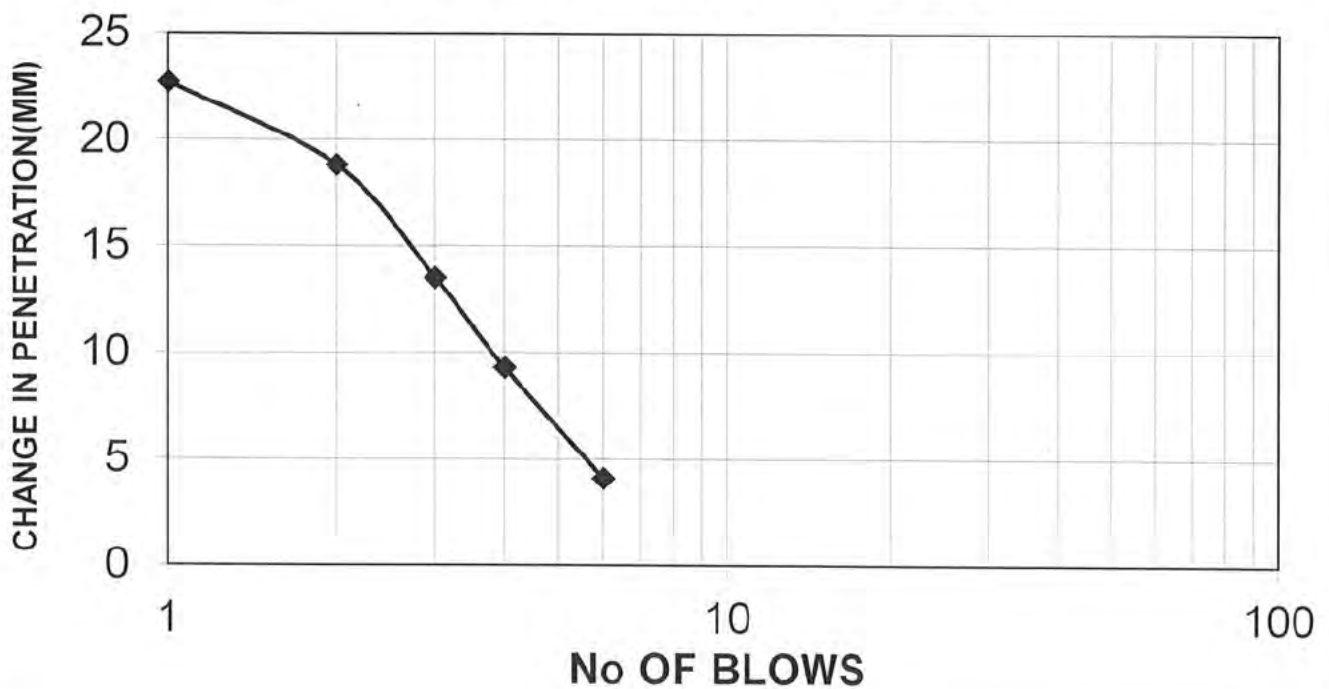


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 3.20m  
**Sample No:** BH BB007 B11      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	7.5
M.C.(%)	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 4.3% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell

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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

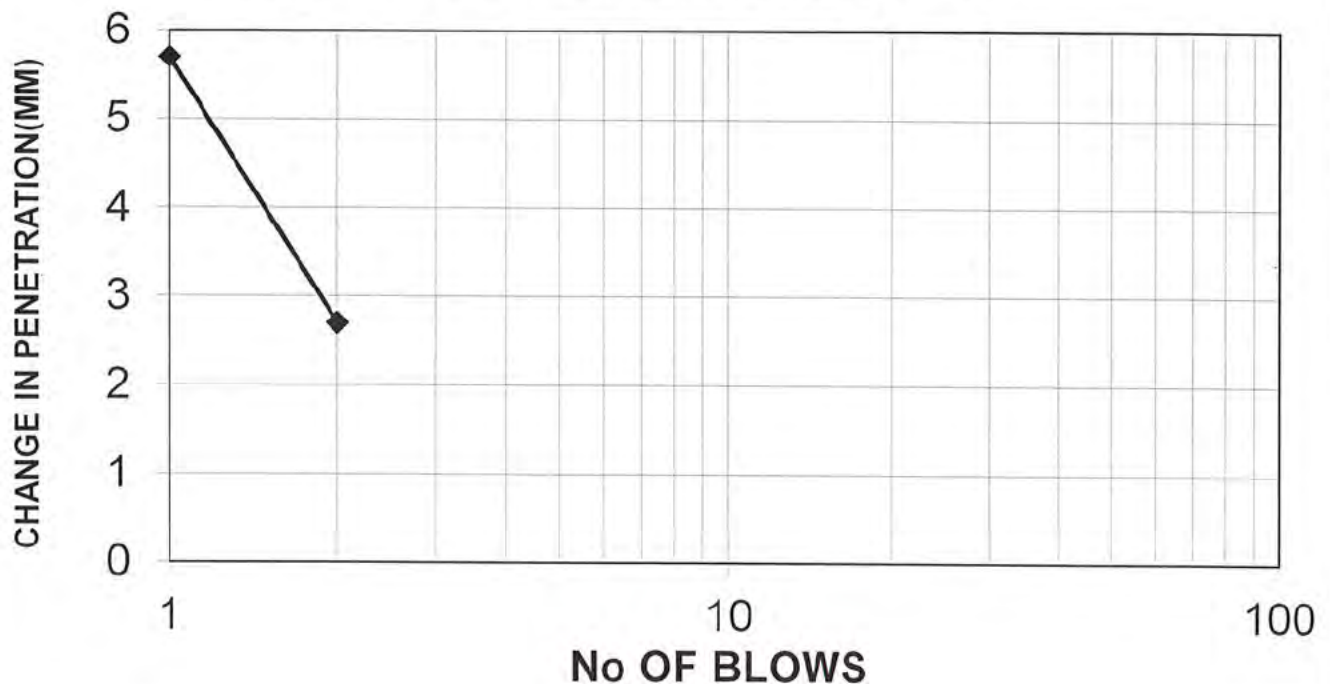
**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C

**CLIENT:** AMEY OW Limited      **Depth:** 0.70m

**Sample No:** BH BB009 B3      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	0.8
M.C.(%)	24
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 20.2% Retained on 20mm sieve

DATE TESTED: 31/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell

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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7

**JOB No:** 4322C

**CLIENT:** AMEY OW Limited

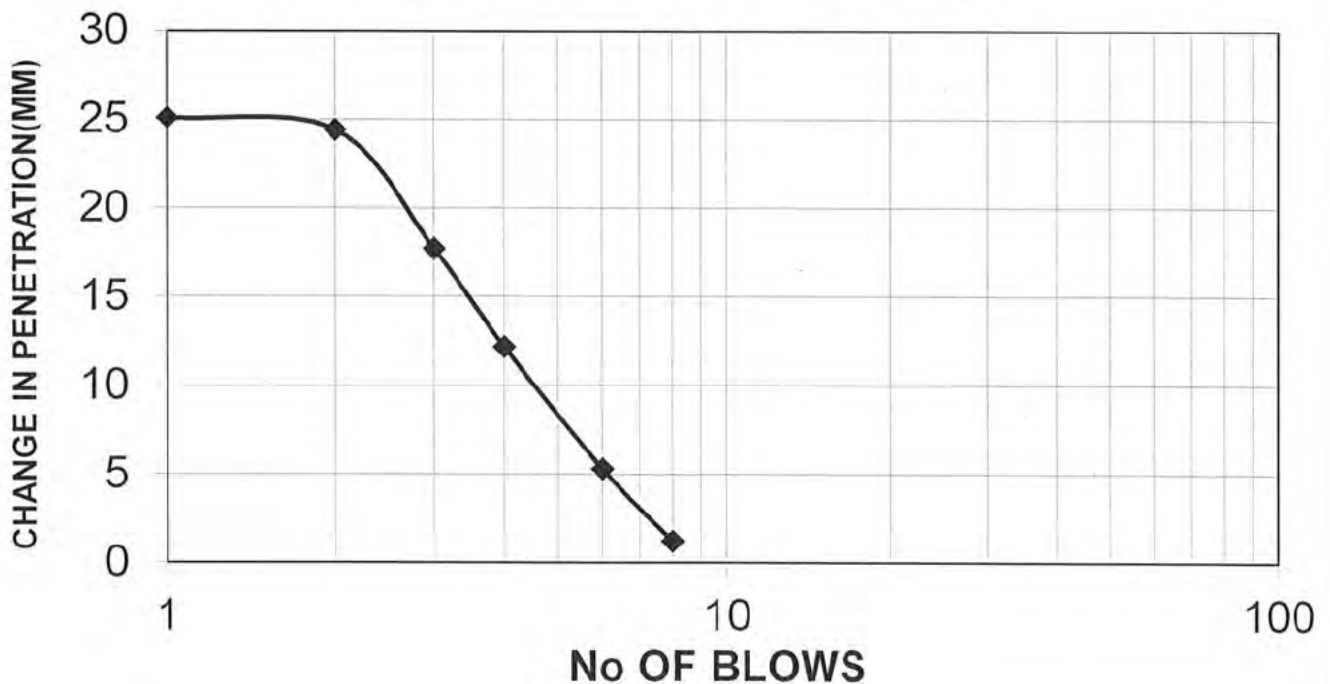
**Depth:** 1.50m

**Sample No:** BH BB009 B6

**Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	7.8
M.C.(%)	17
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 9.1% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk





**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

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 a UKAS Testing Laboratory No.1367



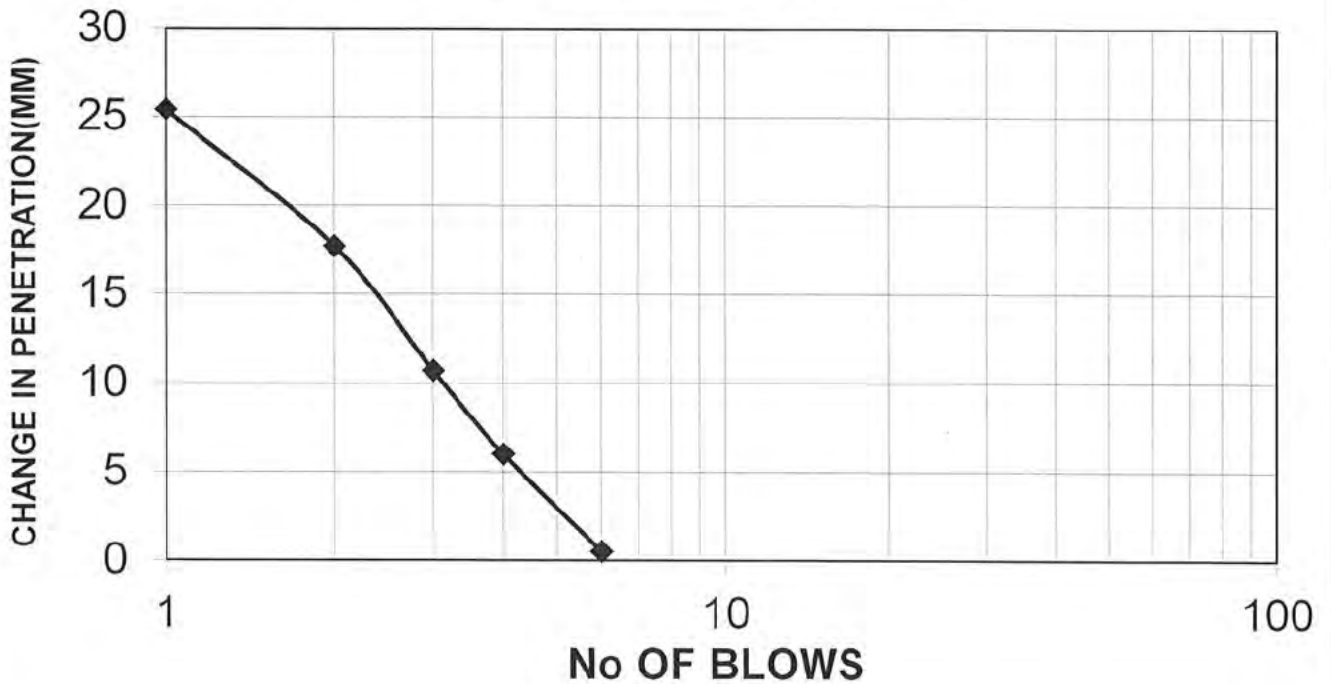
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 3.40m  
**Sample No:** BH BB013 B16      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	NAT
MCV	5.5
M.C.(%)	14
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 4.8% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:



NAME: Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

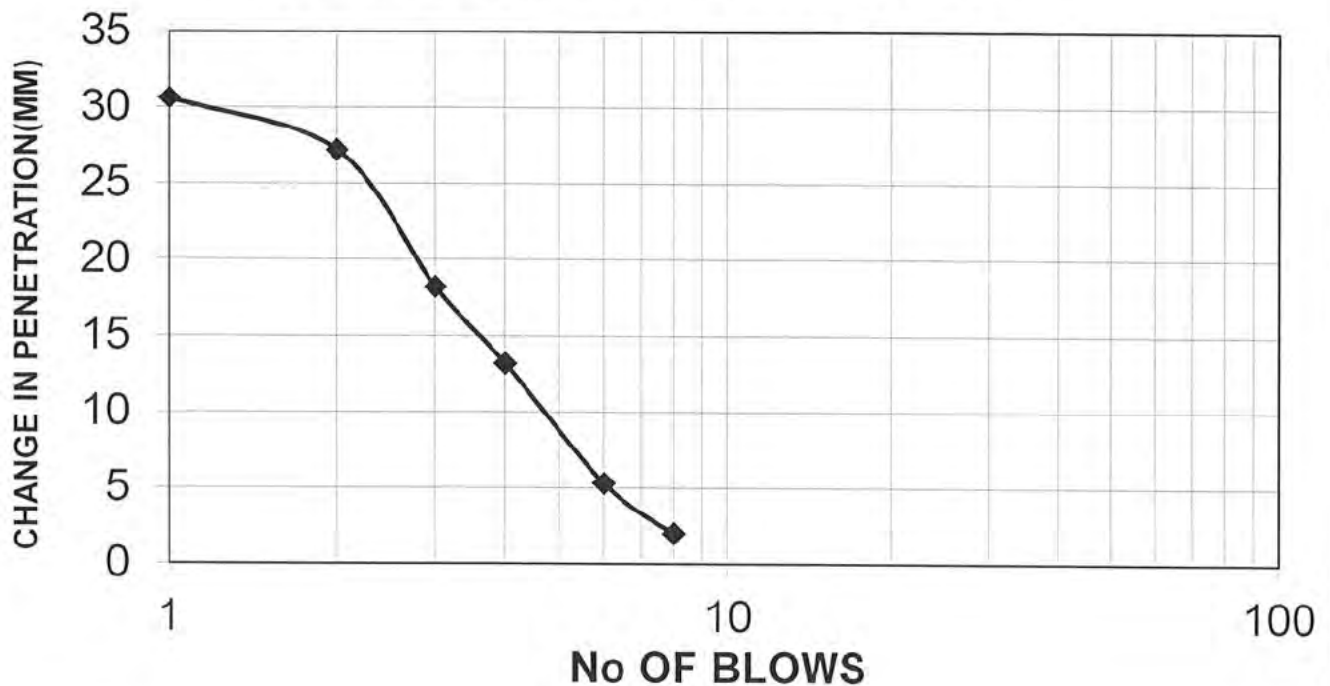


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 4.40m  
**Sample No:** BH BB013 B20      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	8.0
M.C.(%)	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 7.7% Retained on 20mm sieve

DATE TESTED: 31/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell

Chester-le-Street , Co Durham DH2 2RG

a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

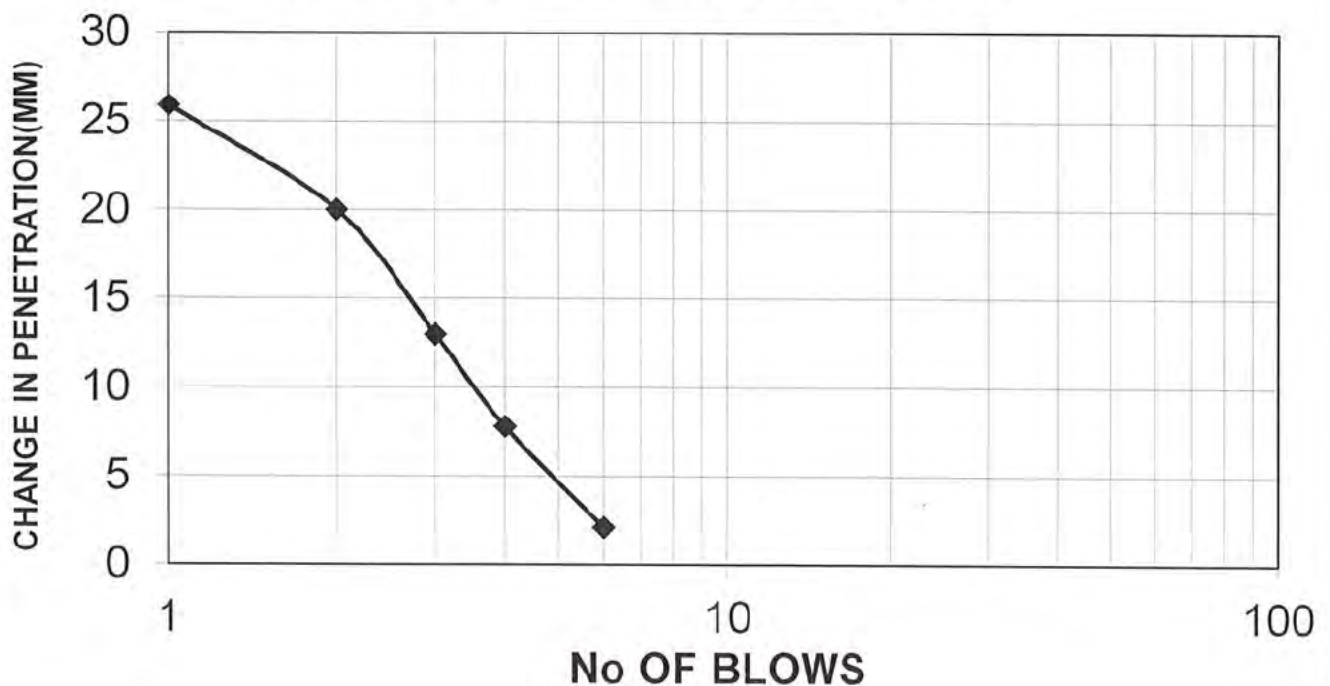
**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C

**CLIENT:** AMEY OW Limited      **Depth:** 1.30m

**Sample No:** BH BB015 B10      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	6.8
M.C.(%)	20
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 3.0% Retained on 20mm sieve

DATE TESTED: 31/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

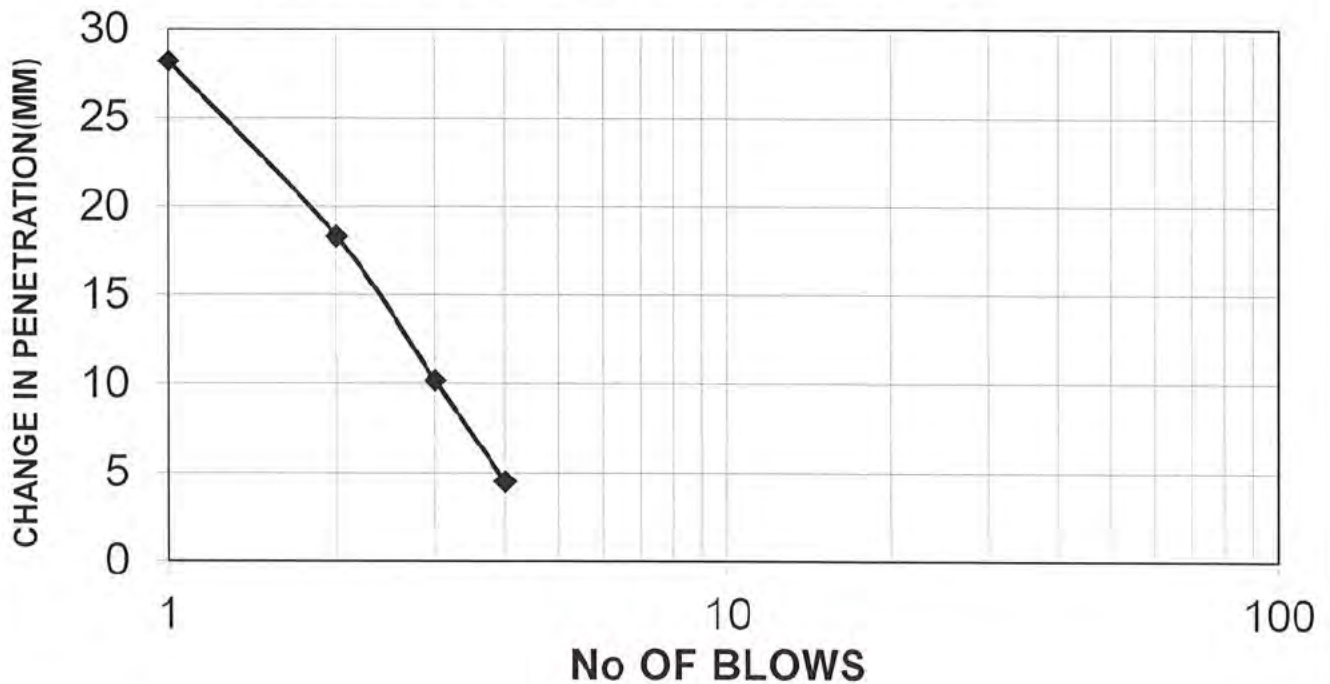


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.20m  
**Sample No:** BH BB017 B8      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	5.9
M.C.(%)	42
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 0% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY

NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

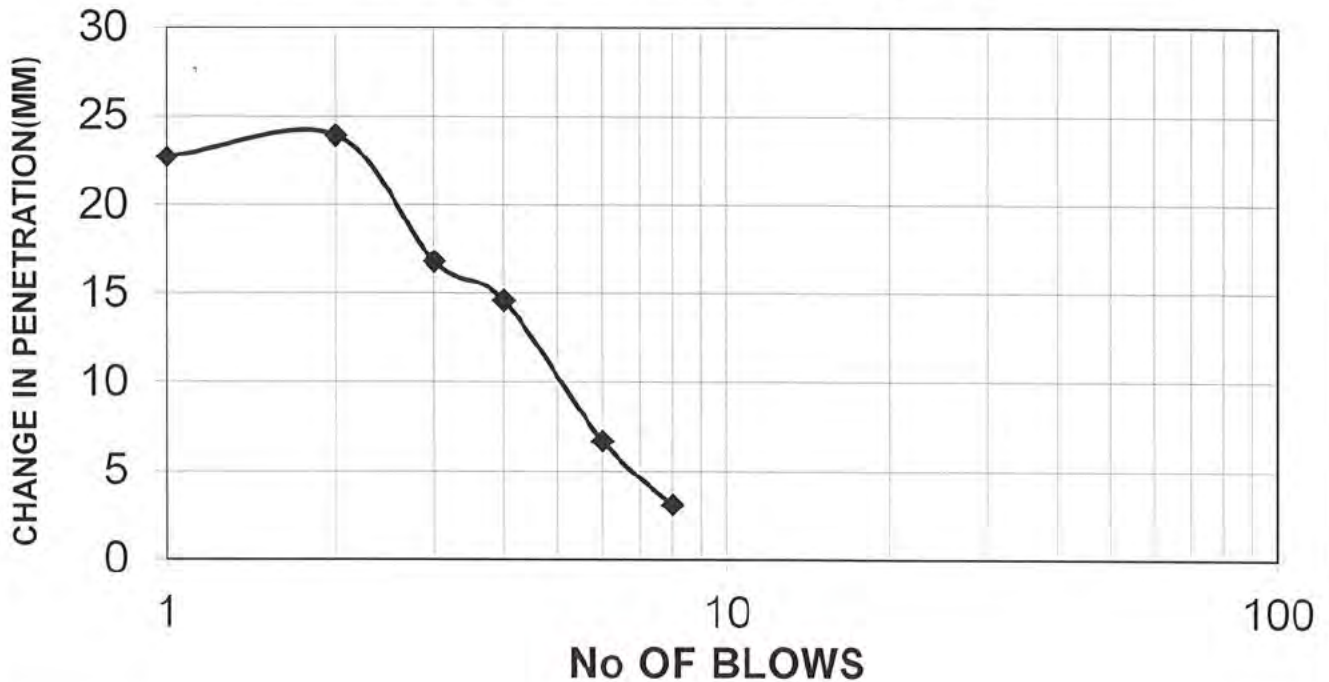


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 2.50m  
**Sample No:** TP BB002 B10      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	7.0
M.C.(%)	18
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 4.5% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:



NAME: Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

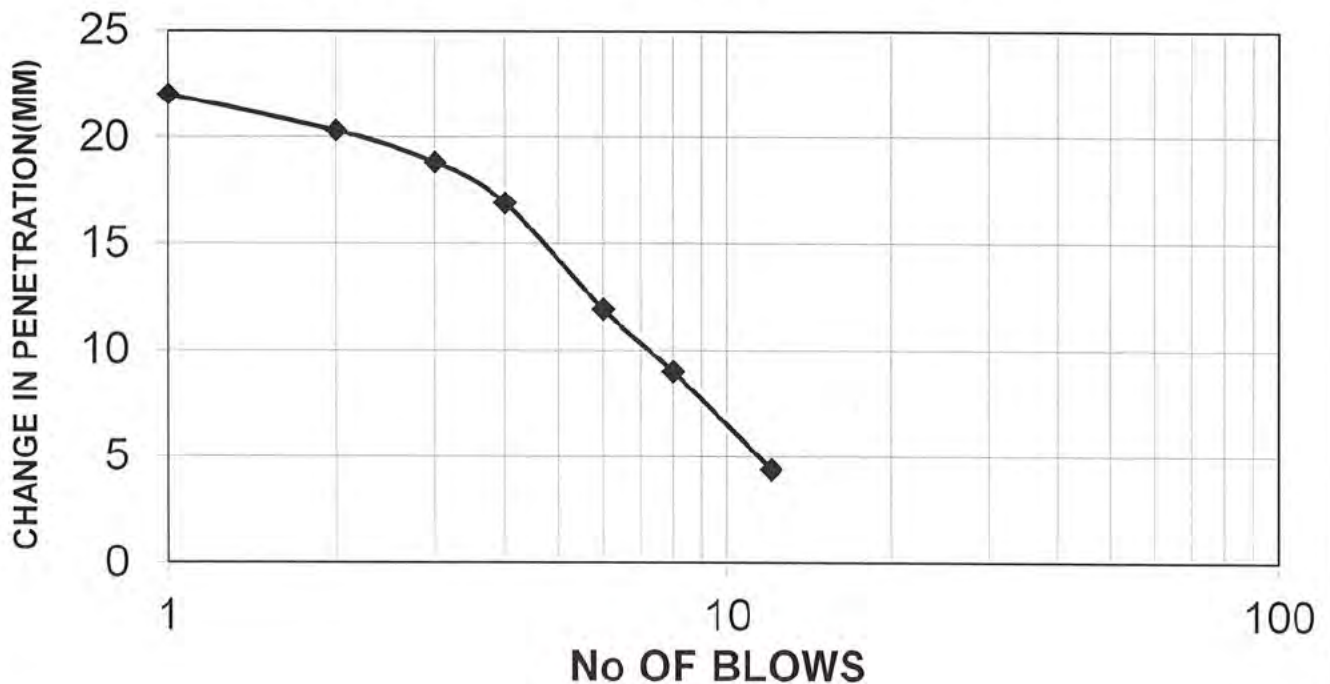
**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C

**CLIENT:** AMEY OW Limited      **Depth:** 4.50m

**Sample No:** TP BB004 B14      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	10.6
M.C.(%)	10
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

Remarks: 5.8% Retained on 20mm sieve

DATE TESTED: 30/03/2021

DATE OF ISSUE: 06/04/2021

APPROVED BY:

NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

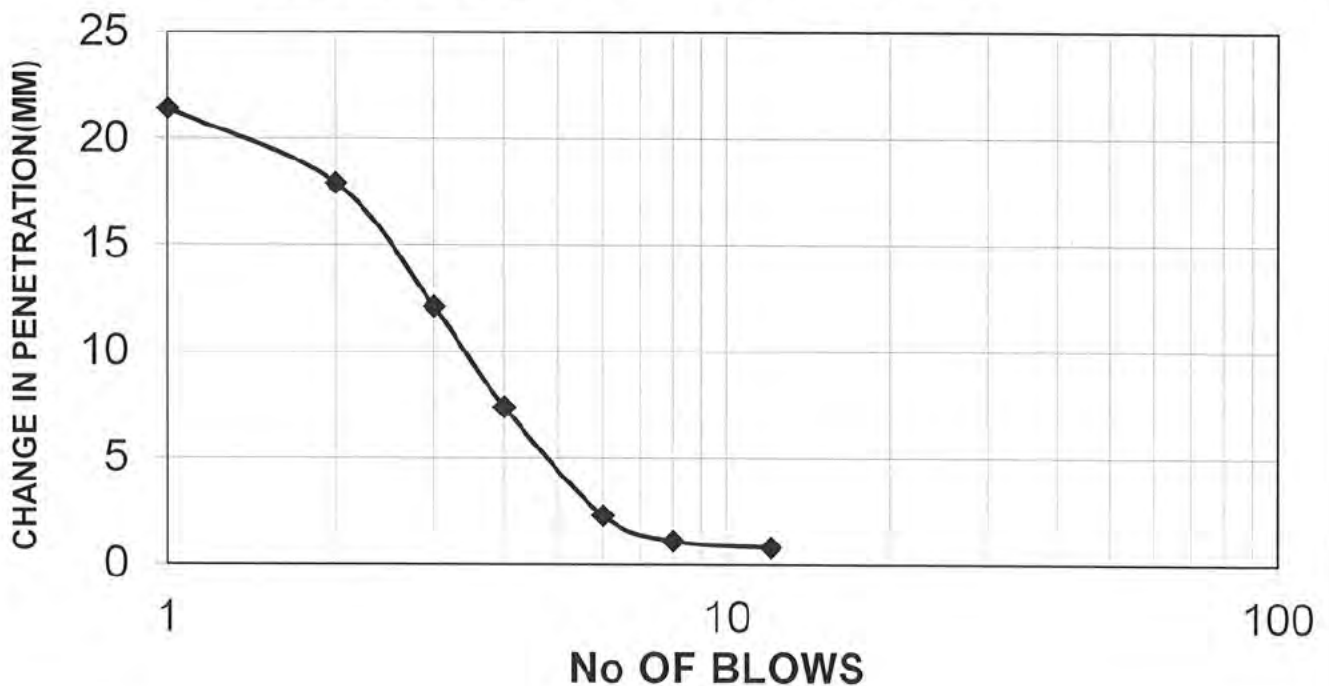


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	1.40m
<b>Sample No:</b>	TP BB008 B7	<b>Specific Depth:</b>	N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	6.9
M.C.(%)	24
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 8.3% Retained on 20mm sieve  
Insufficient sample for 5 point test

DATE TESTED: 25/03/2021

DATE OF ISSUE: 07/04/2021

APPROVED BY:

NAME: Michelle Selkirk



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

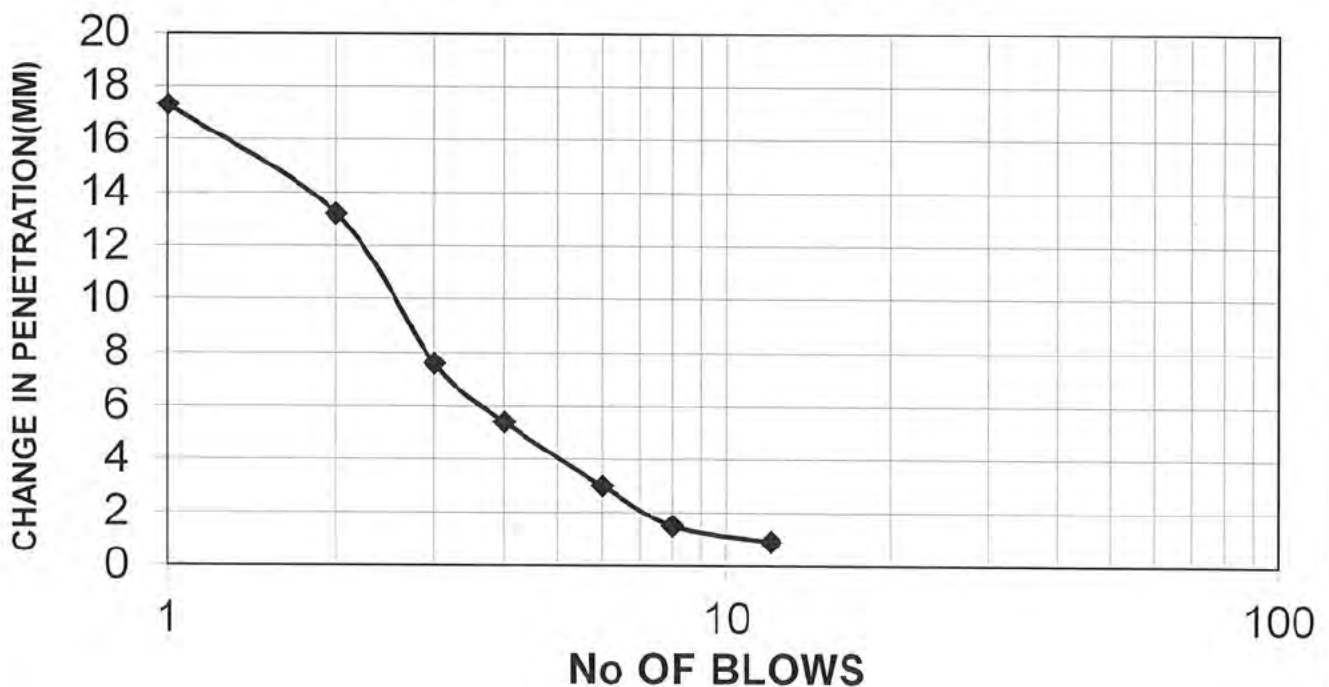


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.30m  
**Sample No:** WS BB001 B3      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	6.3
M.C.(%)	44
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 3.0% Retained on 20mm sieve  
Insufficient sample for 5 point test

DATE TESTED: 17/03/2021

DATE OF ISSUE: 23/04/2021

APPROVED BY

NAME: Michelle Selkirk



## Determination of MCV/Moisture Relationship



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

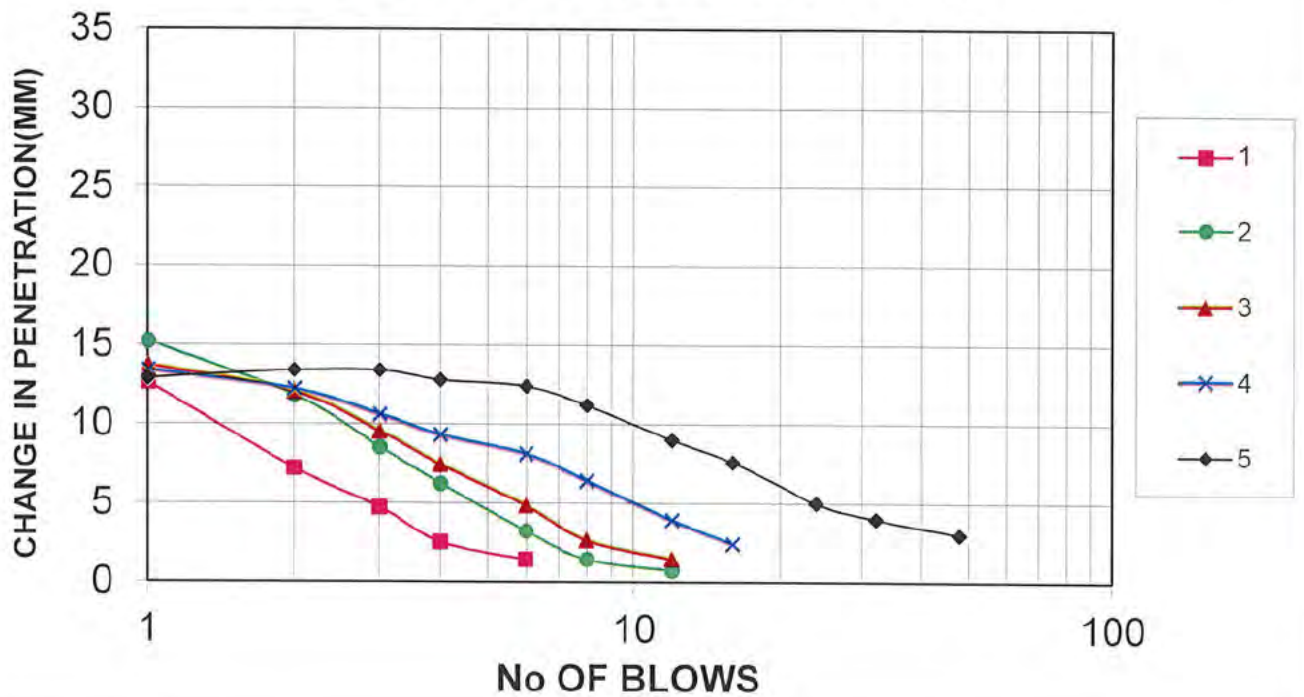


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.40m  
**Sample No:** BH BB002 B3      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4 (NAT)	5
MCV	4.6	6.7	7.8	10.0	13.8
M.C.(%)	12	12	10	10	7.3
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 32.7% Retained on 20mm sieve.

DATE TESTED: 19/03/2021

DATE OF ISSUE: 27/04/2021

APPROVED BY:



NAME: Michelle Selkirk





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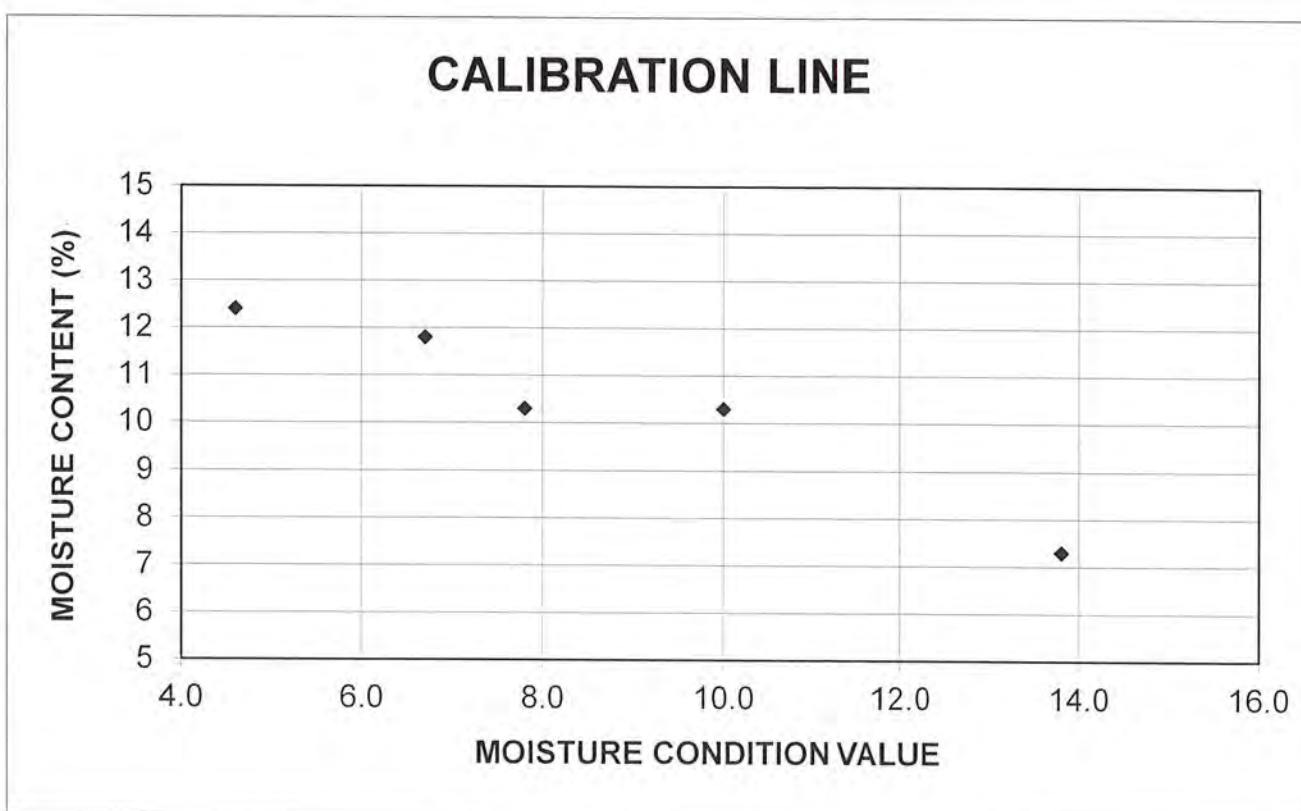
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.40m  
**Sample No:** BH BB002 B3      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**



Sample	1	2	3	4 (NAT)	5
MCV	4.6	6.7	7.8	10.0	13.8
M.C.(%)	12	12	10	10	7
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>			15.10	<b>REMARKS:</b>	
<b>SLOPE</b>			-0.545		
<b>SENSITIVITY (1/SLOPE)</b>			-1.835		



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7

**JOB No:** 4322C

**CLIENT:** AMEY OW Limited

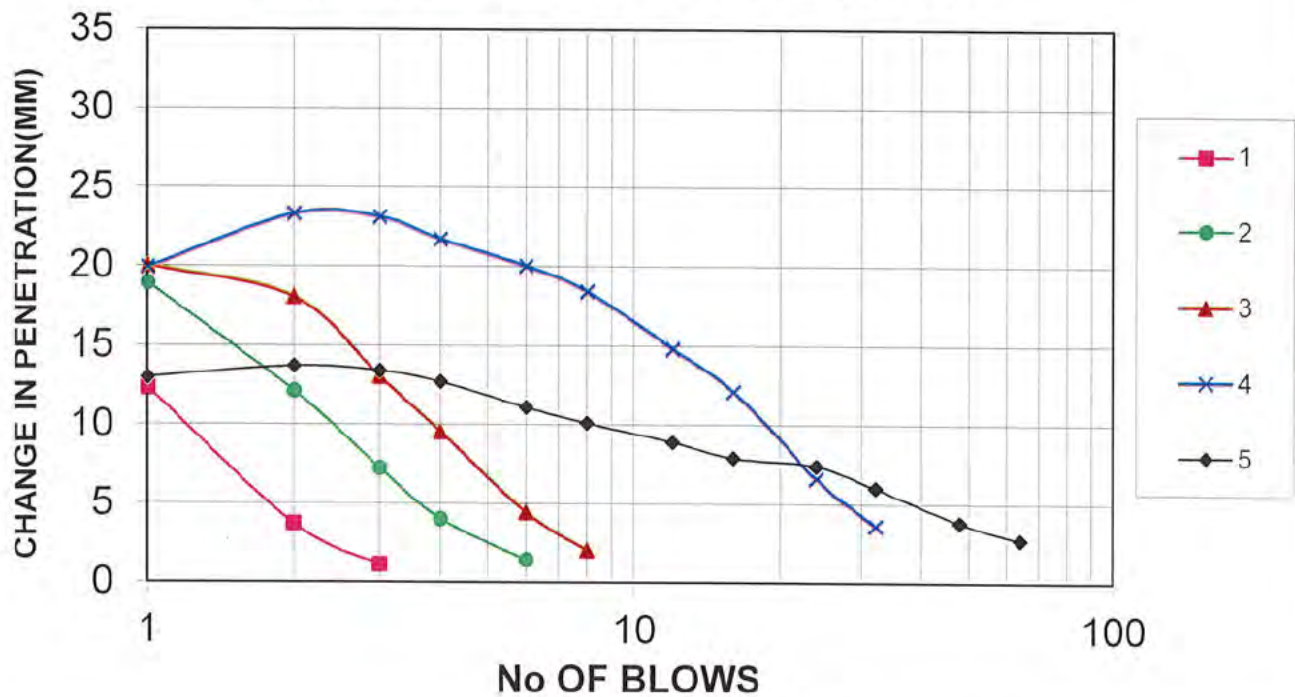
**Depth:** 1.00m

**Sample No:** BH BB003 B5

**Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1 (NAT)	2	3	4	5
MCV	2.6	5.6	7.6	14.4	15.9
M.C.(%)	26	19	19	15	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 20.1% Retained on 20mm sieve.

DATE TESTED: 16/04/2021

DATE OF ISSUE: 06/05/2021

APPROVED BY:



NAME: Michelle Selkirk





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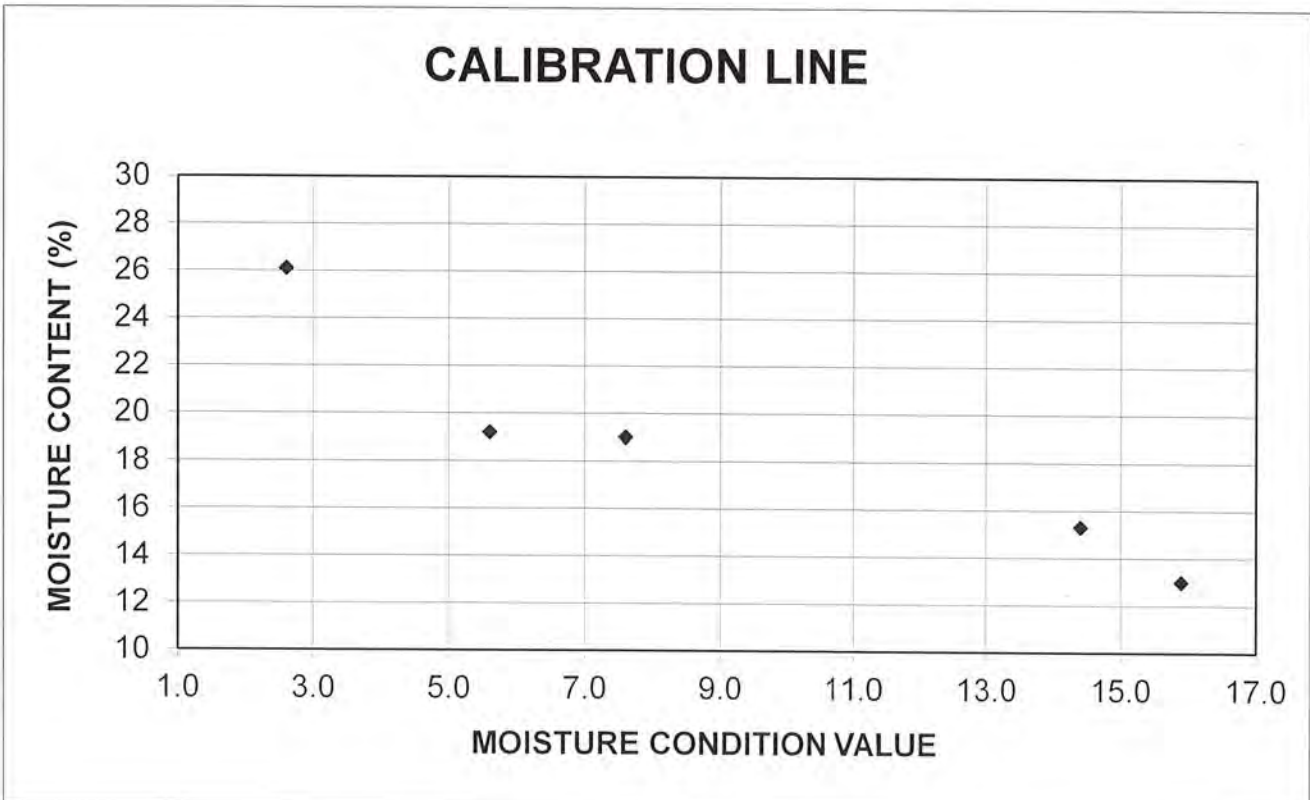
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.00m  
**Sample No:** BH BB003 B5      **Specific Depth:** N/A

For sample description please refer to sample description sheet.



Sample	1 (NAT)	2	3	4	5
MCV	2.6	5.6	7.6	14.4	15.9
M.C.(%)	26	19	19	15	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		26.05		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.817			
<b>SENSITIVITY (1/SLOPE)</b>		-1.225			



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

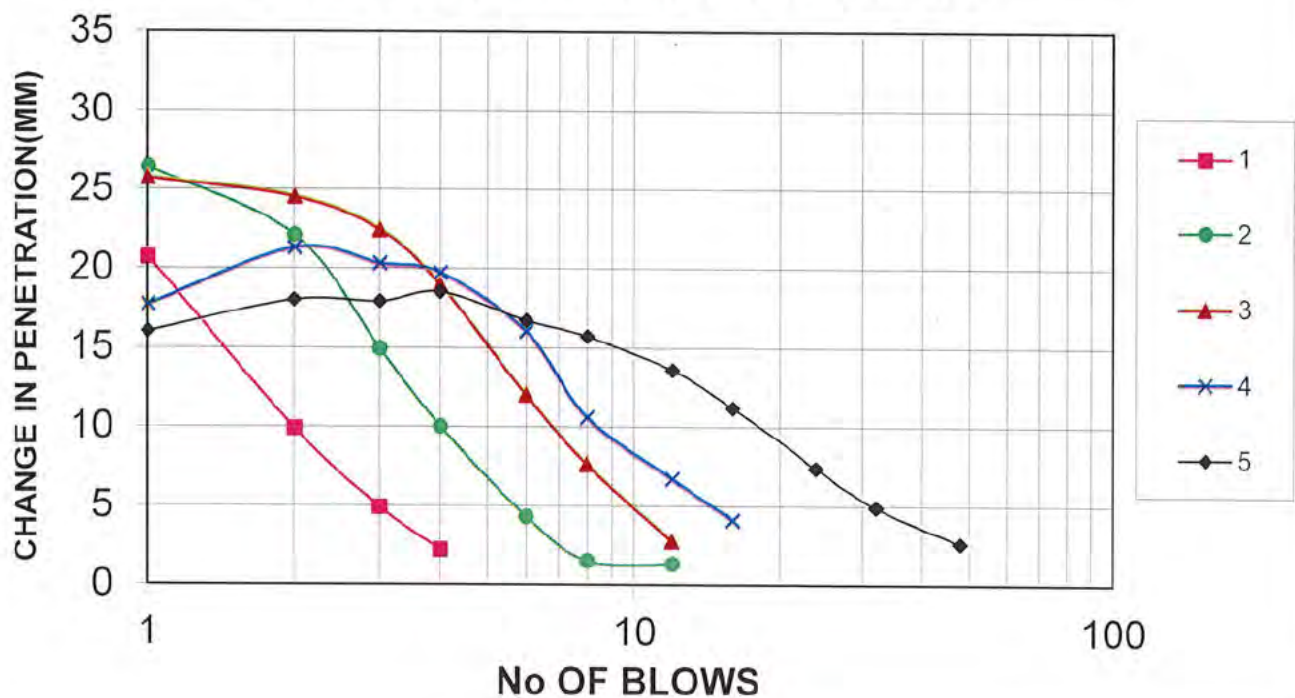


No. 1367

SITE: A66 North Trans Pennine Scheme D Section 7      JOB No: 4322C  
 CLIENT: AMEY OW Limited      Depth: 2.50m  
 Sample No: BH BB006 B12      Specific Depth: N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4	5
MCV	4.8	7.6	10.0	11.6	14.9
M.C.(%)	21	21	16	16	15
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 11.6% Retained on 20mm sieve.

DATE TESTED: 23/04/2021

DATE OF ISSUE: 06/05/2021

APPROVED BY:



NAME: Michelle Selkirk





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Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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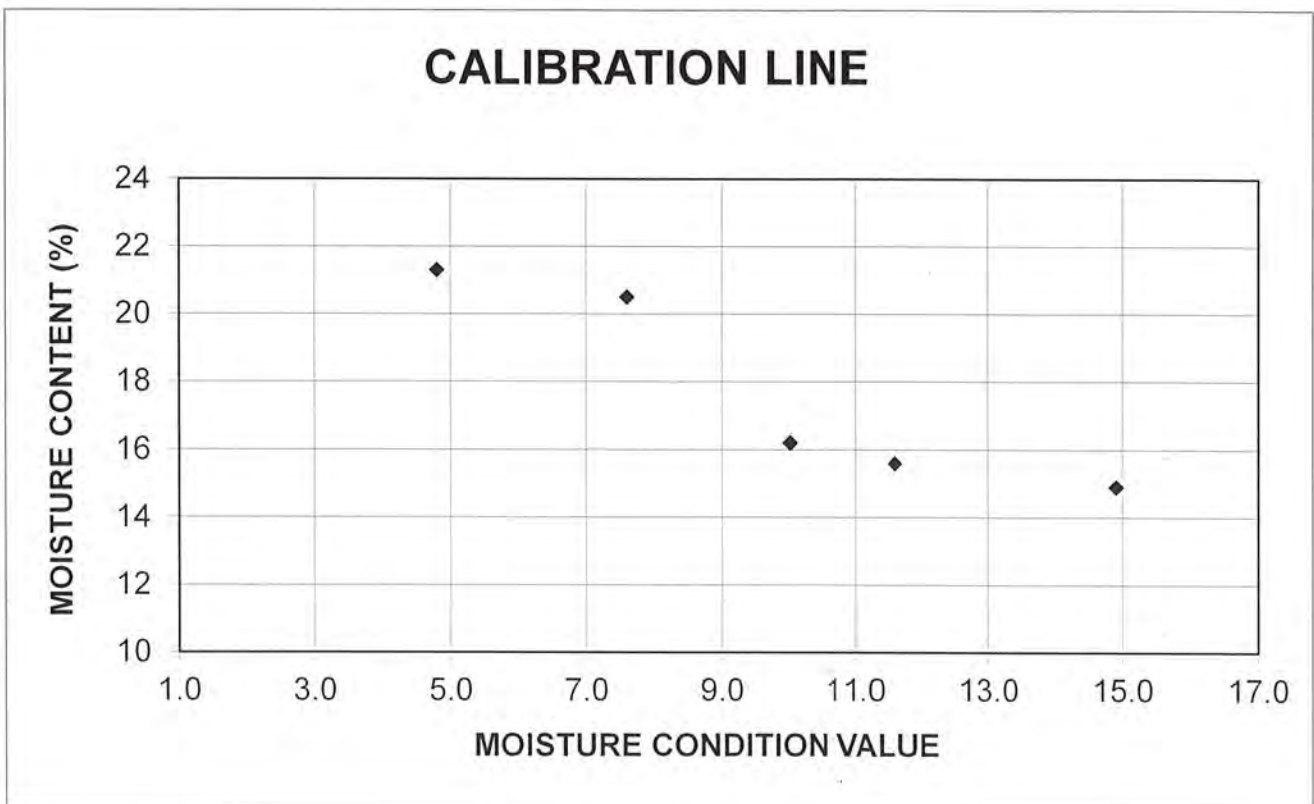
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	2.50m
<b>Sample No:</b>	BH BB006 B12	<b>Specific Depth:</b>	N/A

**For sample description please refer to sample description sheet.**



Sample	1	2	3	4	5
MCV	4.8	7.6	10	11.6	14.9
M.C.(%)	21	21	16	16	15
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		24.73		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.719			
<b>SENSITIVITY (1/SLOPE)</b>		-1.391			



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

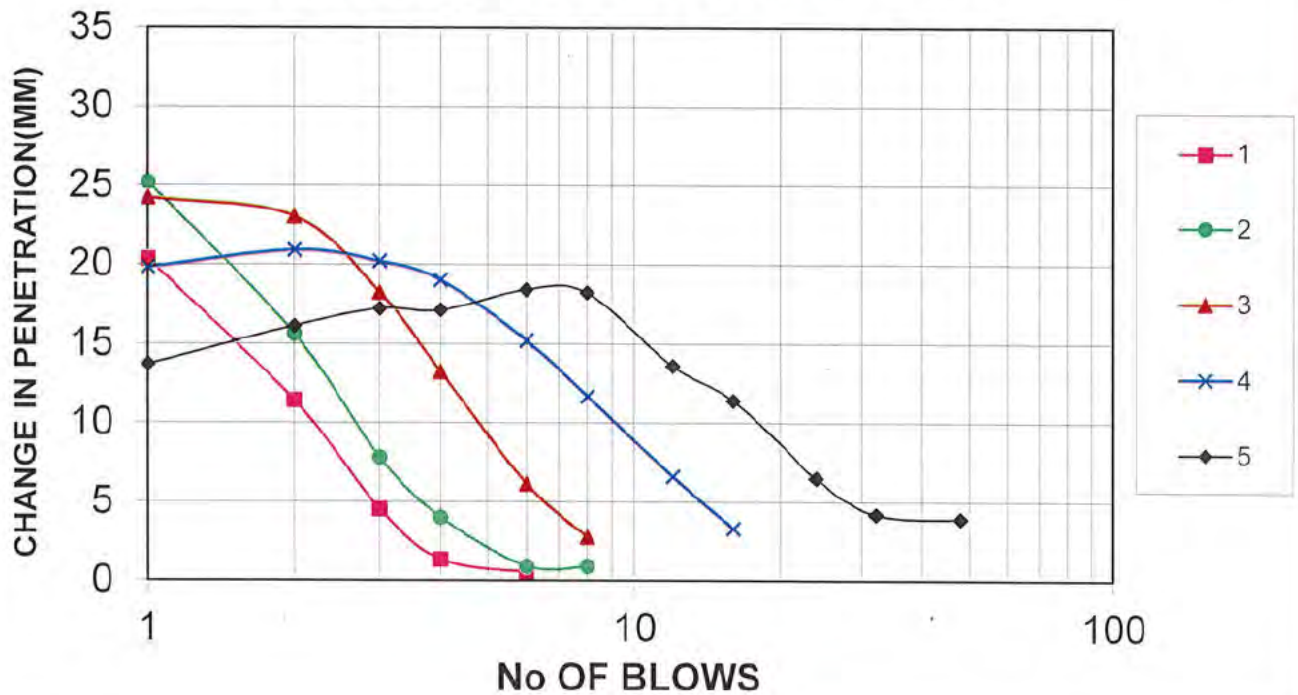
**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C

**CLIENT:** AMEY OW Limited      **Depth:** 1.50m

**Sample No:** BH BB007 B6      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1 (NAT)	2	3	4	5
MCV	4.7	5.7	8.3	11.4	14.6
M.C.(%)	25	20	18	16	11
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 5.8% Retained on 20mm sieve.

DATE TESTED: 13/03/2021

DATE OF ISSUE: 27/04/2021

APPROVED BY



NAME: Michelle Selkirk





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### MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

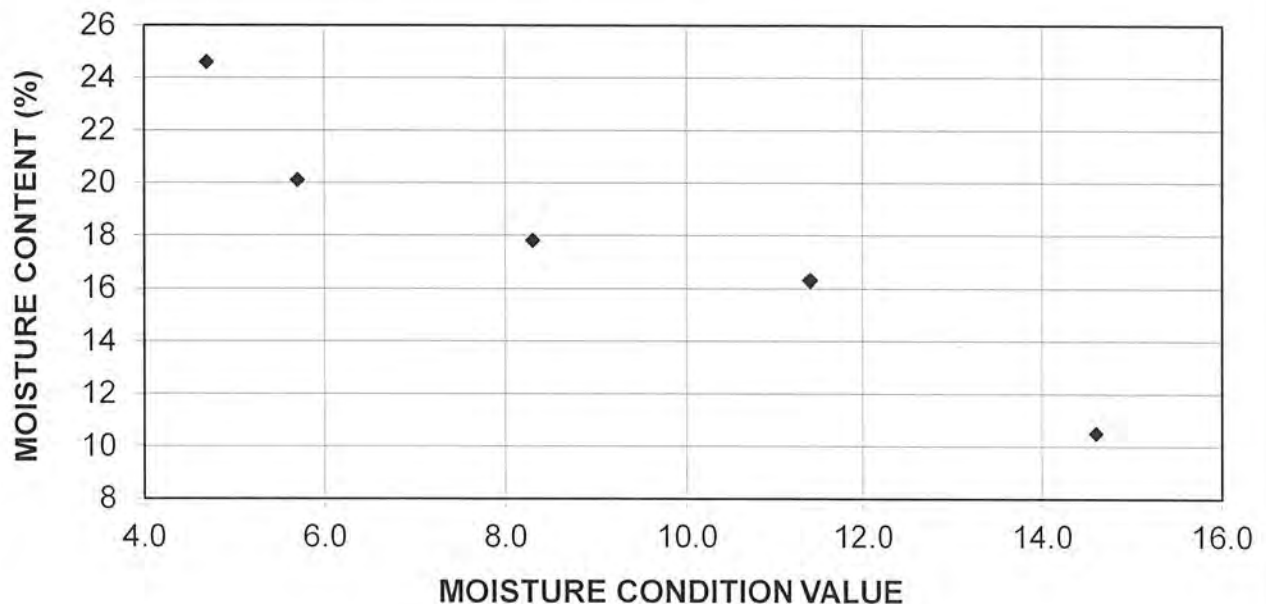


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	1.50m
<b>Sample No:</b>	BH BB007 B6	<b>Specific Depth:</b>	N/A

For sample description please refer to sample description sheet.

### CALIBRATION LINE



Sample	1 (NAT)	2	3	4	5
MCV	4.7	5.7	8.3	11.4	14.6
M.C.(%)	25	20	18	16	11
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		28.71		<b>REMARKS:</b>	
<b>SLOPE</b>		-1.214			
<b>SENSITIVITY (1/SLOPE)</b>		-0.824			



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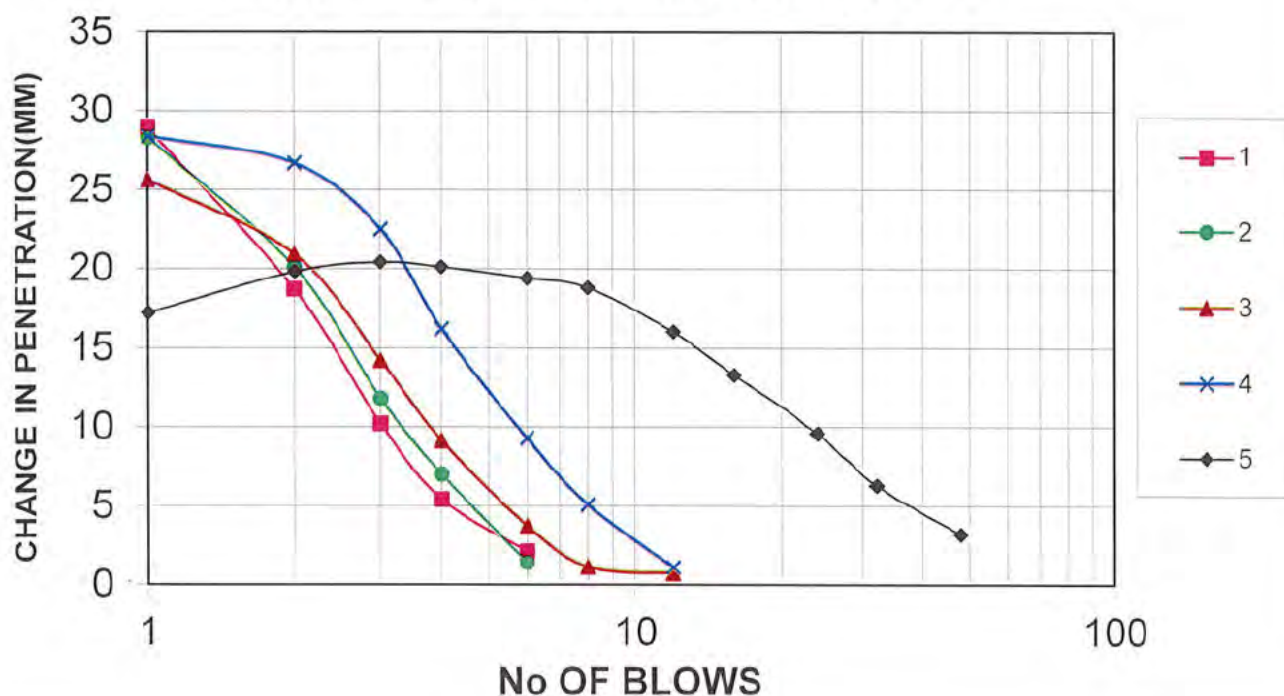
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 3.20m  
**Sample No:** BH BB009 B10      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4 (NAT)	5
MCV	6.3	6.7	7.4	9.1	15.7
M.C.(%)	18	18	15	14	10
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 12.3% Retained on 20mm sieve.

DATE TESTED: 15/03/2021

DATE OF ISSUE: 05/05/2021

APPROVED BY



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

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### MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

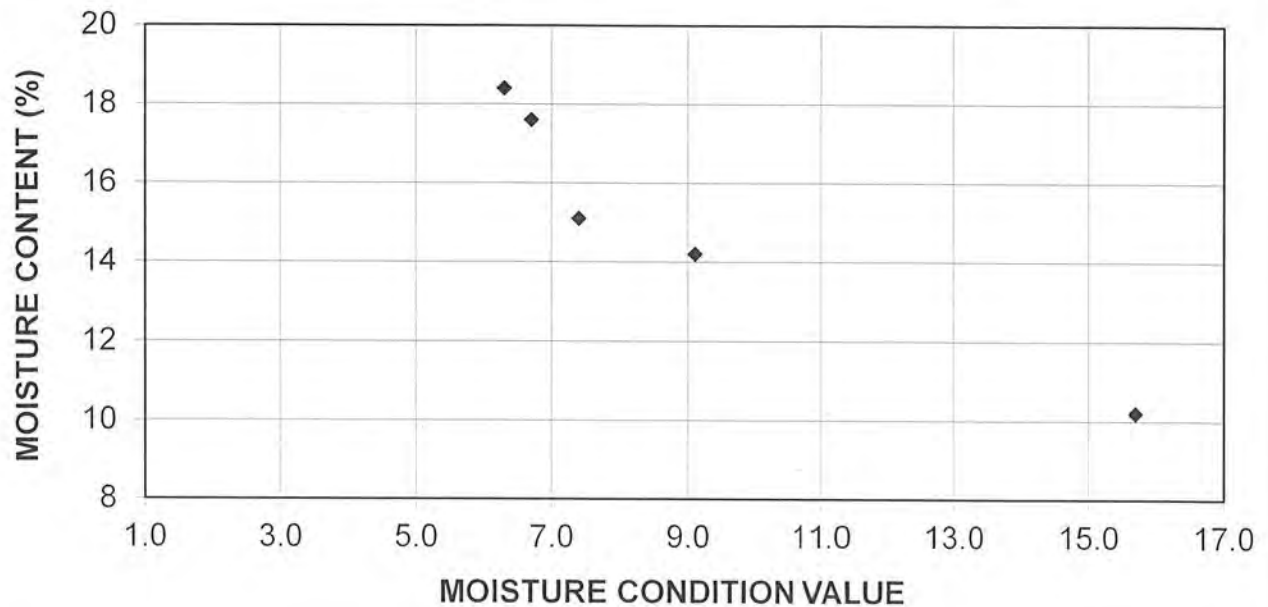


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	3.20m
<b>Sample No:</b>	BH BB009 B10	<b>Specific Depth:</b>	N/A

For sample description please refer to sample description sheet.

### CALIBRATION LINE



Sample	1	2	3	4 (NAT)	5
MCV	6.3	6.7	7.4	9.1	15.7
M.C.(%)	18	18	15	14	10
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		22.26		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.793			
<b>SENSITIVITY (1/SLOPE)</b>		-1.262			



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

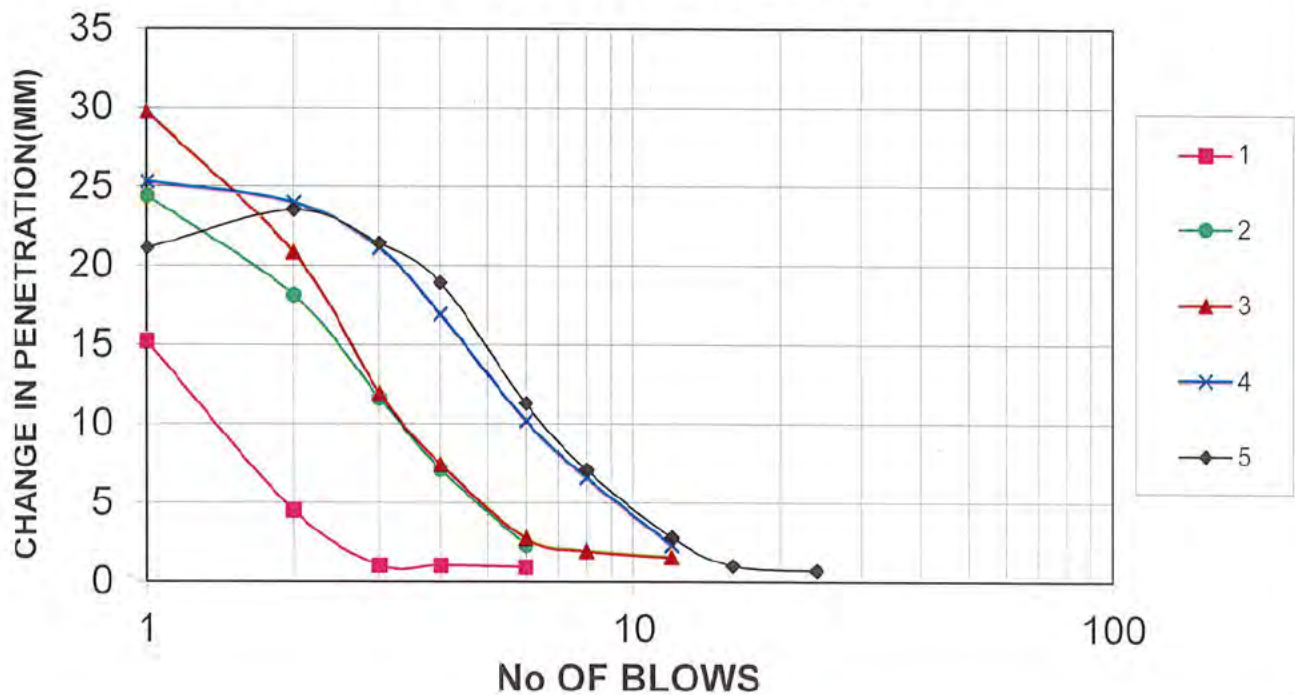
**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C

**CLIENT:** AMEY OW Limited      **Depth:** 2.35m

**Sample No:** BH BB013 B12      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4	5 (NAT)
MCV	2.9	6.8	7.0	9.7	9.9
M.C.(%)	16	15	15	13	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 8.4% Retained on 20mm sieve.

DATE TESTED: 15/03/2021

DATE OF ISSUE: 05/05/2021

APPROVED BY



NAME: Michelle Selkirk





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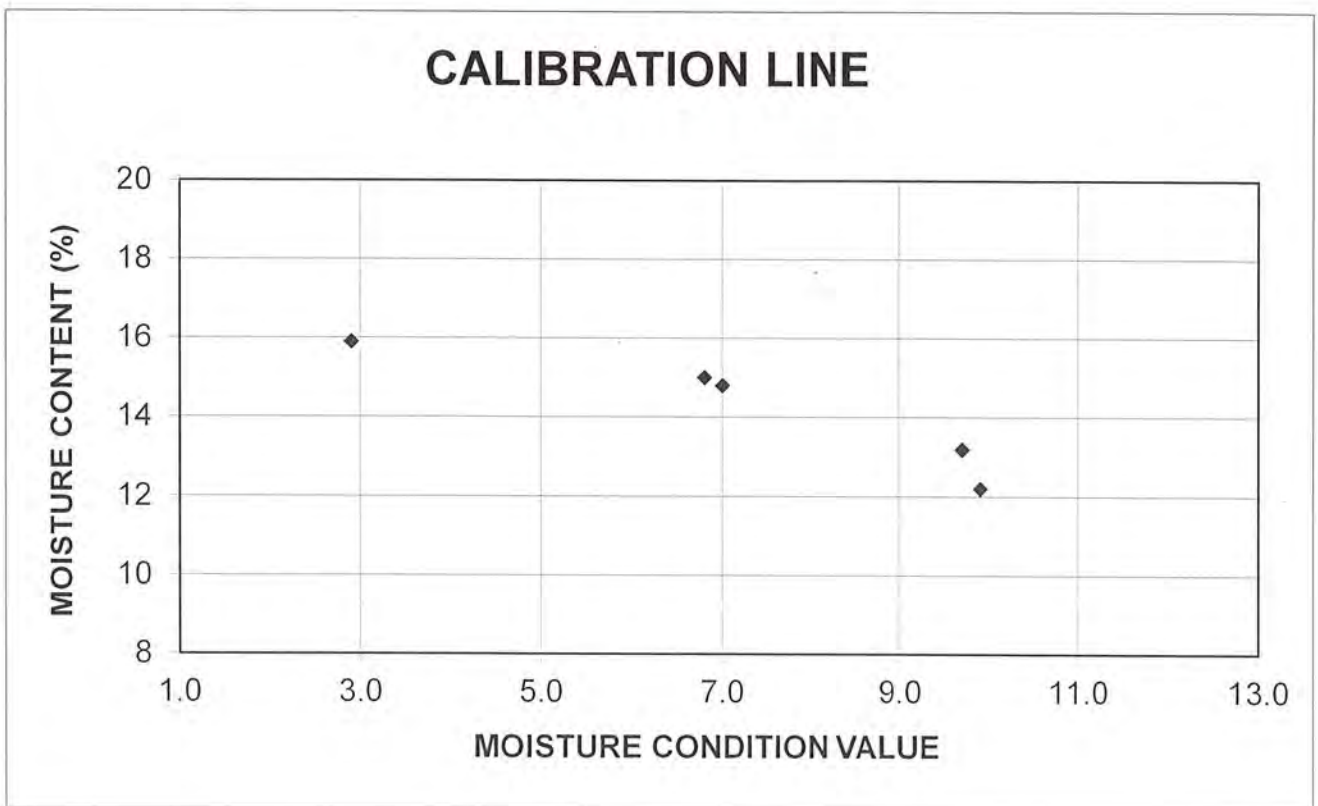
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 2.35m  
**Sample No:** BH BB013 B12      **Specific Depth:** N/A

For sample description please refer to sample description sheet.



Sample	1	2	3	4	5 (NAT)
MCV	2.9	6.8	7.0	9.7	9.9
M.C.(%)	16	15	15	13	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		17.75		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.486			
<b>SENSITIVITY (1/SLOPE)</b>		-2.057			



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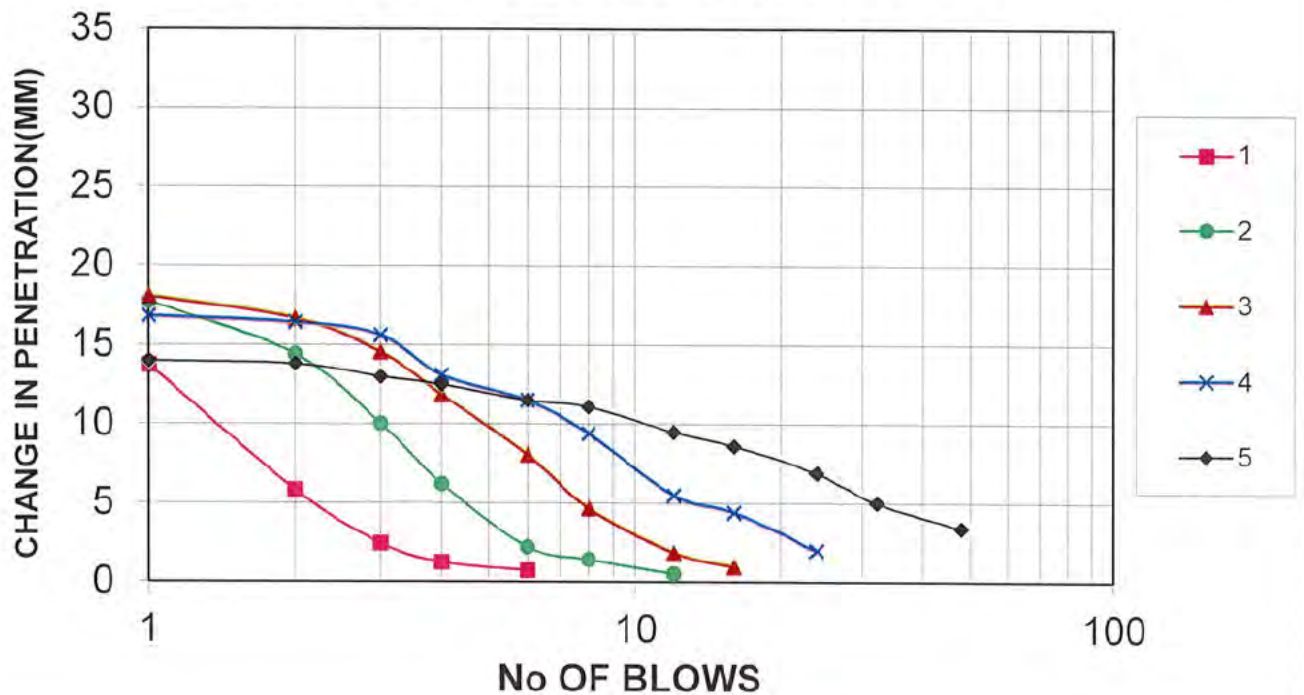


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.20m  
**Sample No:** BH BB017 B3      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2 (NAT)	3	4	5
MCV	3.5	6.6	8.9	11.4	15.0
M.C.(%)	36	34	31	25	21
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 23.0% Retained on 20mm sieve.

DATE TESTED: 17/03/2021

DATE OF ISSUE: 28/04/2021

APPROVED BY



NAME: Michelle Selkirk





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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

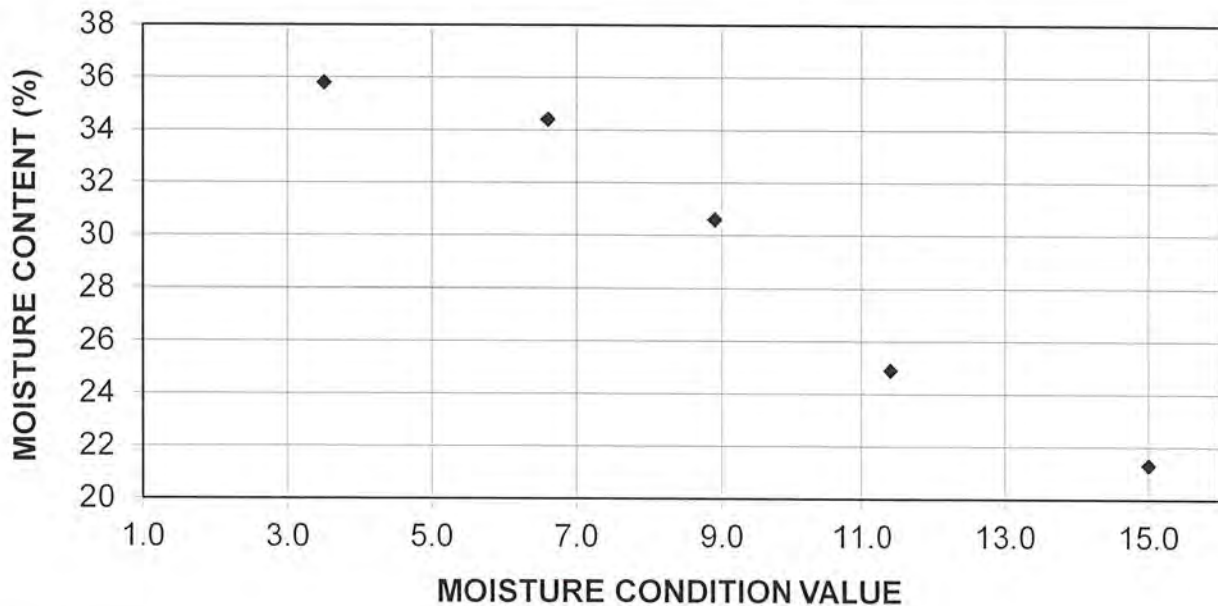


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.20m  
**Sample No:** BH BB017 B3      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CALIBRATION LINE**



Sample	1	2 (NAT)	3	4	5
MCV	3.5	6.6	8.9	11.4	15
M.C.(%)	36	34	31	25	21
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		41.86		<b>REMARKS:</b>	
<b>SLOPE</b>		-1.373			
<b>SENSITIVITY (1/SLOPE)</b>		-0.729			



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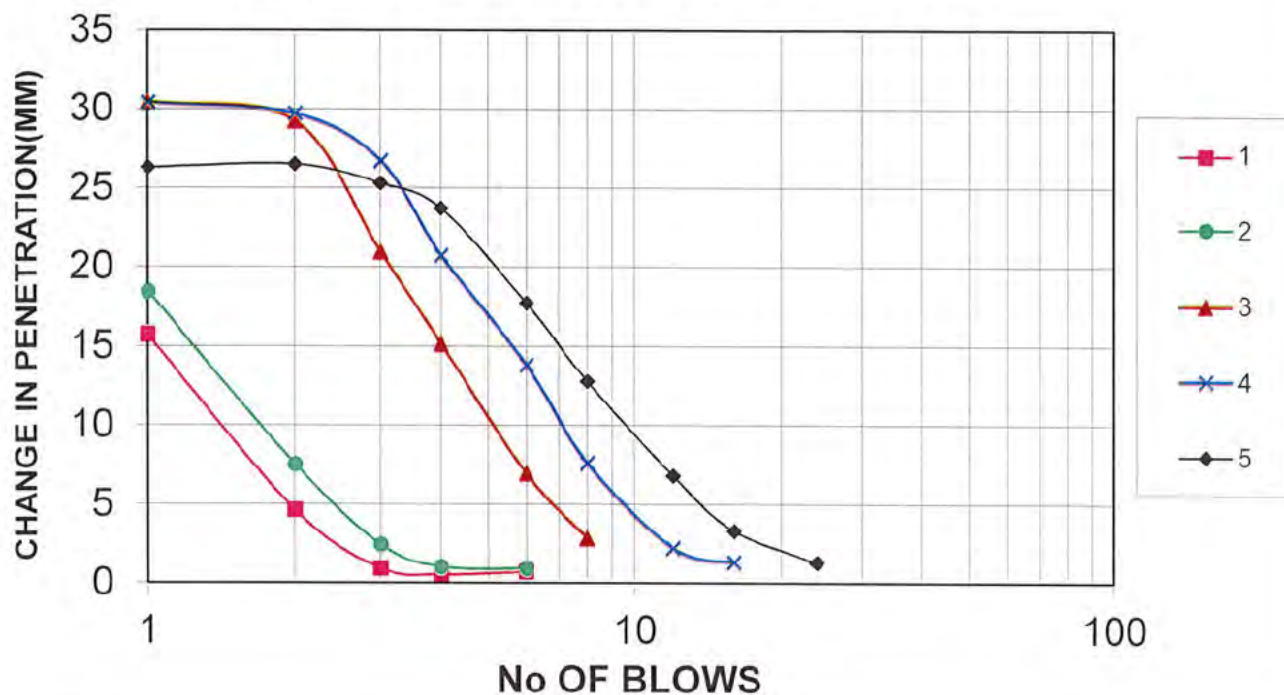
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.50m  
**Sample No:** TP BB001 B7      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1 (NAT)	2	3	4	5
MCV	2.9	3.9	8.4	9.9	11.4
M.C.(%)	26	23	18	18	16
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 17.2% Retained on 20mm sieve.

DATE TESTED: 19/03/2021

DATE OF ISSUE: 27/04/2021

APPROVED BY



NAME: Michelle Selkirk





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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

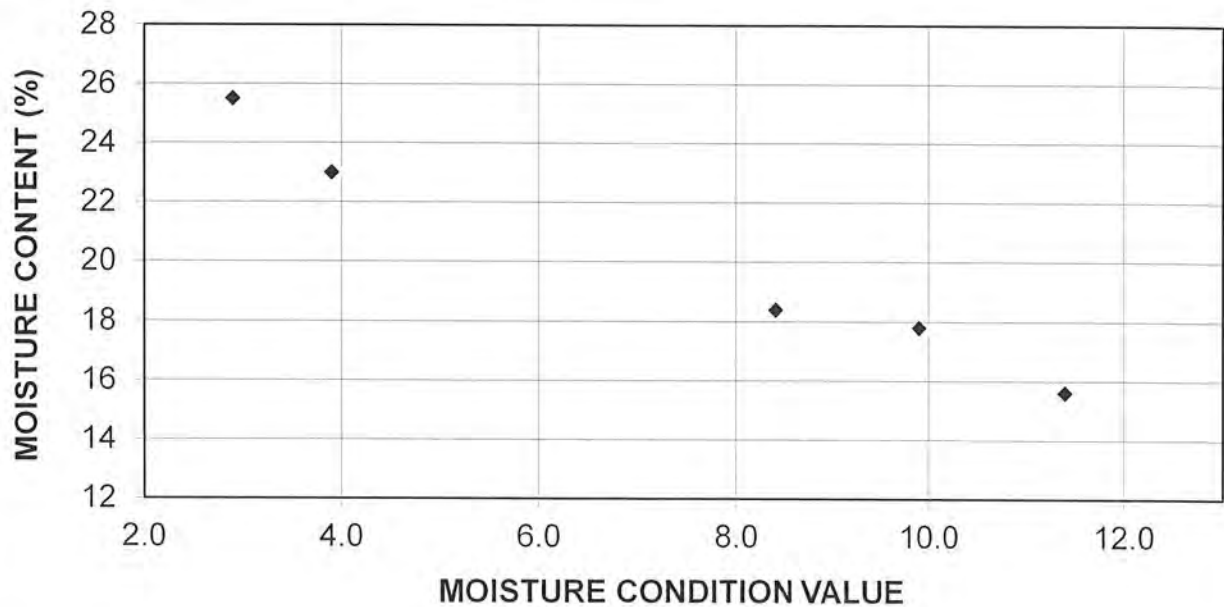


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.50m  
**Sample No:** TP BB001 B7      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CALIBRATION LINE**



Sample	1 (NAT)	2	3	4	5
MCV	2.9	3.9	8.4	9.9	11.4
M.C.(%)	26	23	18	18	16
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		27.91		<b>REMARKS:</b>	
<b>SLOPE</b>		-1.076			
<b>SENSITIVITY (1/SLOPE)</b>		-0.930			



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

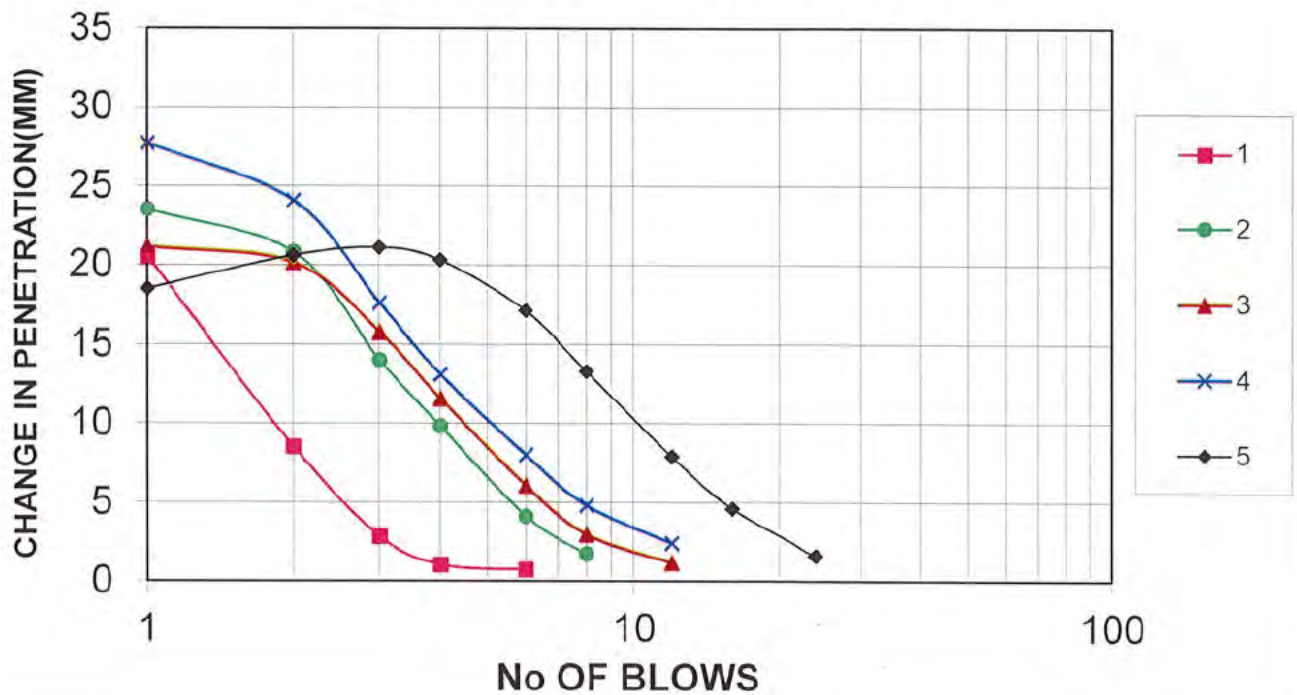


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.75m  
**Sample No:** TP BB002 B7      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4	5
MCV	4.2	7.5	8.2	9.0	11.9
M.C.(%)	18	16	15	14	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 19.2% Retained on 20mm sieve.

DATE TESTED: 19/03/2021

DATE OF ISSUE: 28/04/2021

APPROVED BY



NAME: Michelle Selkirk





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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

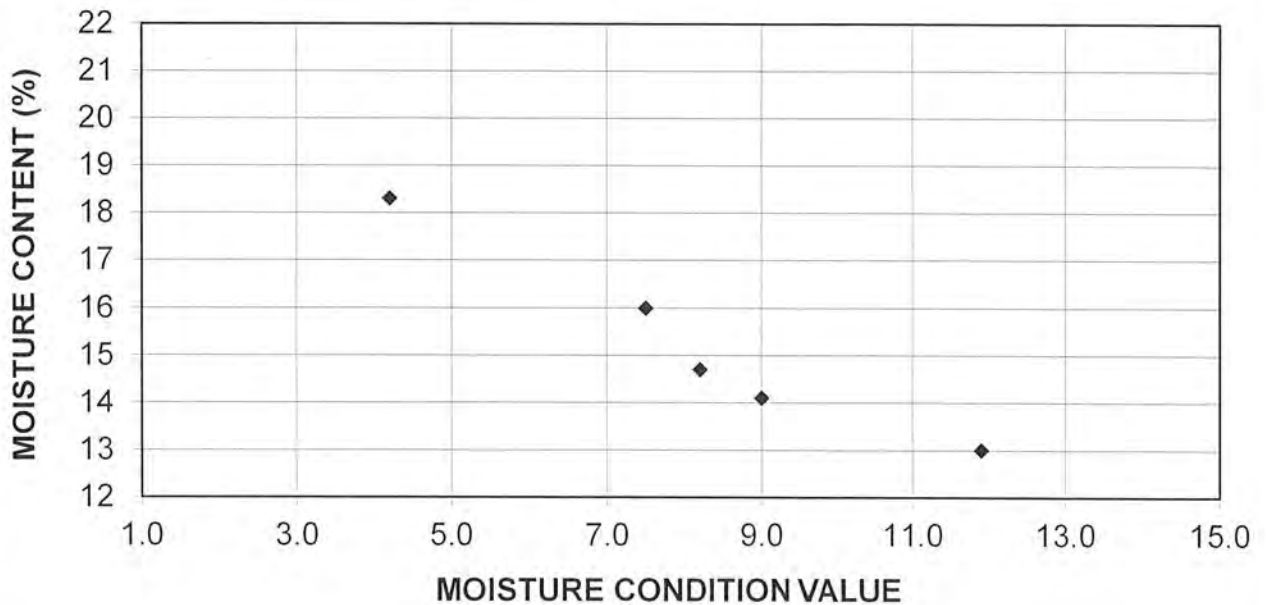


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.75m  
**Sample No:** TP BB002 B7      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CALIBRATION LINE**



Sample	1	2	3	4	5
MCV	4.2	7.5	8.2	9.0	11.9
M.C.(%)	18	16	15	14	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		21.04		<b>REMARKS:</b> Natural point too wet to test	
<b>SLOPE</b>		-0.713			
<b>SENSITIVITY (1/SLOPE)</b>		-1.402			



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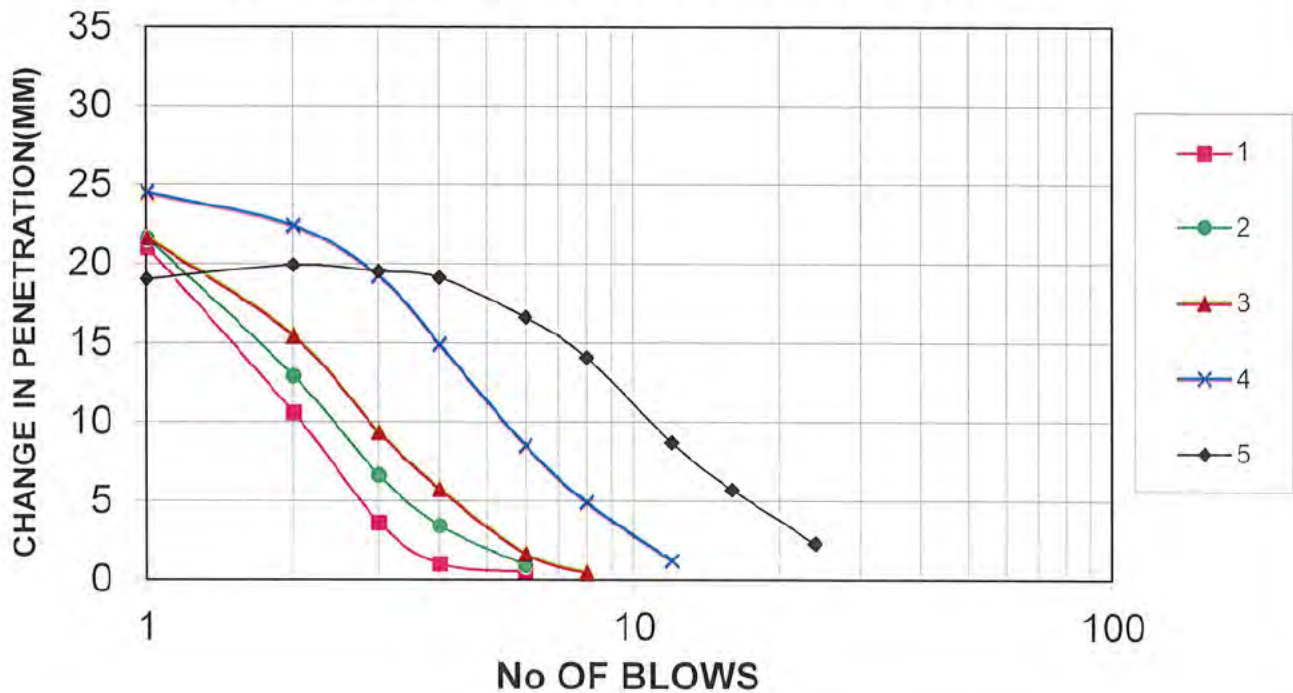
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 2.50m  
**Sample No:** TP BB004 B9      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4	5 (NAT)
MCV	4.5	5.4	6.4	8.9	12.5
M.C.(%)	14	13	12	12	10
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 17.4% Retained on 20mm sieve.

DATE TESTED: 15/03/2021

DATE OF ISSUE: 23/04/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

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### MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

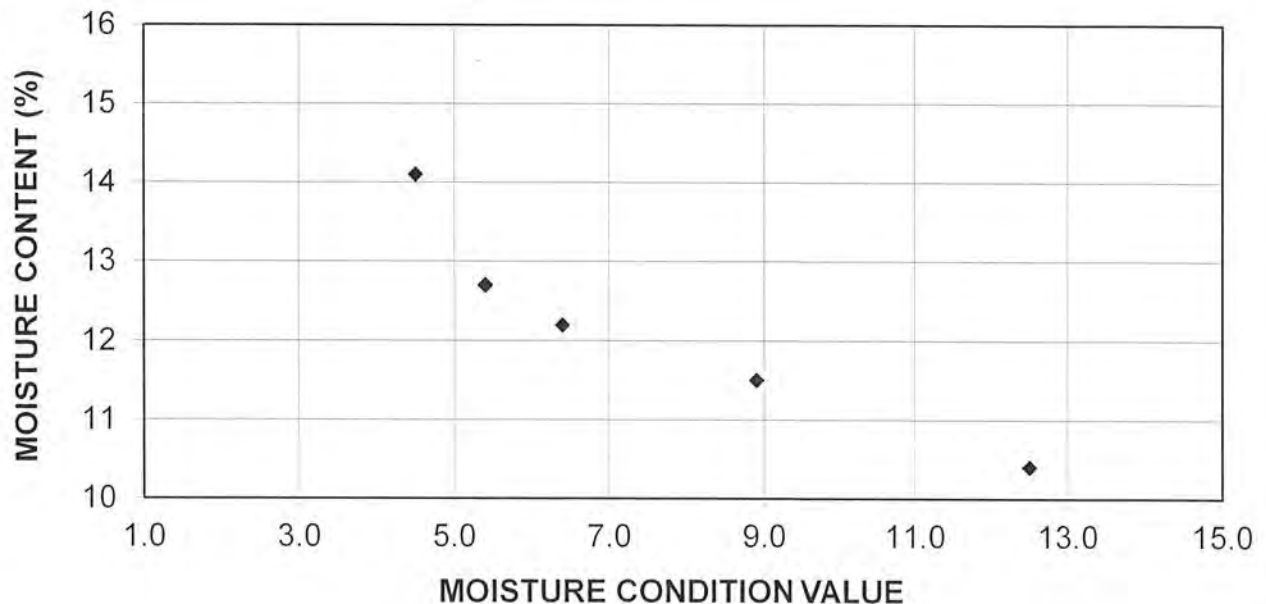


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	2.50m
<b>Sample No:</b>	TP BB004 B9	<b>Specific Depth:</b>	N/A

For sample description please refer to sample description sheet.

### CALIBRATION LINE



Sample	1	2	3	4	5 (NAT)
MCV	4.5	5.4	6.4	8.9	12.5
M.C.(%)	14	13	12	12	10
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		15.21		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.402			
<b>SENSITIVITY (1/SLOPE)</b>		-2.485			



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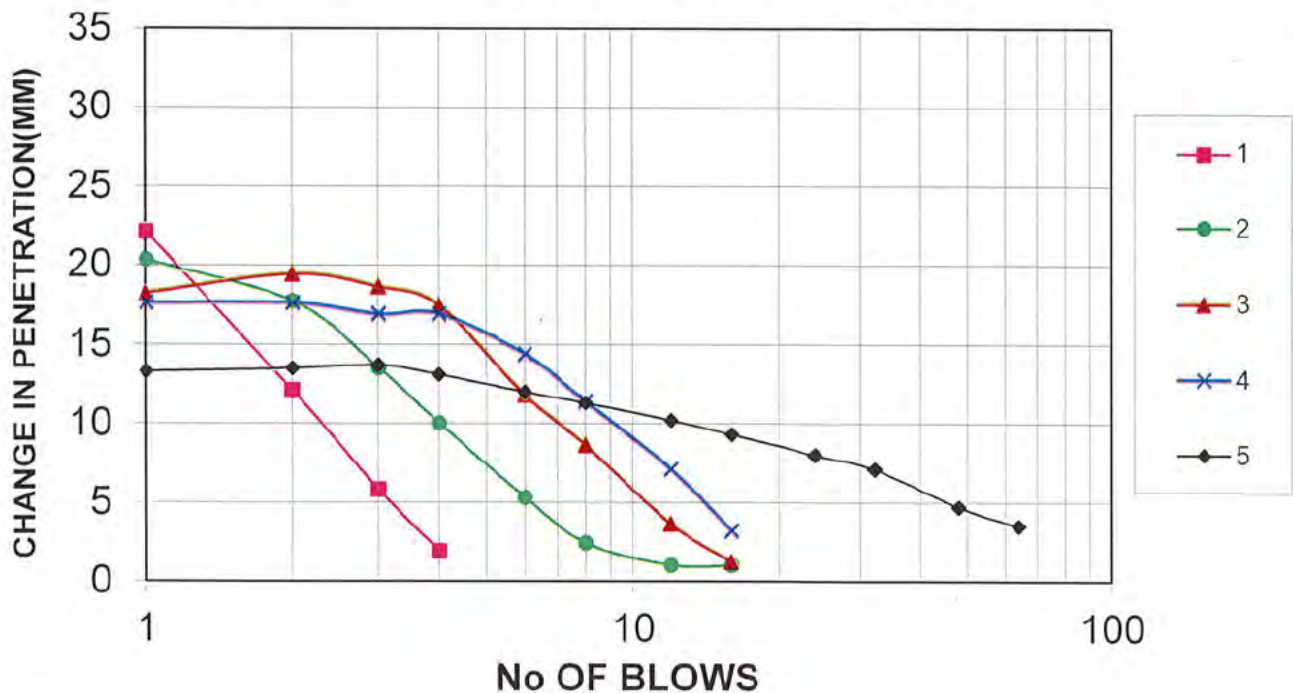
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 2.00m  
**Sample No:** TP BB005 B9      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CHANGE IN PENETRATION PLOT**



Sample	1 (NAT)	2	3	4	5
MCV	5.1	7.9	10.3	11.5	16.6
M.C.(%)	30	20	19	17	15
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 0% Retained on 20mm sieve.

DATE TESTED: 16/04/2021

DATE OF ISSUE: 06/05/2021

APPROVED BY:



NAME: Michelle Selkirk





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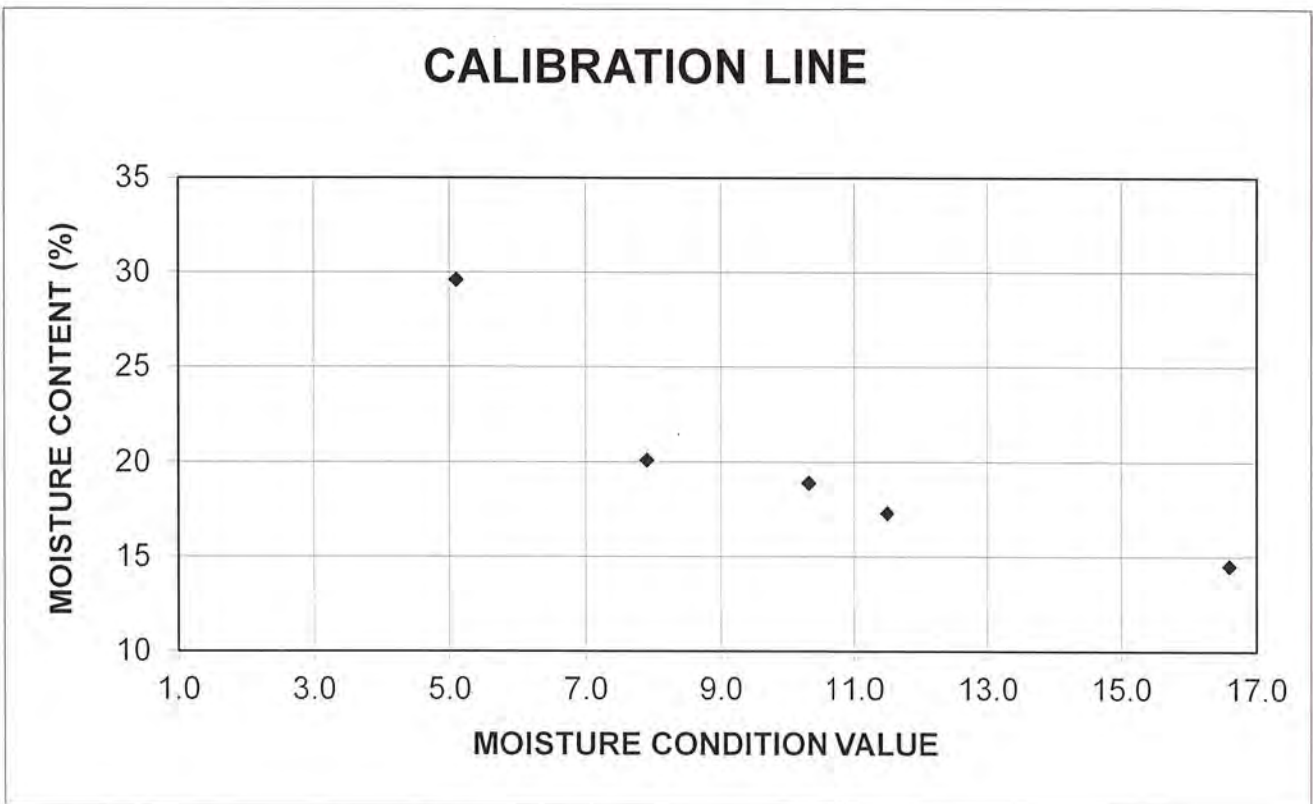
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	2.00m
<b>Sample No:</b>	TP BB005 B9	<b>Specific Depth:</b>	N/A

For sample description please refer to sample description sheet.



Sample	1 (NAT)	2	3	4	5
MCV	5.1	7.9	10.3	11.5	16.6
M.C.(%)	30	20	19	17	15
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		32.32		<b>REMARKS:</b>	
<b>SLOPE</b>		-1.191			
<b>SENSITIVITY (1/SLOPE)</b>		-0.840			



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

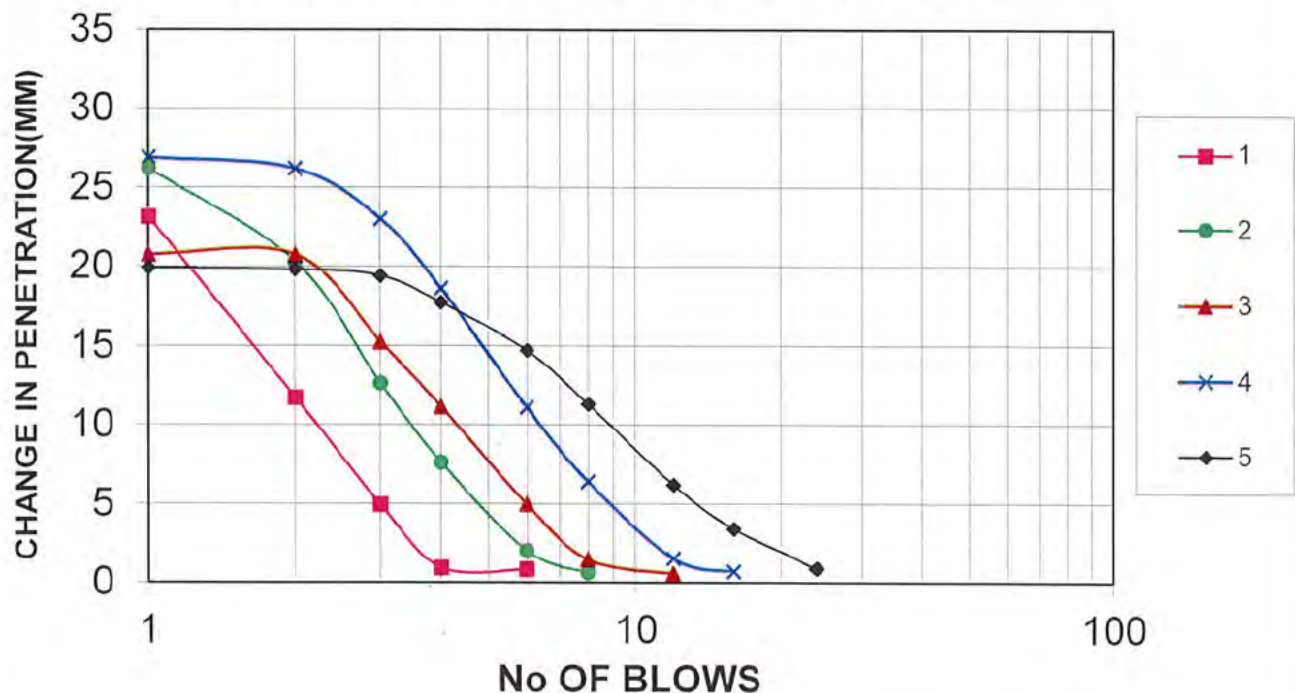


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.80m  
**Sample No:** TP BB007 B4      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



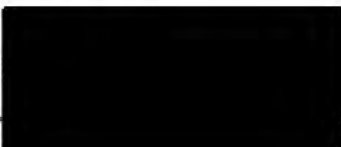
Sample	1	2 (NAT)	3	4	5
MCV	4.8	6.9	7.8	9.5	11.4
M.C.(%)	23	22	20	17	16
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 18% Retained on 20mm sieve.

DATE TESTED: 17/03/2021

DATE OF ISSUE: 27/04/2021

APPROVED BY



NAME: Michelle Selkirk





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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

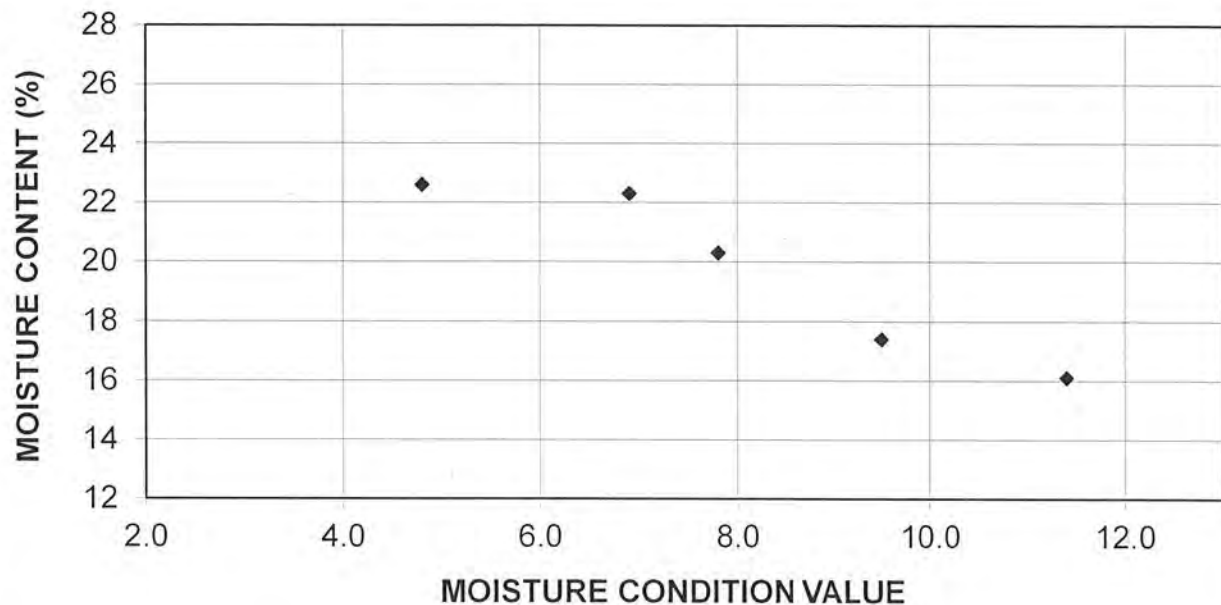


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	0.80m
<b>Sample No:</b>	TP BB007 B4	<b>Specific Depth:</b>	N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	4.8	6.9	7.8	9.5	11.4
M.C.(%)	23	22	20	17	16
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		28.68		<b>REMARKS:</b>	
<b>SLOPE</b>		-1.107			
<b>SENSITIVITY (1/SLOPE)</b>		-0.904			



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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

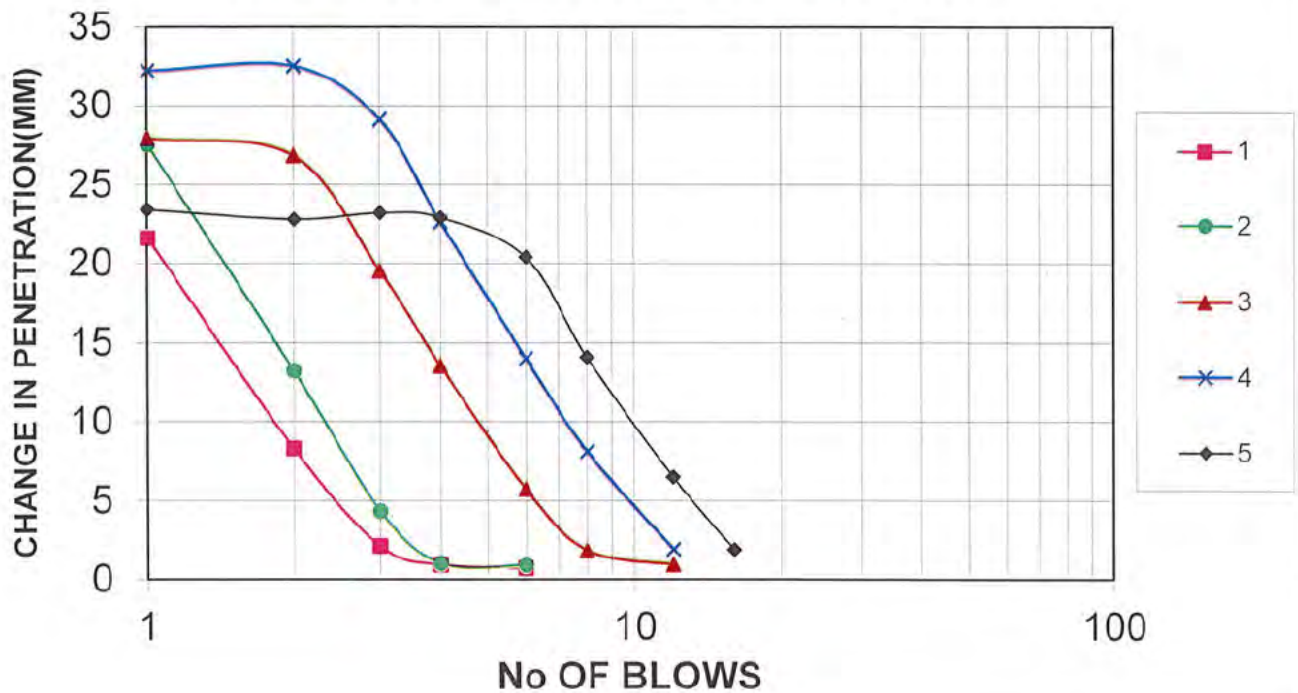


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.80m  
**Sample No:** TP BB009 B7      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CHANGE IN PENETRATION PLOT**



Sample	1	2 (NAT)	3	4	5
MCV	4.0	4.6	8.1	9.9	11.2
M.C.(%)	37	36	32	28	26
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 7.7% Retained on 20mm sieve.

DATE TESTED: 25/03/2021

DATE OF ISSUE: 05/05/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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a UKAS Testing Laboratory No.1367

### MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)

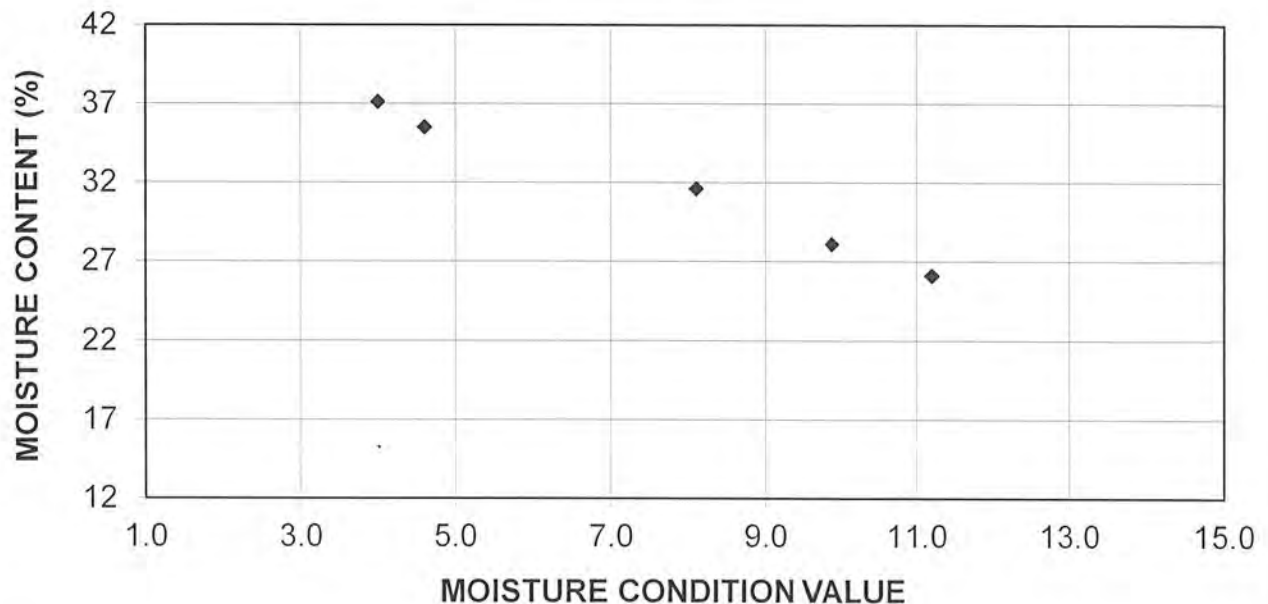


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	1.80m
<b>Sample No:</b>	TP BB009 B7	<b>Specific Depth:</b>	N/A

For sample description please refer to sample description sheet.

### CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	4.0	4.6	8.1	9.9	11.2
M.C.(%)	37	36	32	28	26
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		42.77		<b>REMARKS:</b>	
<b>SLOPE</b>		-1.467			
<b>SENSITIVITY (1/SLOPE)</b>		-0.682			



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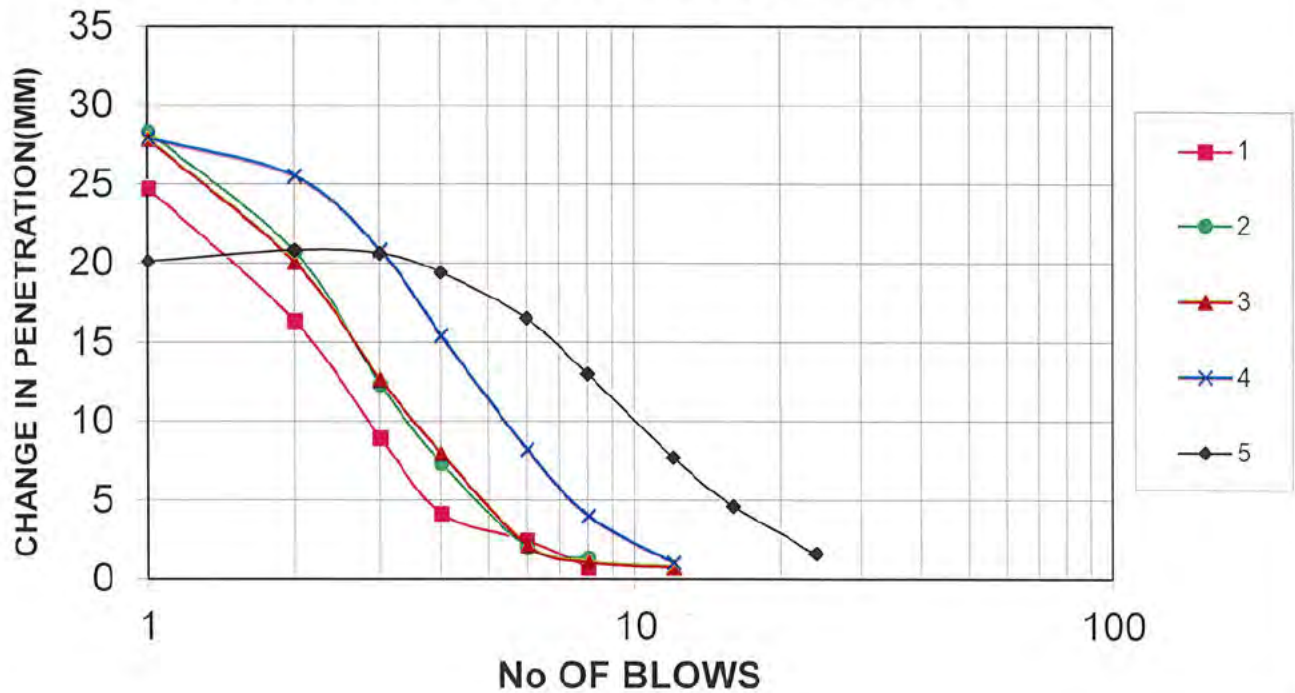
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.70m  
**Sample No:** TP BB011 B7      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2 (NAT)	3	4	5
MCV	5.8	6.8	7.0	8.7	11.8
M.C.(%)	22	21	20	17	15
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 7.4% Retained on 20mm sieve.

DATE TESTED: 29/04/2021

DATE OF ISSUE: 12/05/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

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**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

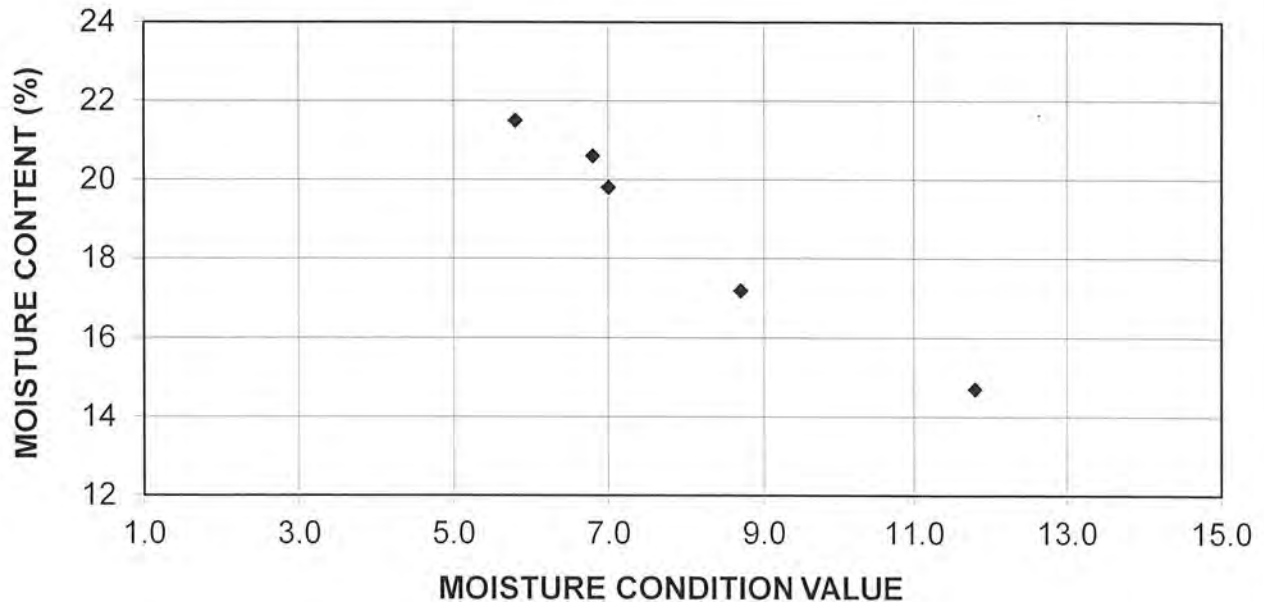


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 1.70m  
**Sample No:** TP BB011 B7      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	5.8	6.8	7.0	8.7	11.8
M.C.(%)	22	21	20	17	15
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		28.08	<b>REMARKS:</b>		
<b>SLOPE</b>		-1.162			
<b>SENSITIVITY (1/SLOPE)</b>		-0.861			



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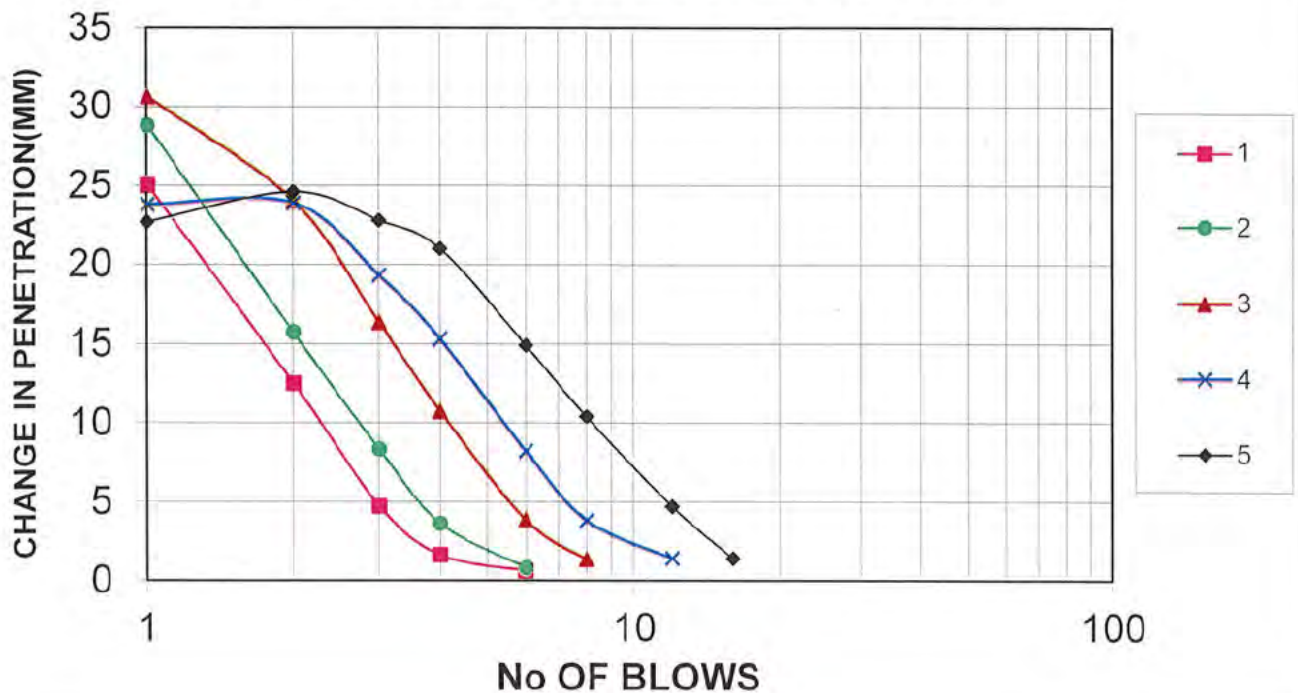
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.80m  
**Sample No:** TP BB013 B6      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2 (NAT)	3	4	5
MCV	4.7	5.6	7.5	8.7	10.7
M.C.(%)	17	15	14	14	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 23.4% Retained on 20mm sieve.

DATE TESTED: 17/03/2021

DATE OF ISSUE: 21/04/2021

APPROVED BY:



NAME: Michelle Selkirk





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 a UKAS Testing Laboratory No.1367

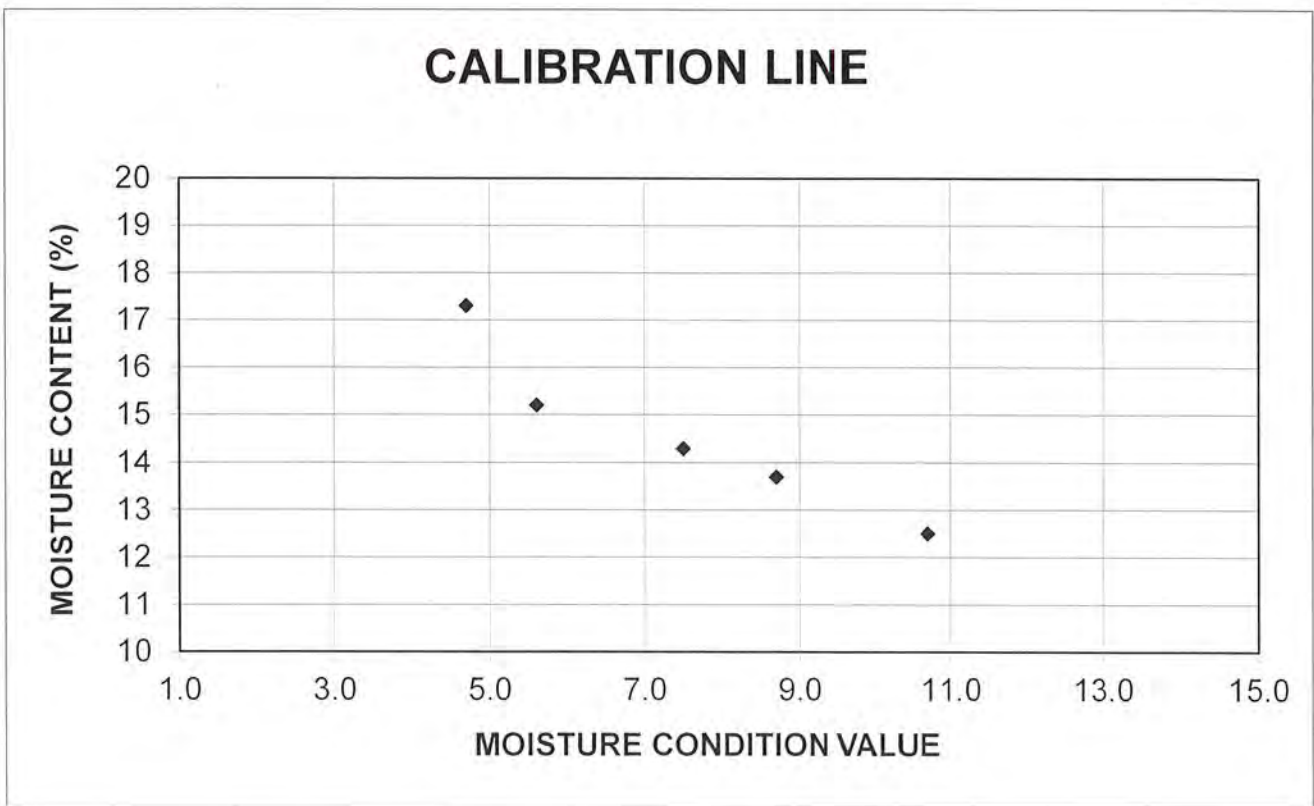
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	0.80m
<b>Sample No:</b>	TP BB013 B6	<b>Specific Depth:</b>	N/A

**For sample description please refer to sample description sheet.**



Sample	1	2 (NAT)	3	4	5
MCV	4.7	5.6	7.5	8.7	10.7
M.C.(%)	17	15	14	14	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		19.91		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.714			
<b>SENSITIVITY (1/SLOPE)</b>		-1.401			



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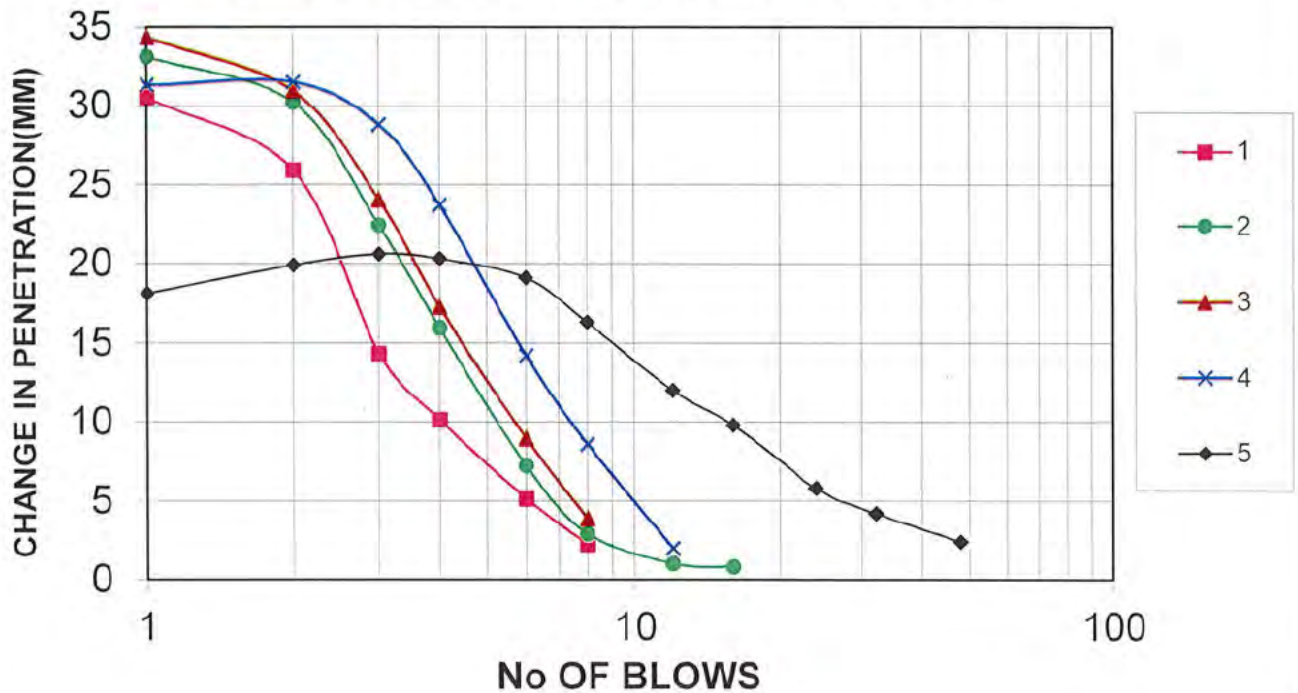
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 7      **JOB No:** 4322C  
**CLIENT:** AMEY OW Limited      **Depth:** 0.80m  
**Sample No:** TP BB014 B5      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4	5
MCV	7.9	8.4	8.7	10.0	14.4
M.C.(%)	19	18	18	16	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 12.2% Retained on 20mm sieve.

DATE TESTED: 28/04/2021

DATE OF ISSUE: 04/05/2021

APPROVED BY



NAME: Michelle Selkirk





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Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

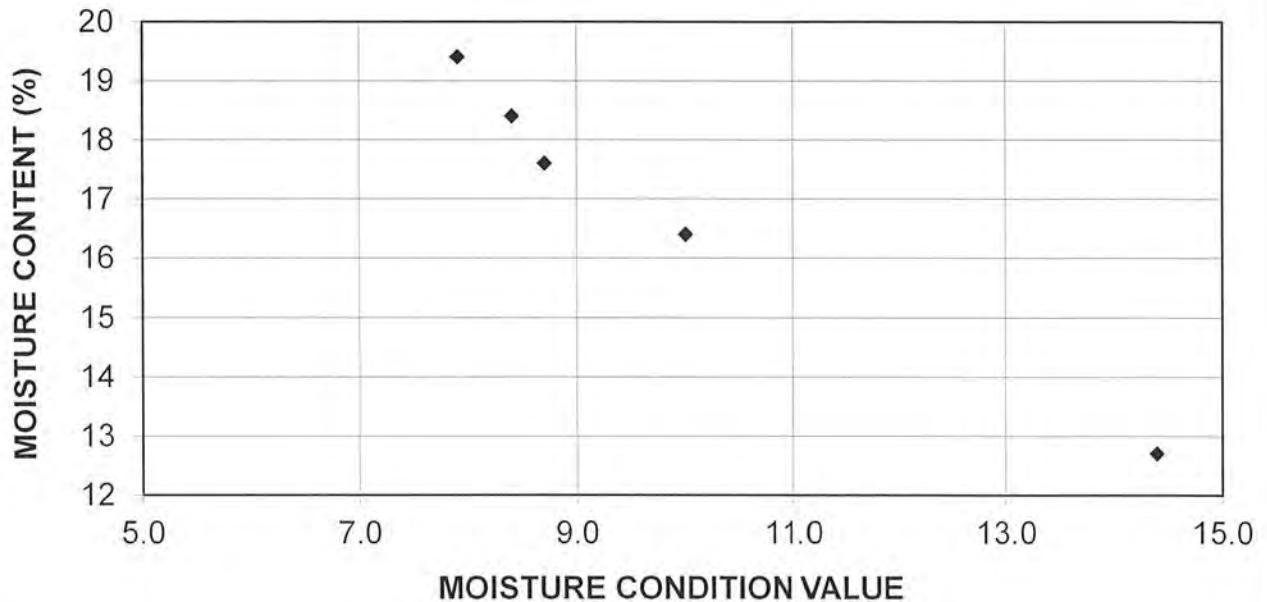


No. 1367

<b>SITE:</b>	A66 North Trans Pennine Scheme D Section 7	<b>JOB No:</b>	4322C
<b>CLIENT:</b>	AMEY OW Limited	<b>Depth:</b>	0.80m
<b>Sample No:</b>	TP BB014 B5	<b>Specific Depth:</b>	N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2	3	4	5
MCV	7.9	8.4	8.7	10.0	14.4
M.C.(%)	19	18	18	16	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		26.46		<b>REMARKS:</b> Natural point not tested	
<b>SLOPE</b>		-0.968			
<b>SENSITIVITY (1/SLOPE)</b>		-1.034			

## Determination of California Bearing Ratio





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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## DETERMINATION OF THE CALIFORNIA BEARING RATIO

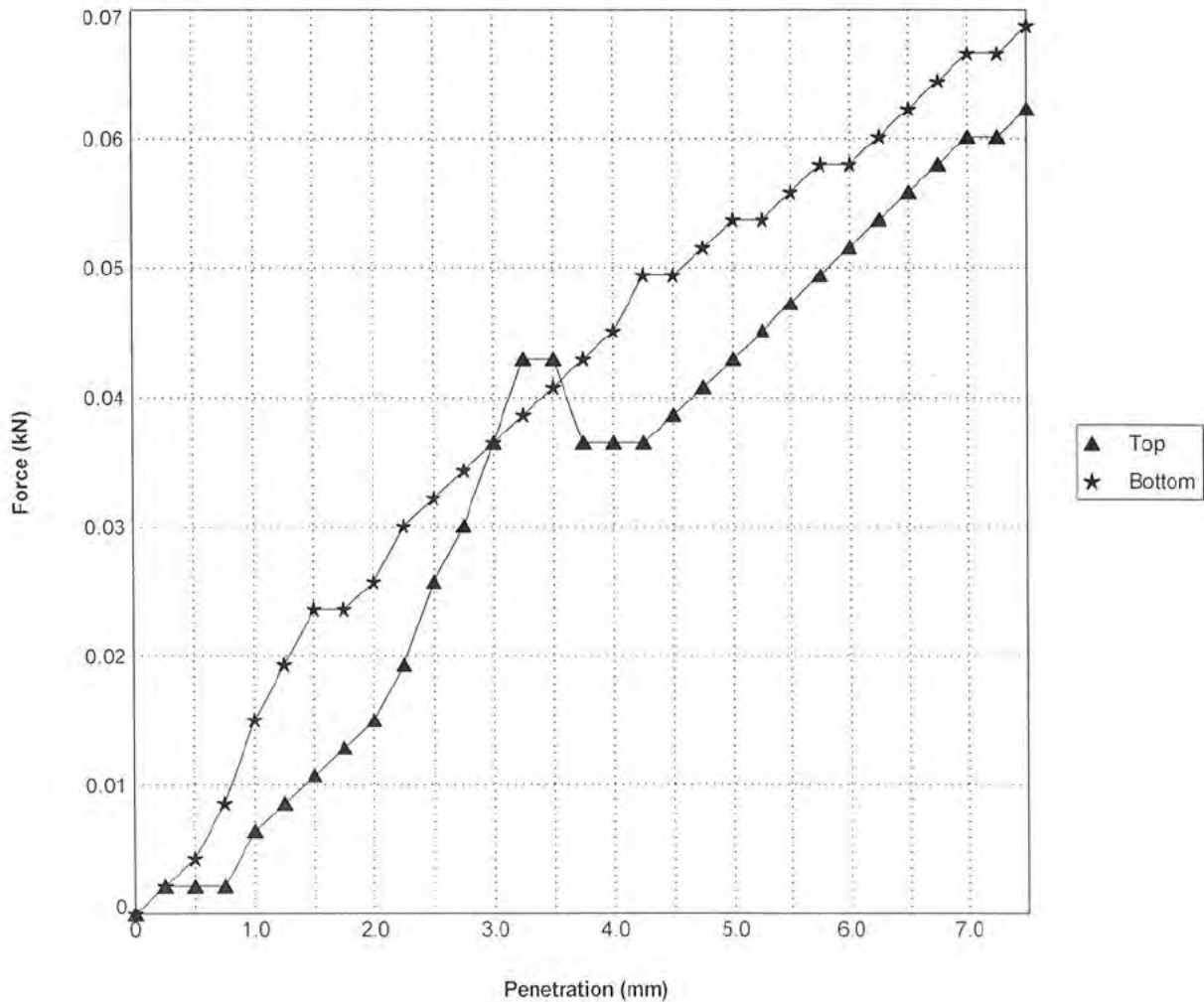
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **BH BB005**

Sample No.- **B10**

Depth (m)- **2.00**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	18.1	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 26 / Bottom 26
Soaking Time (Days) :	7	Bulk Density (Mg/m <sup>3</sup> ) :	1.96
Swelling (mm) :	2.18	Dry Density (Mg/m <sup>3</sup> ) :	1.56
Date Tested :	31/03/2021	CBR Value (%) :	Top 0.21 / Bottom 0.27
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- A66 North Trans Bypass Scheme D Section 7

Client :- AMEY OW Limited



Signature

Date

20/04/2021

CBR/4322C/BH BB005/B10/2.00/1

Contract No. :-

4322C

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

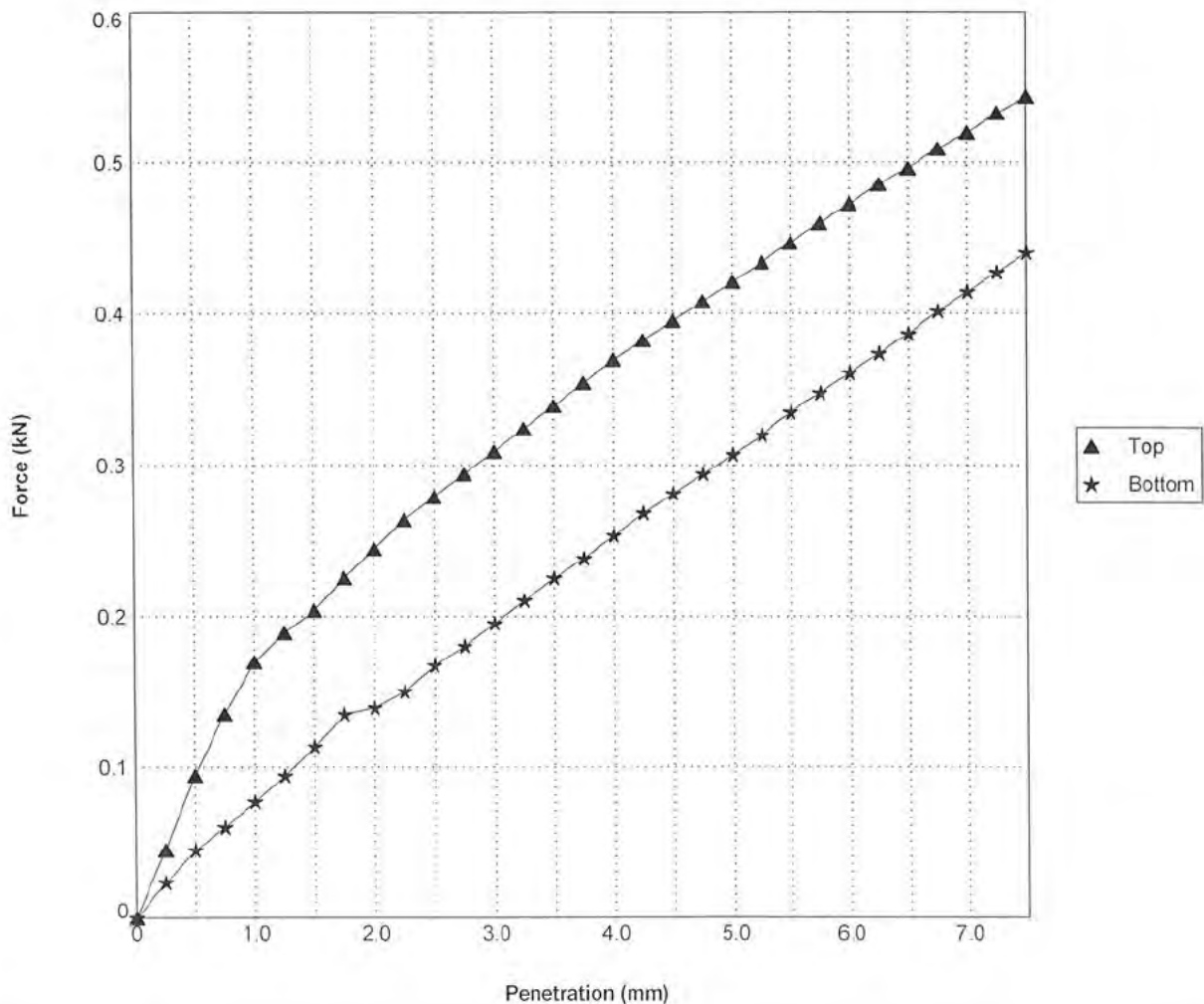
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - **BH BB007**

Sample No. - **B13**

Depth (m) - **3.50**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	4.1	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 12 / Bottom 12
Soaking Time (Days) :	6	Bulk Density (Mg/m <sup>3</sup> ) :	2.27
Swelling (mm) :	0.33	Dry Density (Mg/m <sup>3</sup> ) :	2.03
Date Tested :	25/02/2021	CBR Value (%) :	Top 2.1 / Bottom 1.5
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- **A66 North Trans Pennine Scheme D Section 7**

Client :- **AMEY OW Limited**



Signed: [Redacted Signature]

Page 1 of 1

Date of issue :- **25/03/2021**

Certificate No :- **CBR/4322C/BH BB007/B13/3.50/1**

AEG Contract No. :- **4322C**





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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

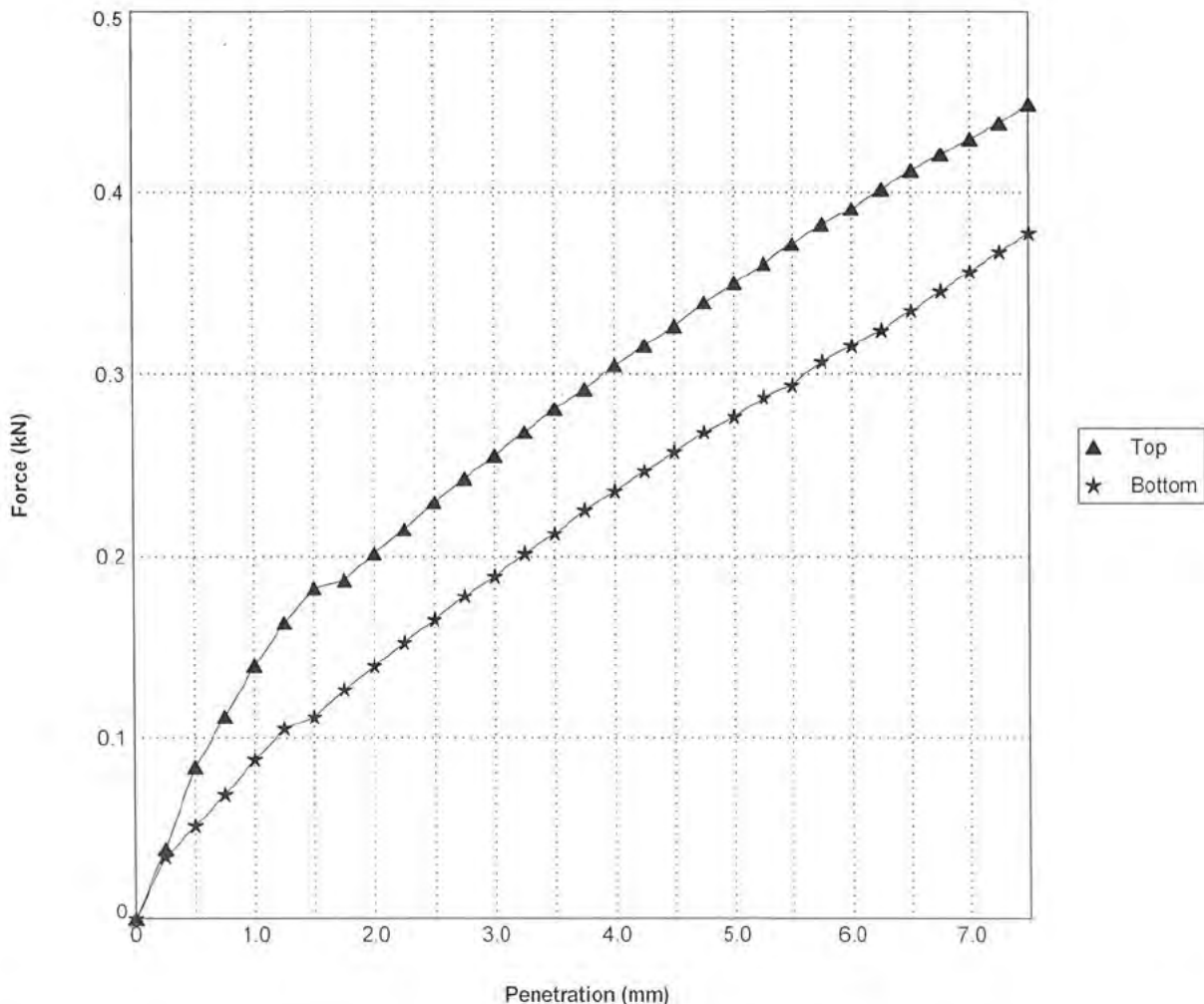
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - **BH BB013**

Sample No. - **B20**

Depth (m) - **4.40**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	3.9	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 14 / Bottom 13
Soaking Time (Days) :	8.5	Bulk Density (Mg/m <sup>3</sup> ) :	2.24
Swelling (mm) :	0.18	Dry Density (Mg/m <sup>3</sup> ) :	1.98
Date Tested :	03/03/2021	CBR Value (%) :	Top 1.8 / Bottom 1.4
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- **A66 North Trans Pennine Scheme D Section 7**

Client :- **AMEY OW Limited**



Signature: [Redacted]

Page 1 of 1

Date of issue :- **25/03/2021**

Certificate No :- **CBR/4322C/BH BB013/B20/4 40/1**

AEG Contract No. :- **4322C**



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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

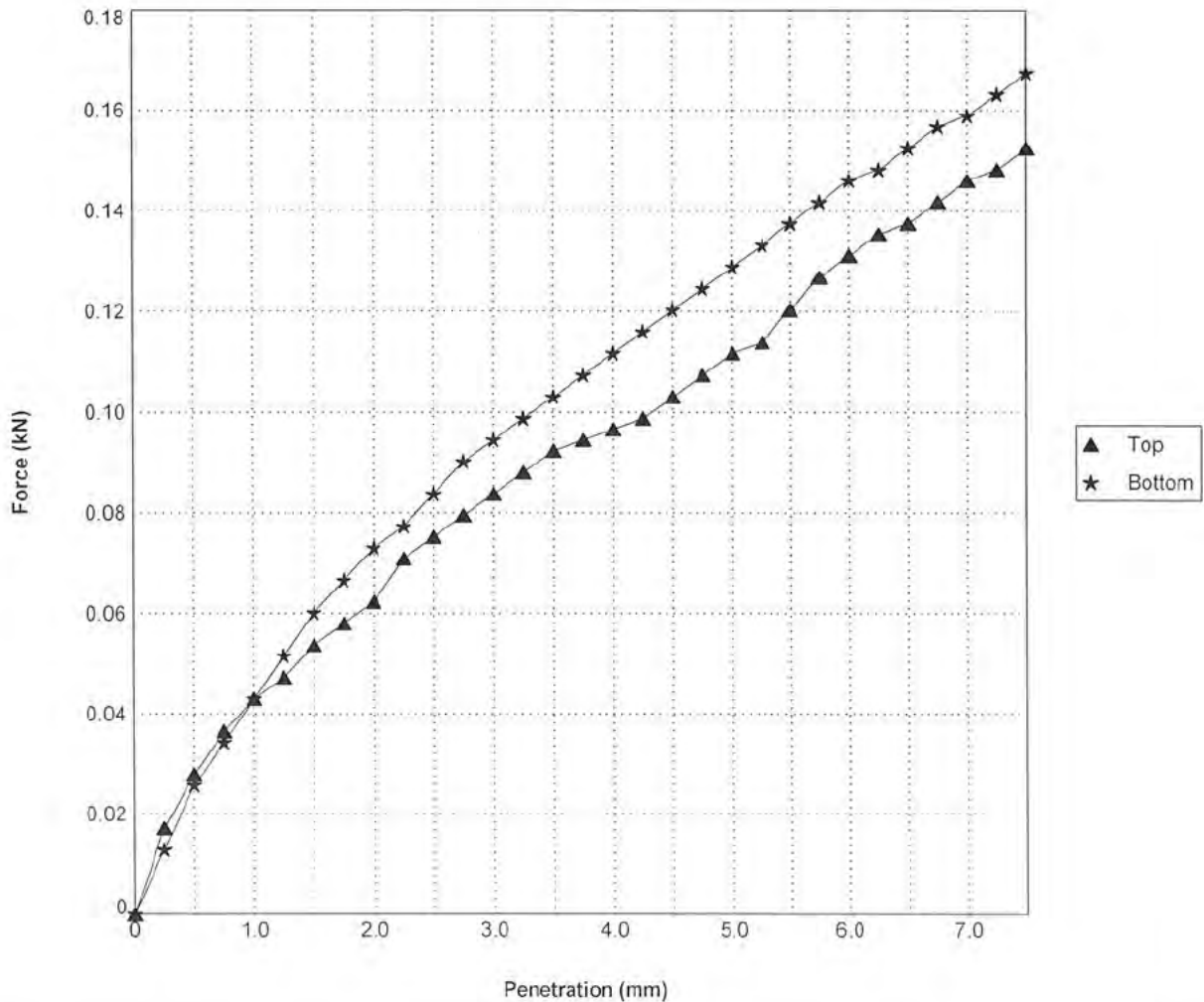
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - **BH BB015**

Sample No. - **B4**

Depth (m) - **0.20**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	3.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 28 / Bottom 32
Soaking Time (Days) :	13	Bulk Density (Mg/m <sup>3</sup> ) :	1.85
Swelling (mm) :	0.8	Dry Density (Mg/m <sup>3</sup> ) :	1.42
Date Tested :	26/03/2021	CBR Value (%) :	Top 0.57 / Bottom 0.64
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signe

Date



20/04/2021

CBR/4322C/BH BB015/B4/0.20/1

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Contract No. :-

4322C



1367



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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## DETERMINATION OF THE CALIFORNIA BEARING RATIO

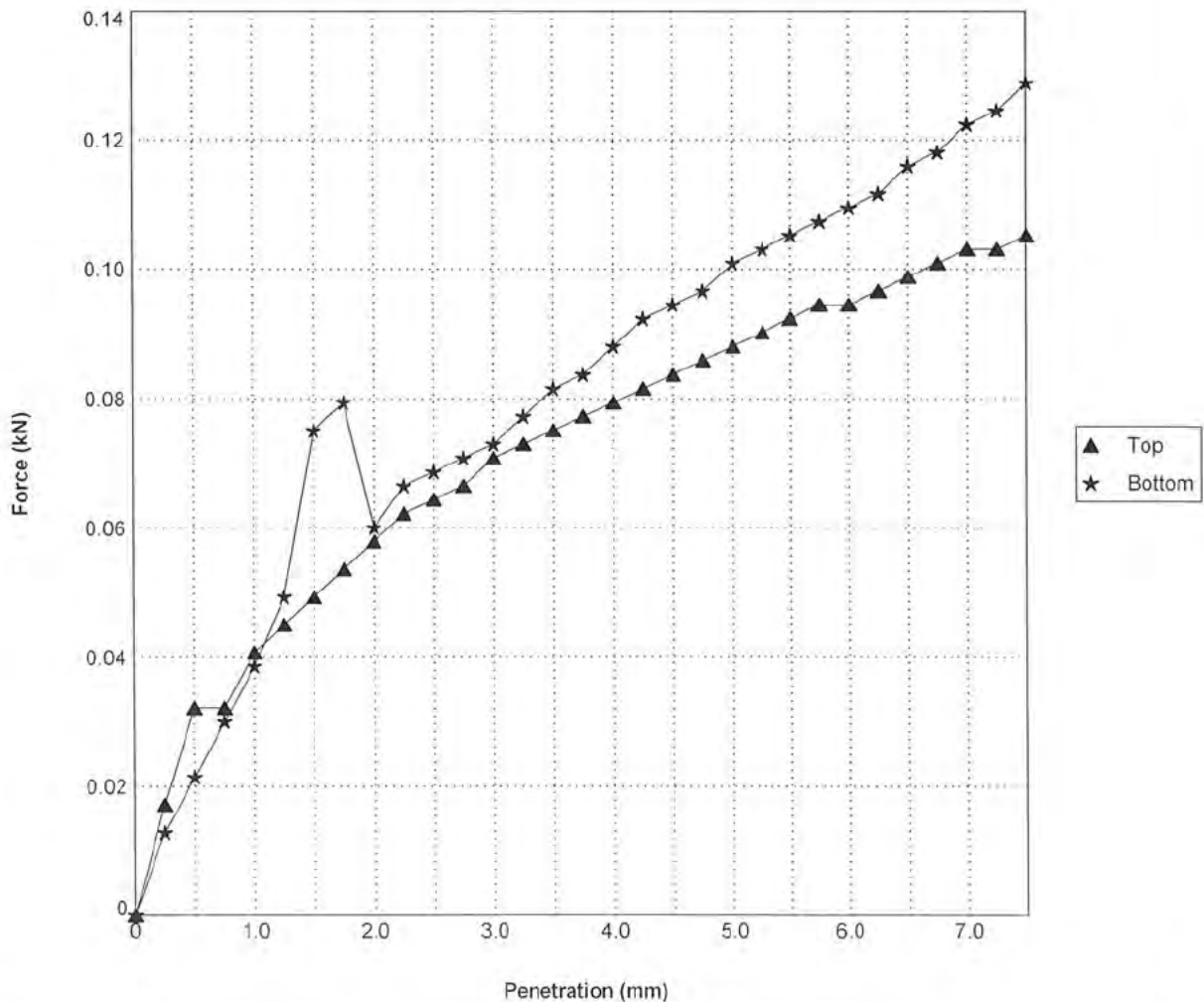
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **BH BB015**

Sample No.- **B6**

Depth (m)- **0.75**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	2.3	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 22 / Bottom 22
Soaking Time (Days) :	N/A	Bulk Density (Mg/m <sup>3</sup> ) :	2.03
Swelling (mm) :	N/A	Dry Density (Mg/m <sup>3</sup> ) :	1.66
Date Tested :	25/03/2021	CBR Value (%) :	Top 0.49 / Bottom 0.52
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signe

Date



31/03/2021

CBR/4322C/BH BB015/B6/0.75/1

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No. :-

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

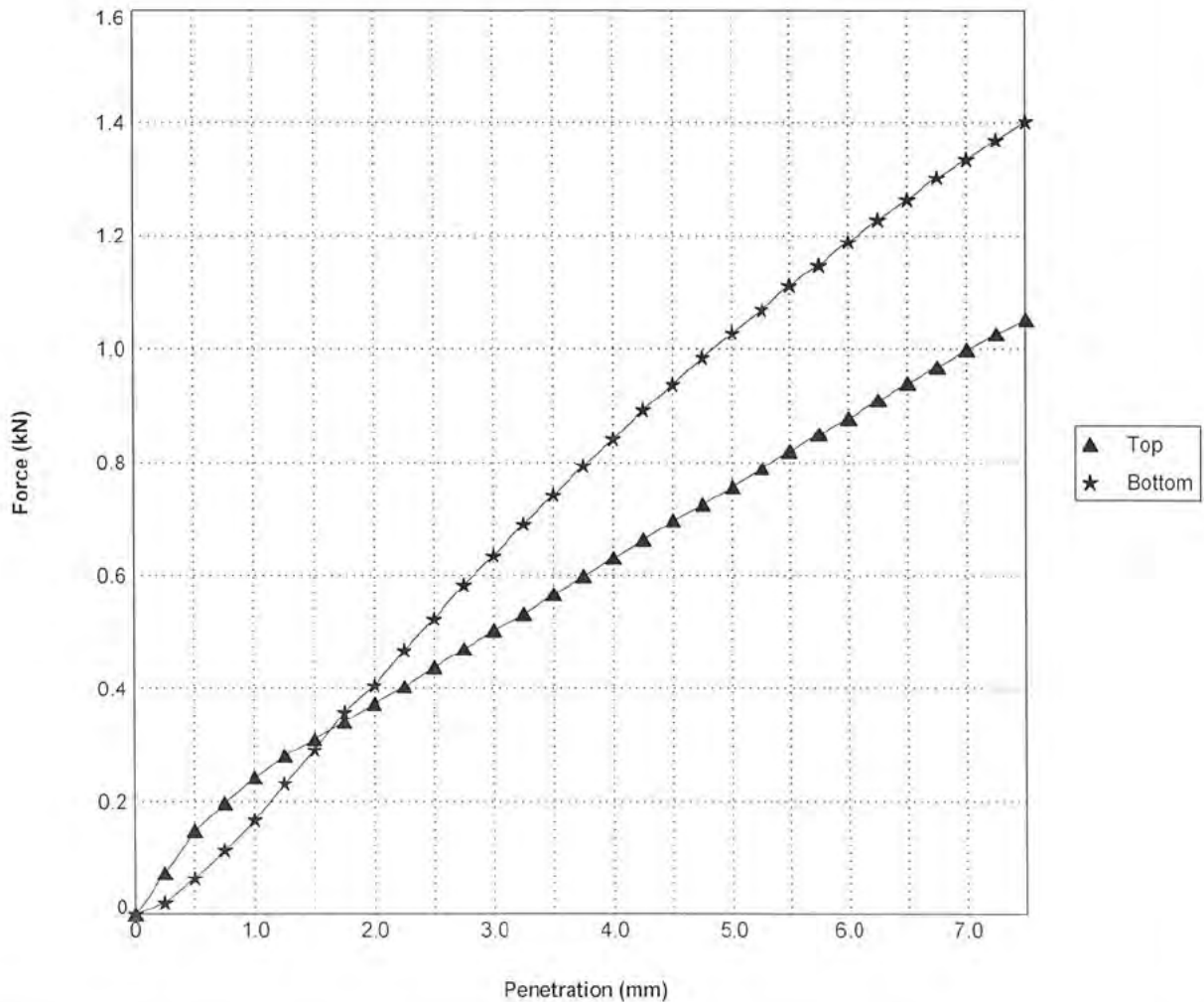
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **BH BB016**

Sample No.- **B9**

Depth (m)- **1.30**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	0.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 19 / Bottom 19
Soaking Time (Days) :	7	Bulk Density (Mg/m <sup>3</sup> ) :	2.08
Swelling (mm) :	0.01	Dry Density (Mg/m <sup>3</sup> ) :	1.75
Date Tested :	25/03/2021	CBR Value (%) :	Top 3.8 / Bottom 5.1
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :-

Date of issue



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NEG Contract No. :-  
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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

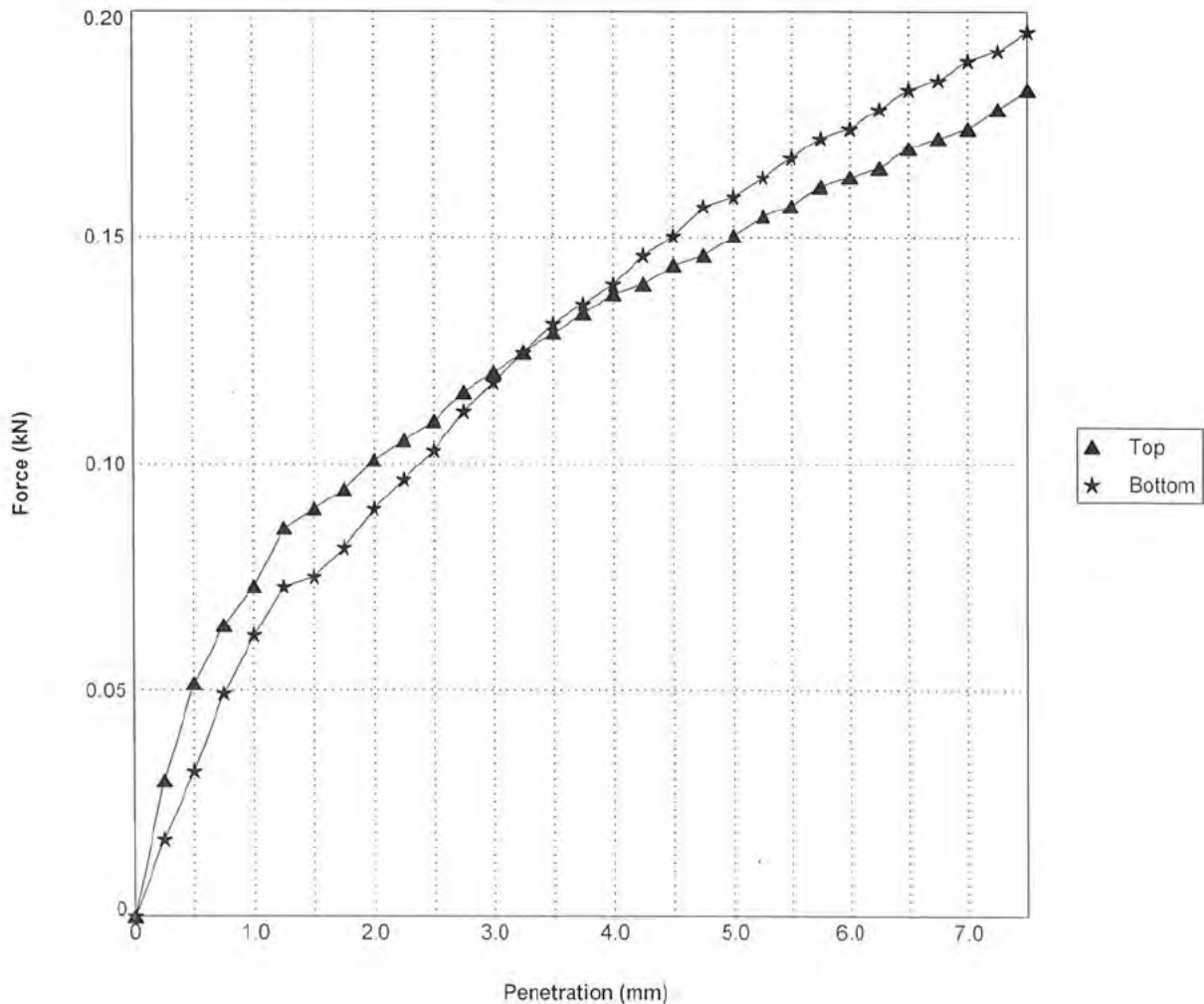
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - **BH BB017**

Sample No. - **B5**

Depth (m) - **0.50**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	0.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 44 / Bottom 41
Soaking Time (Days) :	7.5	Bulk Density (Mg/m <sup>3</sup> ) :	1.75
Swelling (mm) :	0.21	Dry Density (Mg/m <sup>3</sup> ) :	1.23
Date Tested :	23/02/2021	CBR Value (%) :	Top 0.80 / Bottom 0.80
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



Signed :

Date of

25/03/2021

CBR/4322C/BH BB017/B5/0.50/1

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Test No. :-

4322C



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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

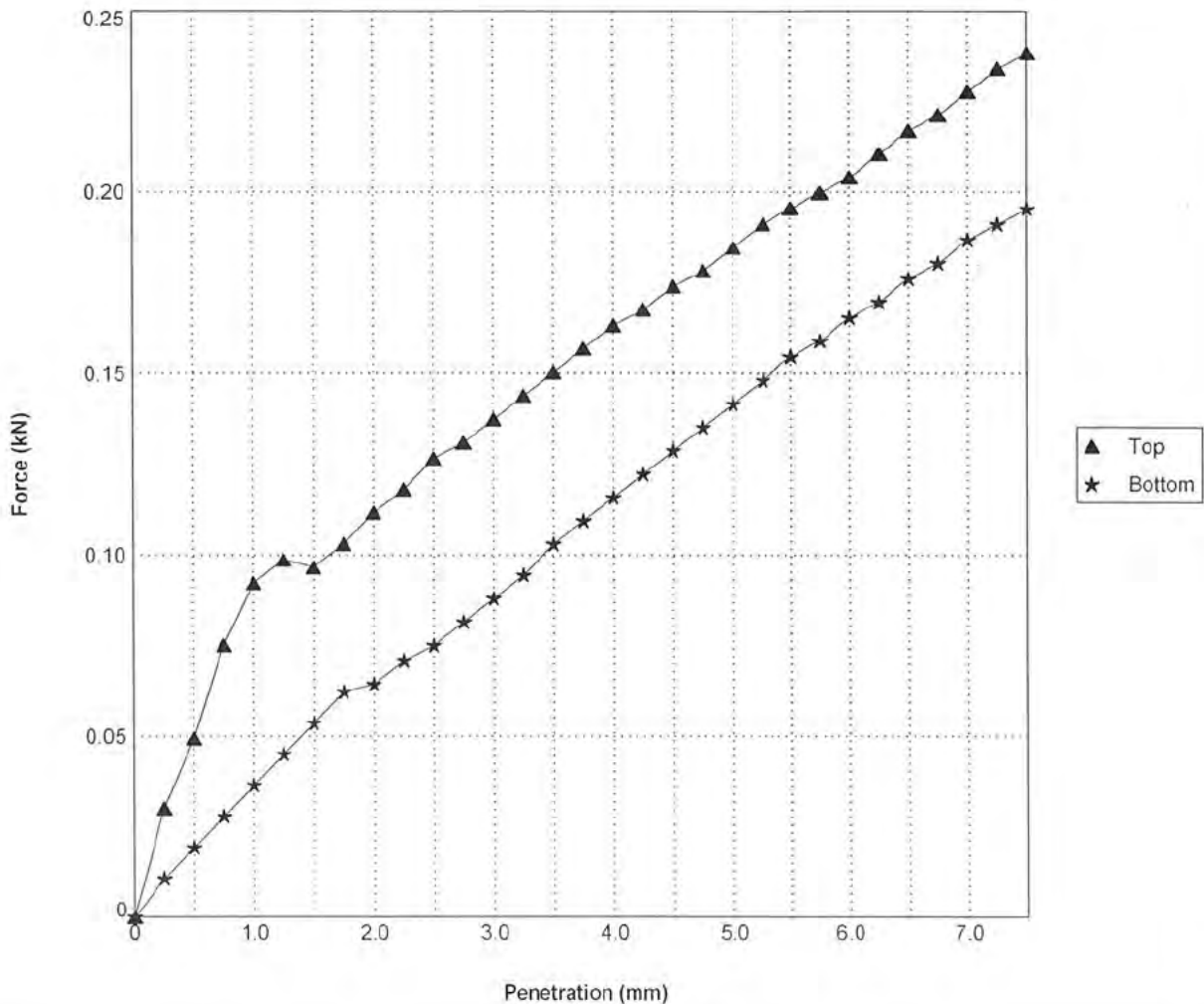
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- TP BB005

Sample No.- B6

Depth (m)- 1.00

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	0.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 27 / Bottom 26
Soaking Time (Days) :	6	Bulk Density (Mg/m <sup>3</sup> ) :	1.93
Swelling (mm) :	0.56	Dry Density (Mg/m <sup>3</sup> ) :	1.53
Date Tested :	25/03/2021	CBR Value (%) :	Top 0.96 / Bottom 0.71
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

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Date of



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Contract No. :-

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

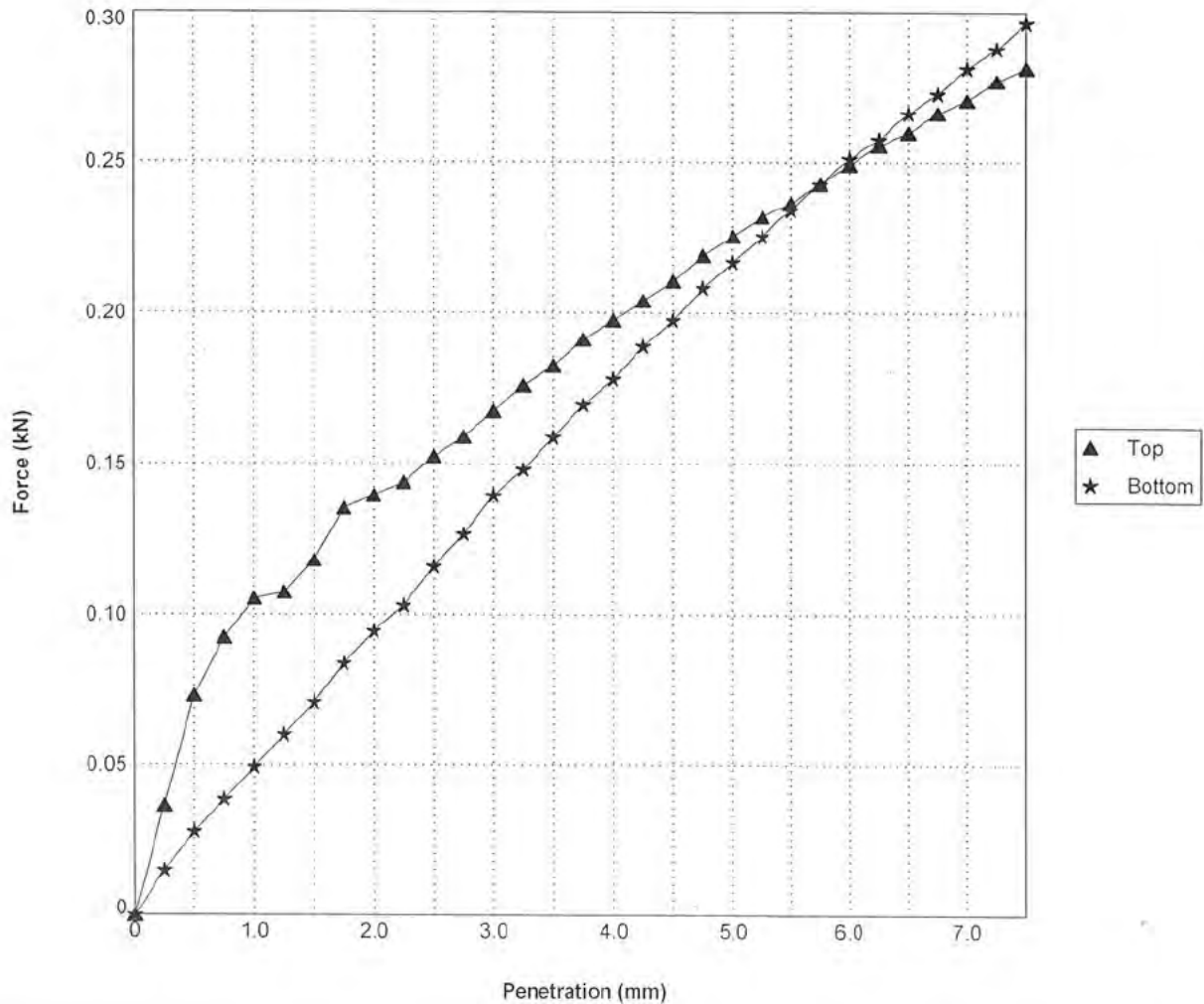
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP BB007**

Sample No.- **B4**

Depth (m)- **0.80**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	1.9	Seating Load (N)	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 23 / Bottom 22
Soaking Time (Days) :	15.5	Bulk Density (Mg/m <sup>3</sup> ) :	2.04
Swelling (mm) :	0.5	Dry Density (Mg/m <sup>3</sup> ) :	1.66
Date Tested :	24/02/2021	CBR Value (%) :	Top 1.2 / Bottom 1.1
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

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Date of Issue: 25/03/2021  
Certificate No.: CBR/4322C/TP BB007/B4/0.80/1

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AMEG Contract No. :-  
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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

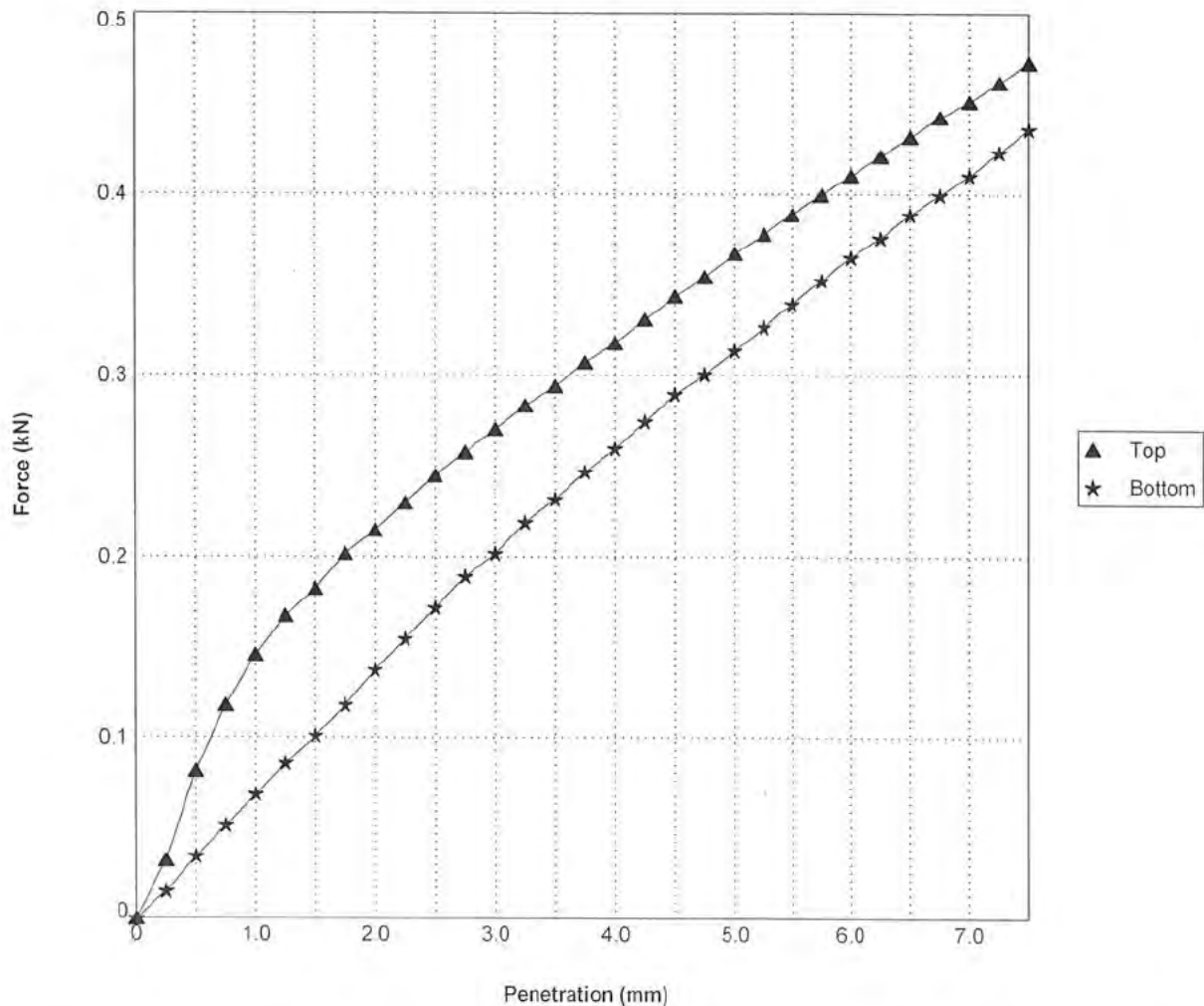
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - TP BB008

Sample No. - B4

Depth (m) - 0.80

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	11.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 22 / Bottom 21
Soaking Time (Days) :	8.5	Bulk Density (Mg/m <sup>3</sup> ) :	2.03
Swelling (mm) :	0.38	Dry Density (Mg/m <sup>3</sup> ) :	1.67
Date Tested :	24/02/2021	CBR Value (%) :	Top 1.9 / Bottom 1.6
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of issue :-

25/03/2021

Certificate No. :-

CBR/4322C/TP BB008/B4/0.80/1

AEG Contract No. :-

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

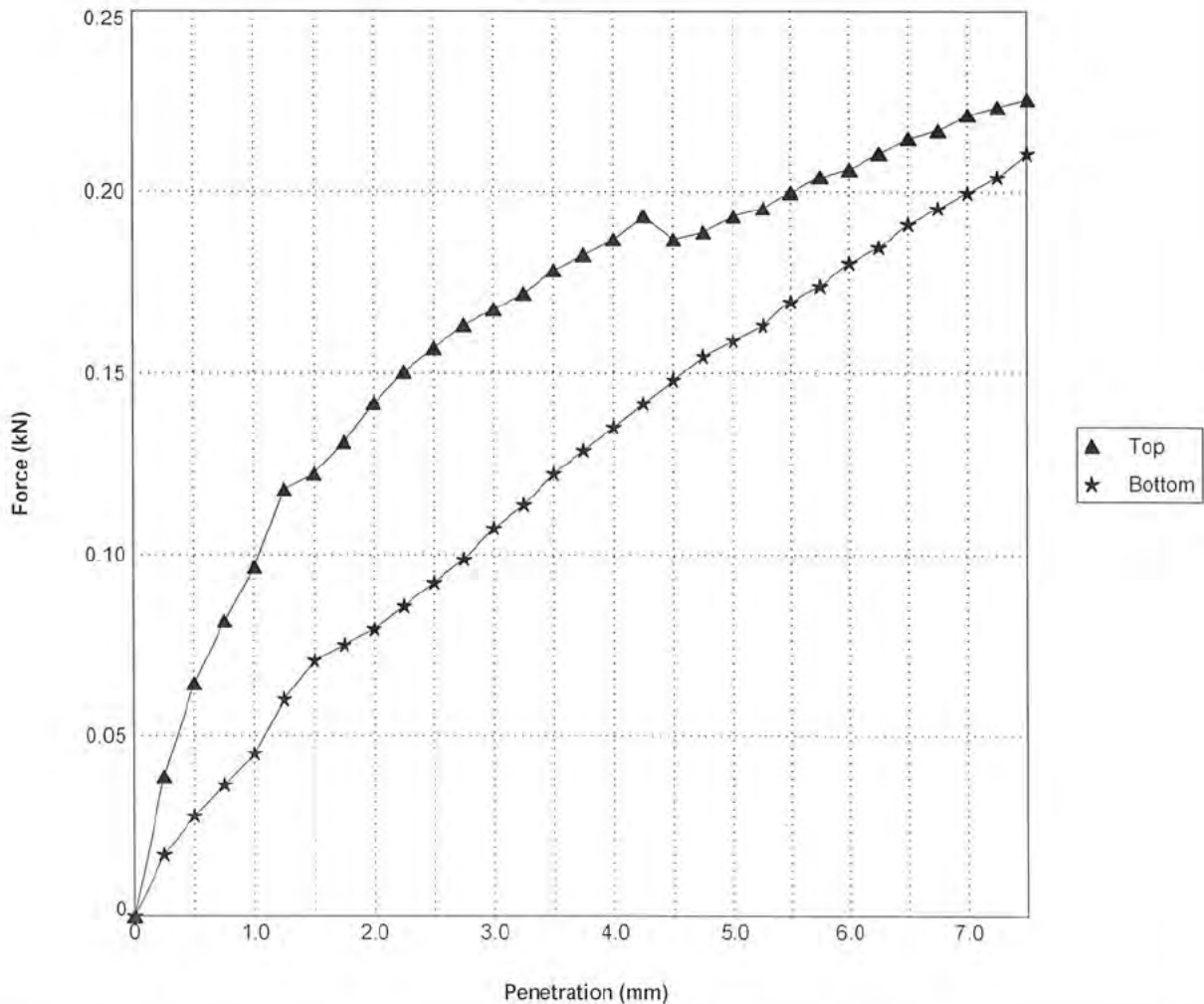
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP BB011**

Sample No.- **B7**

Depth (m)- **1.70**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	7.4	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 22 / Bottom 21
Soaking Time (Days) :	8	Bulk Density (Mg/m <sup>3</sup> ) :	2.05
Swelling (mm) :	0.55	Dry Density (Mg/m <sup>3</sup> ) :	1.69
Date Tested :	20/04/2021	CBR Value (%) :	Top 1.2 / Bottom 0.79
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of

[Redacted Signature and Date]

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Contract No. :-

**4322C**

30/04/2021

CBR/4322C/TP BB011/B7/1.70/1



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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

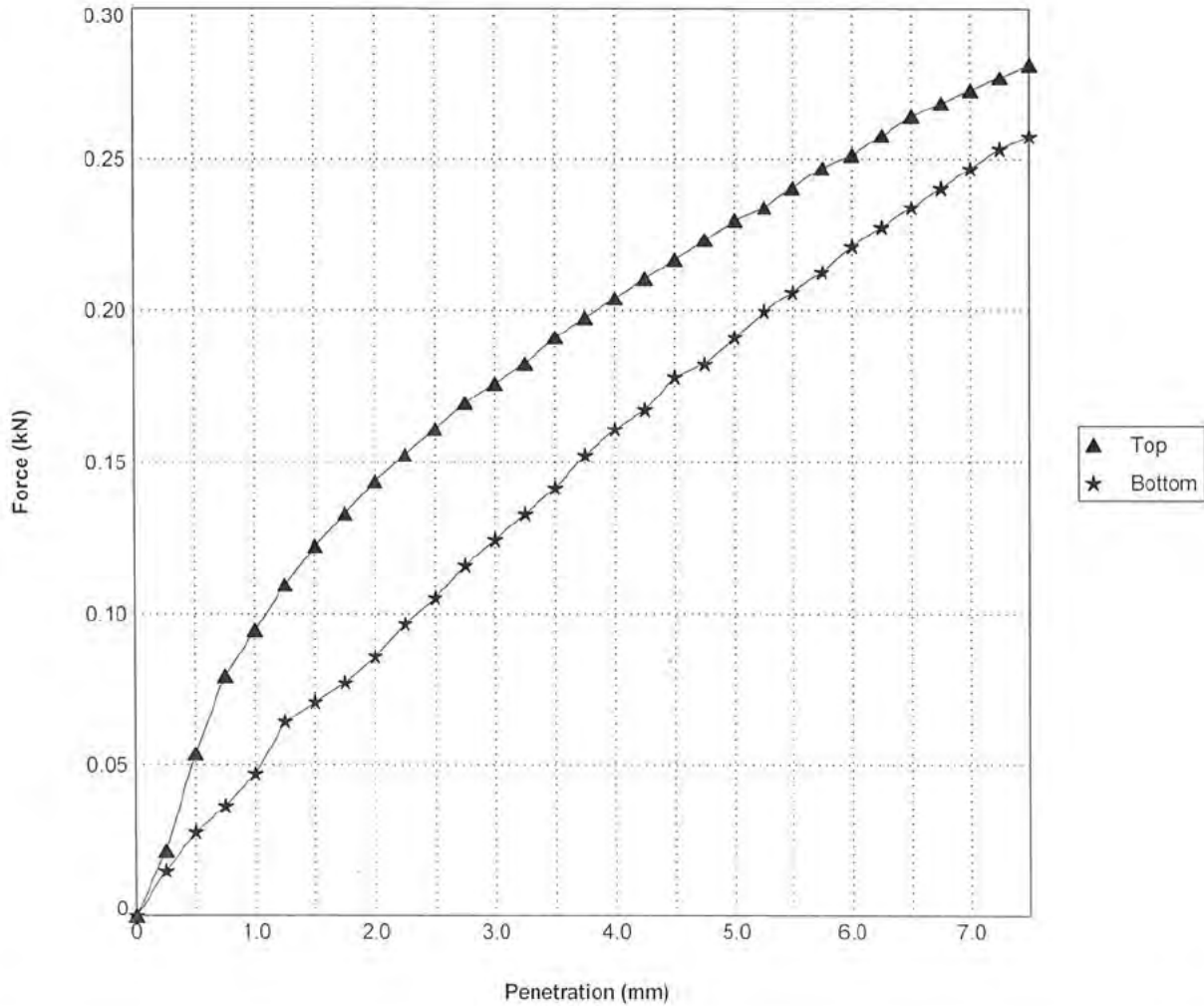
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP BB013**

Sample No.- **B6**

Depth (m)- **0.80**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	23.4	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 18 / Bottom 15
Soaking Time (Days) :	6	Bulk Density (Mg/m <sup>3</sup> ) :	2.15
Swelling (mm) :	0.23	Dry Density (Mg/m <sup>3</sup> ) :	1.85
Date Tested :	25/02/2021	CBR Value (%) :	Top 1.2 / Bottom 1.0
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet.

Contract Title - <b>A66 North Trans Pennine Scheme D Section 7</b>	Client - <b>AMEY OW Limited</b>
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	Signed: <span style="background-color: black; color: black;">[REDACTED]</span>	Page 1 of 1
Date of issue :- 25/03/2021	Certificate No :- CBR/4322C/TP BB013/B6/0.80/1	AEG Contract No. :- <b>4322C</b>



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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

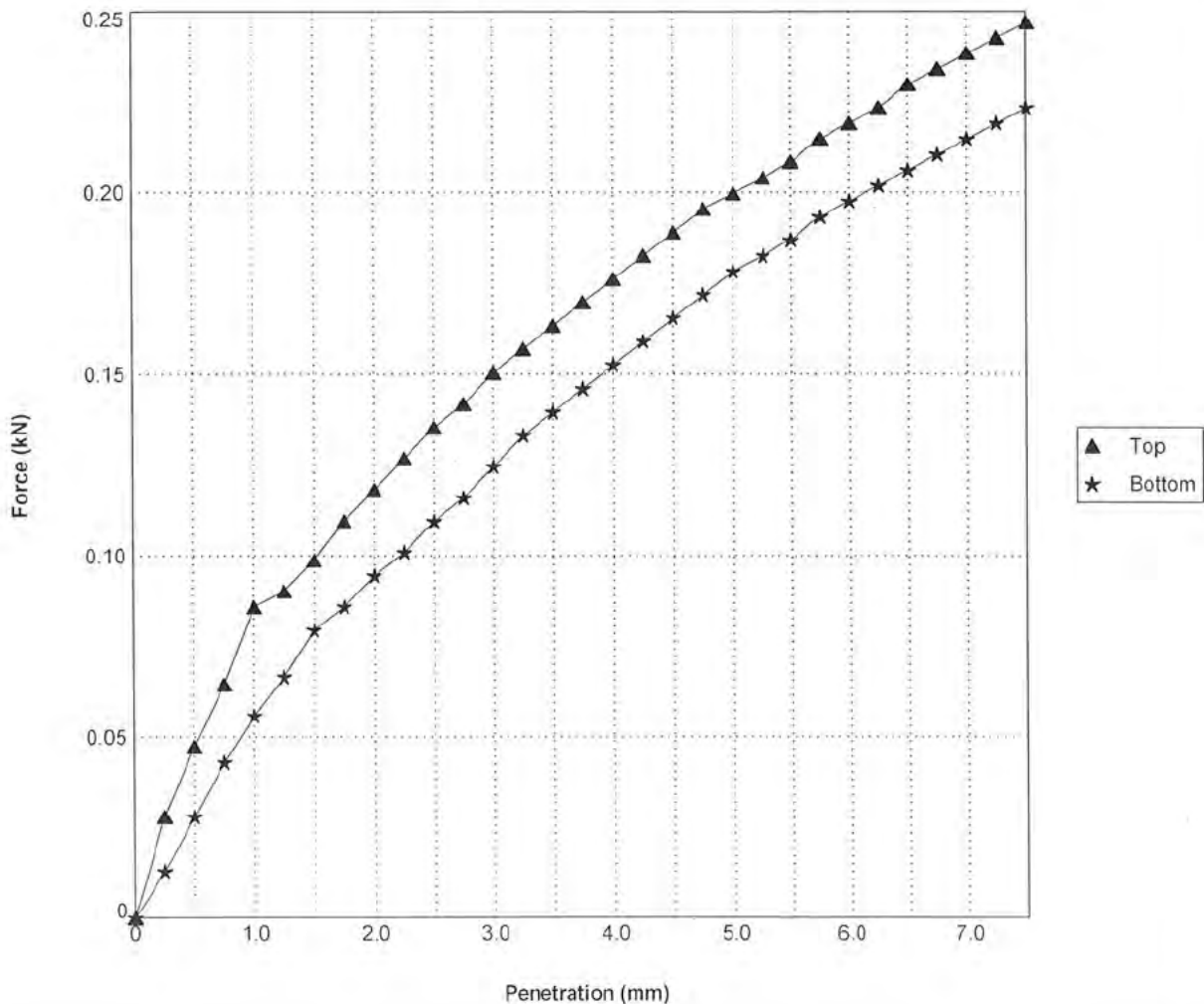
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- TP BB014

Sample No. - B5

Depth (m)- 0.80

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	12.2	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 21 / Bottom 21
Soaking Time (Days) :	5	Bulk Density (Mg/m <sup>3</sup> ) :	2.26
Swelling (mm) :	0.5	Dry Density (Mg/m <sup>3</sup> ) :	1.87
Date Tested :	29/03/2021	CBR Value (%) :	Top 1.0 / Bottom 0.89
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Client :-

AMEY OW Limited



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Date of

[Redacted Signature and Date]

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20/04/2021

CBR/4322C/TP BB014/B5/0.80/1

EG Contract No. :-  
**4322C**



## Determination of One Dimensional Consolidation Properties



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## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	<b>BH BB020</b>	Sample	<b>U8</b>	Depth (m)	<b>2.00m</b>
Specimen Type	<b>Undisturbed</b>	Orientation	<b>Vertical</b>	Specific Depth (m)	<b>2.04m</b>
	INITIAL	FINAL			
Height	18.7	17.2	mm	Particle Density (Assumed)	2.70
Diameter	74.84	74.84	mm	Degree of Saturation (%)	91.6
Moisture Content	18.2	16.5	%	Test Duration (Days)	5
Wet Density	2.08	2.20	Mg/m <sup>3</sup>	Date Tested	14/05/2021
Dry Density	1.76	1.89	Mg/m <sup>3</sup>		

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Voids Ratio
Initial				0.536
0 - 25	1.098	.	21	0.494
25 - 50	0.494	4.51	21	0.476
50 - 100	0.344	5.49	21	0.450
100 - 200	0.236	5.27	21	0.416
200 - 50	0.013	Swelling	21	0.419

For sample description please refer to the Laboratory Sample Description Sheet.

Contract Title: <b>A66 North Trans Pennine Scheme D Section 7</b>		Client: <b>AMEY OW Limited</b>	
	Signed: 	Name: <b>M. SELKIRK</b>	Page 1 of 2
	21/05/2021	Certificate No: 4322C/D	AEG Contract No: 4322C

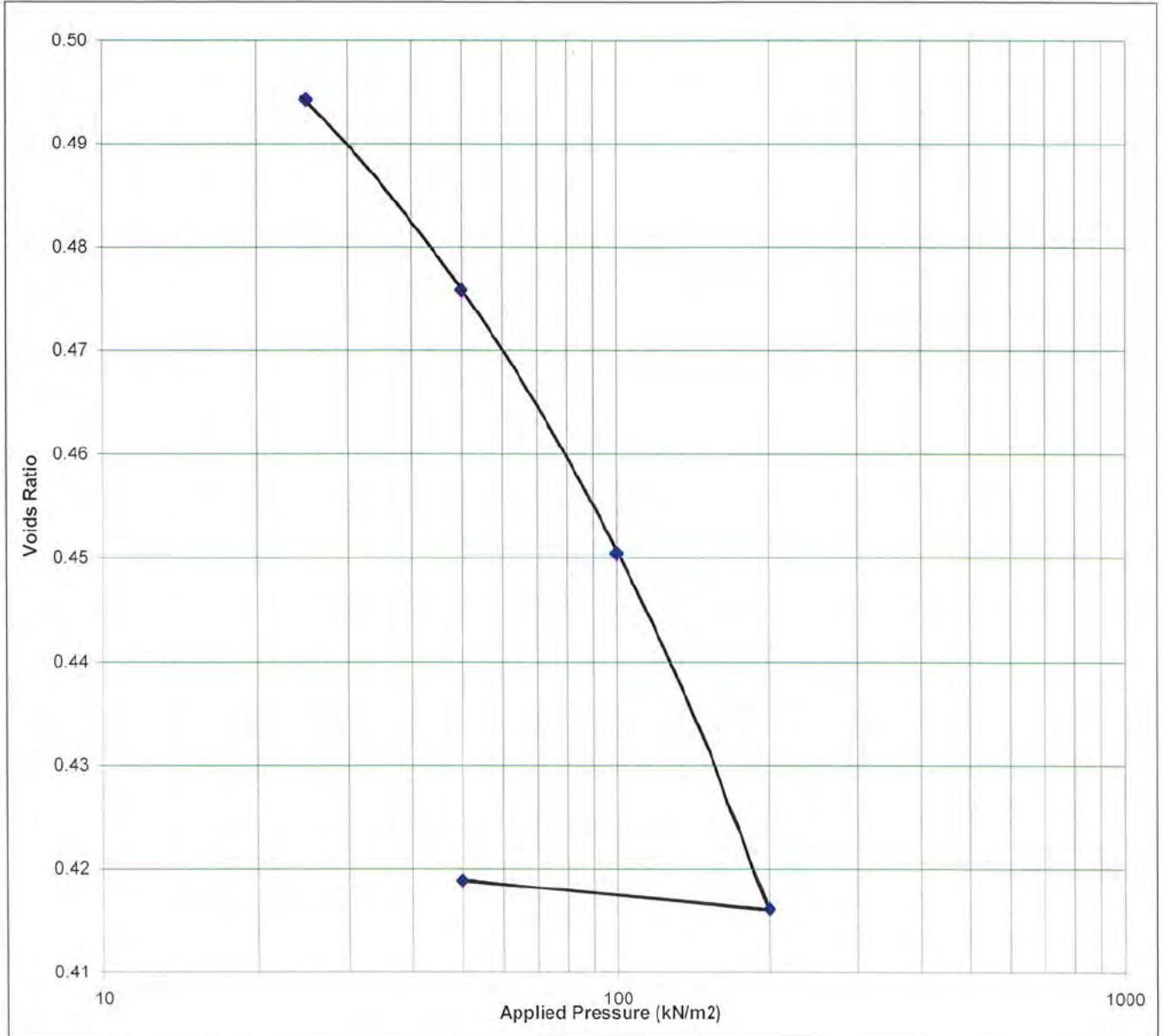
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772735300 Fax: 01772735999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES

BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH BB020	Sample	U8	Depth (m)	2.00m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth (m)	2.04m



Contract Title:  
**A66 North Trans Pennine Scheme D Section 7**

Client:  
**AMEY OW Limited**

[REDACTED]  
Date of Issue:  
21/05/2021

Name:  
**M. SELKIRK**

Certificate No:  
4322C/D

Page 2 of 2

AEG Contract No:  
4322C





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## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	<b>BH BB021</b>	Sample	<b>U8</b>	Depth (m)	<b>1.20m</b>
Specimen Type	<b>Undisturbed</b>	Orientation	<b>Vertical</b>	Specific Depth (m)	<b>1.20m</b>
	INITIAL	FINAL			
Height	18.9	17.0	mm	Particle Density (Assumed)	2.70
Diameter	74.4	74.4	mm	Degree of Saturation (%)	76.7
Moisture Content	19.5	25.8	%	Test Duration (Days)	6
Wet Density	1.91	2.05	Mg/m <sup>3</sup>	Date Tested	23/03/2021
Dry Density	1.60	1.63	Mg/m <sup>3</sup>		

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Void Ratio
Initial				0.686
0 - 12.5	2.248	.	20	0.639
12.5 - 25	1.019	1.83	20	0.618
25 - 50	0.706	2.33	19	0.590
50 - 100	0.415	2.98	20	0.557
100 - 200	0.281	3.21	20	0.513
200 - 50	0.020	Swelling	20	0.518

For sample description please refer to the Laboratory Sample Description Sheet.

Contract Title: <b>A66 North Trans Pennine Scheme D Section 7</b>			Client: <b>AMEY OW Limited</b>	
	Signed: 	Name: <b>M. SELKIRK</b>		Page 1 of 2
	Date of Issue: 31/03/2021	Certificate No: 4322C/B	AEG Contract No: 4322C	
				 1367

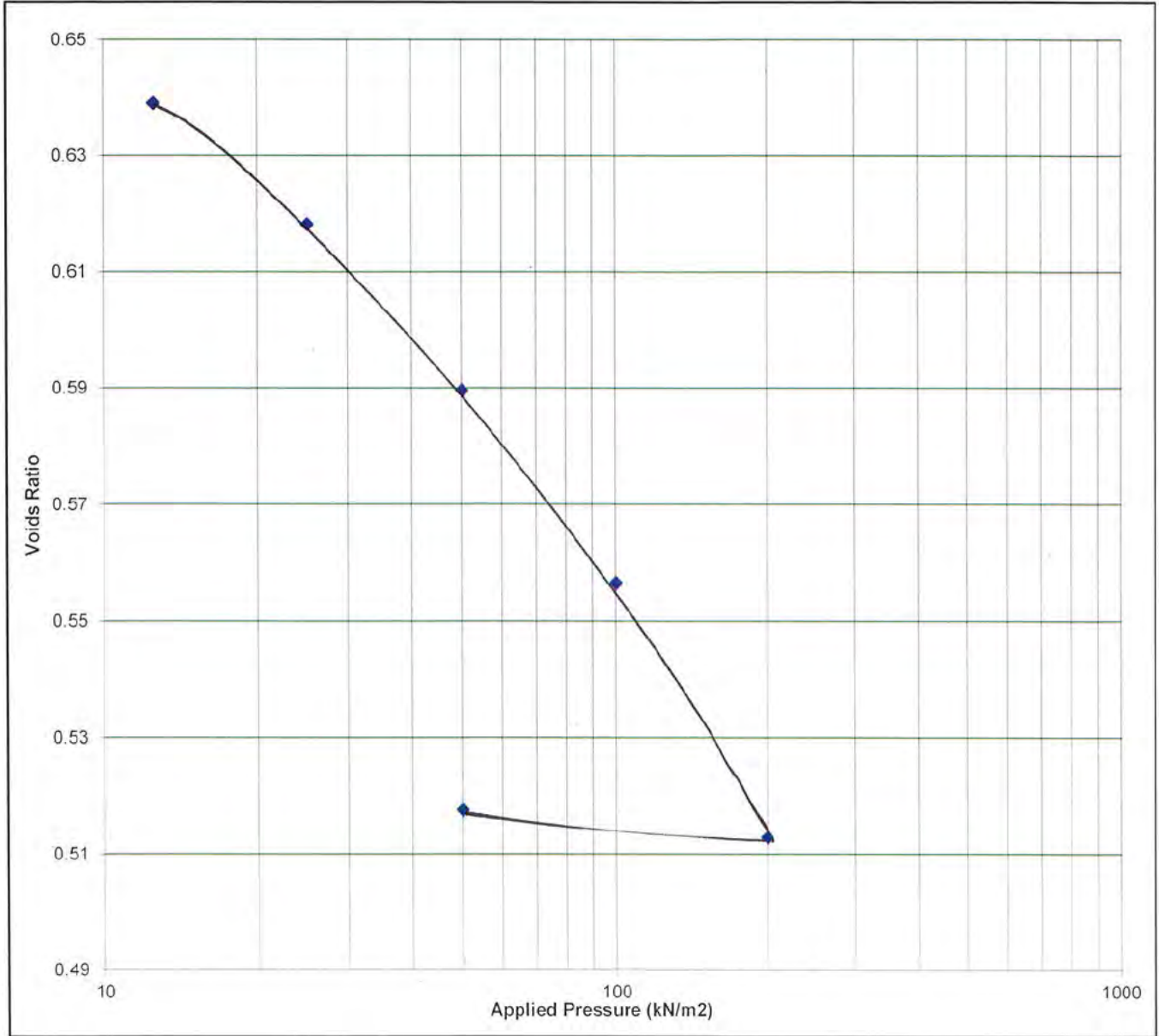
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## ONE DIMENSIONAL CONSOLIDATION PROPERTIES

BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH BB021	Sample	U8	Depth (m)	1.20m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth (m)	1.20m



Contract Title:	Client:
<b>A66 North Trans Pennine Scheme D Section 7</b>	<b>AMEY OW Limited</b>

	Signed:	[Redacted Signature]	Name:	M. SELKIRK	Page 2 of 2
	Date of Issue:	[Redacted Date]	Certificate No:	4322C/B	AEG Contract No:
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## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	<b>BH BB021</b>	Sample	<b>U12</b>	Depth (m)	<b>3.00m</b>
Specimen Type	<b>Undisturbed</b>	Orientation	<b>Vertical</b>	Specific Depth (m)	<b>3.00m</b>
	INITIAL	FINAL			
Height	20.1	18.7	mm	Particle Density (Assumed)	2.70
Diameter	74.5	74.5	mm	Degree of Saturation (%)	99.5
Moisture Content	22.5	12.7	%	Test Duration (Days)	6
Wet Density	2.05	2.15	Mg/m <sup>3</sup>	Date Tested	23/03/2021
Dry Density	1.68	1.91	Mg/m <sup>3</sup>		

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Voids Ratio
Initial				0.611
0 - 25	0.772	.	20	0.580
25 - 50	0.353	3.12	20	0.566
50 - 100	0.248	4.00	19	0.546
100 - 200	0.156	4.84	20	0.522
200 - 400	0.093	4.67	20	0.494
400 - 100	0.009	Swelling	20	0.498

For sample description please refer to the Laboratory Sample Description Sheet.

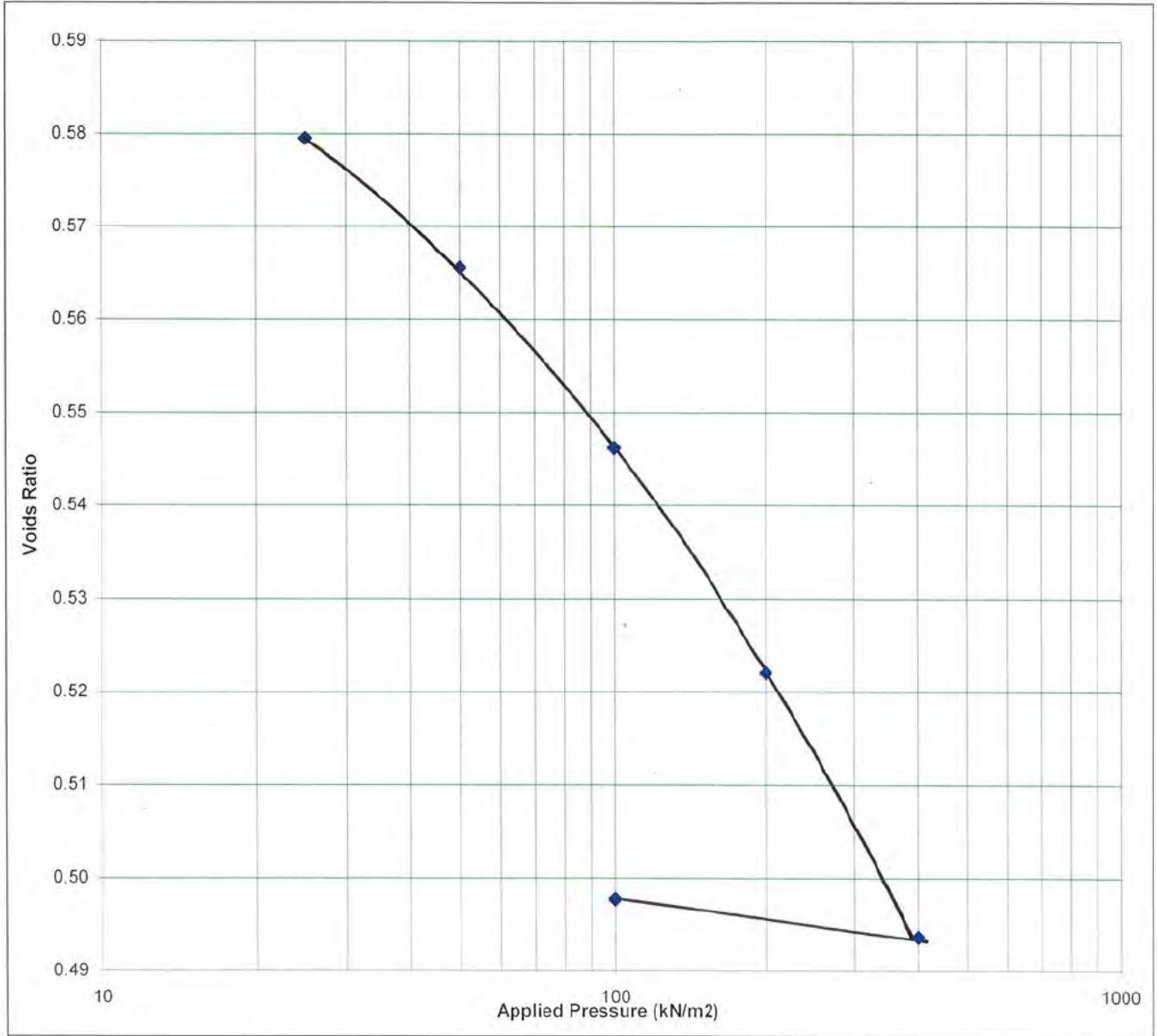
Contract Title: <b>A66 North Trans Pennine Scheme D Section 7</b>			Client: <b>AMEY OW Limited</b>	
	Signed: <div style="background-color: black; width: 150px; height: 40px; margin: 5px 0;"></div>	Name: <b>M. SELKIRK</b>		Page 1 of 2
	Date of Issue: 31/03/2021	Certificate No: 4322C/A	AEG Contract No: 4322C	
				 1367

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel 0191 378 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel 01772735300 Fax: 01772735999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	<b>BH BB021</b>	Sample	<b>U12</b>	Depth (m)	<b>3.00m</b>
Specimen Type	<b>Undisturbed</b>	Orientation	<b>Vertical</b>	Specific Depth (m)	<b>3.00m</b>



Contract Title:	Client:
<b>A66 North Trans Pennine Scheme D Section 7</b>	<b>AMEY OW Limited</b>

	Signed:	Name:	<b>M. SELKIRK</b>	Page 2 of 2
	Date of Issue:	Certificate No:	AEG Contract No:	
	<b>31/03/2021</b>	<b>4322C/A</b>	<b>4322C</b>	 1367



# ALLIED EXPLORATION & GEOTECHNICS LIMITED



Head Office: Unit 25 Steels Gill Industrial Estate, Pelton Fell, Chesler-le-Street, Co. Durham, DH2 2RG - Tel 0191 3784700 Fax: 0191 3674710  
Regional Office: Unit 20, Business Development Centre, Eastam Wharf, Blackburn, BB1 5BL - Tel 01772735300 Fax 01772735999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	<b>BHBB022</b>	Sample	<b>U5</b>	Depth (m)	<b>1.50m</b>
Specimen Type	<b>Undisturbed</b>	Orientation	<b>Vertical</b>	Specific Depth (m)	<b>1.50m</b>
	INITIAL	FINAL			
Height	18.5	17.0	mm	Particle Density (Assumed)	2.70
Diameter	75.04	75.04	mm	Degree of Saturation (%)	90.2
Moisture Content	20.0	19.7	%	Test Duration (Days)	6
Wet Density	2.03	2.15	Mg/m <sup>3</sup>	Date Tested	06/04/2021
Dry Density	1.69	1.79	Mg/m <sup>3</sup>		

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Voids Ratio
Initial				0.599
0 - 12.5	1.868	.	18	0.561
12.5 - 25	0.853	5.99	19	0.545
25 - 50	0.592	4.17	18	0.522
50 - 100	0.397	4.63	18	0.492
100 - 200	0.224	5.56	18	0.458
200 - 50	0.021	Swelling	18	0.463

For sample description please refer to the Laboratory Sample Description Sheet.

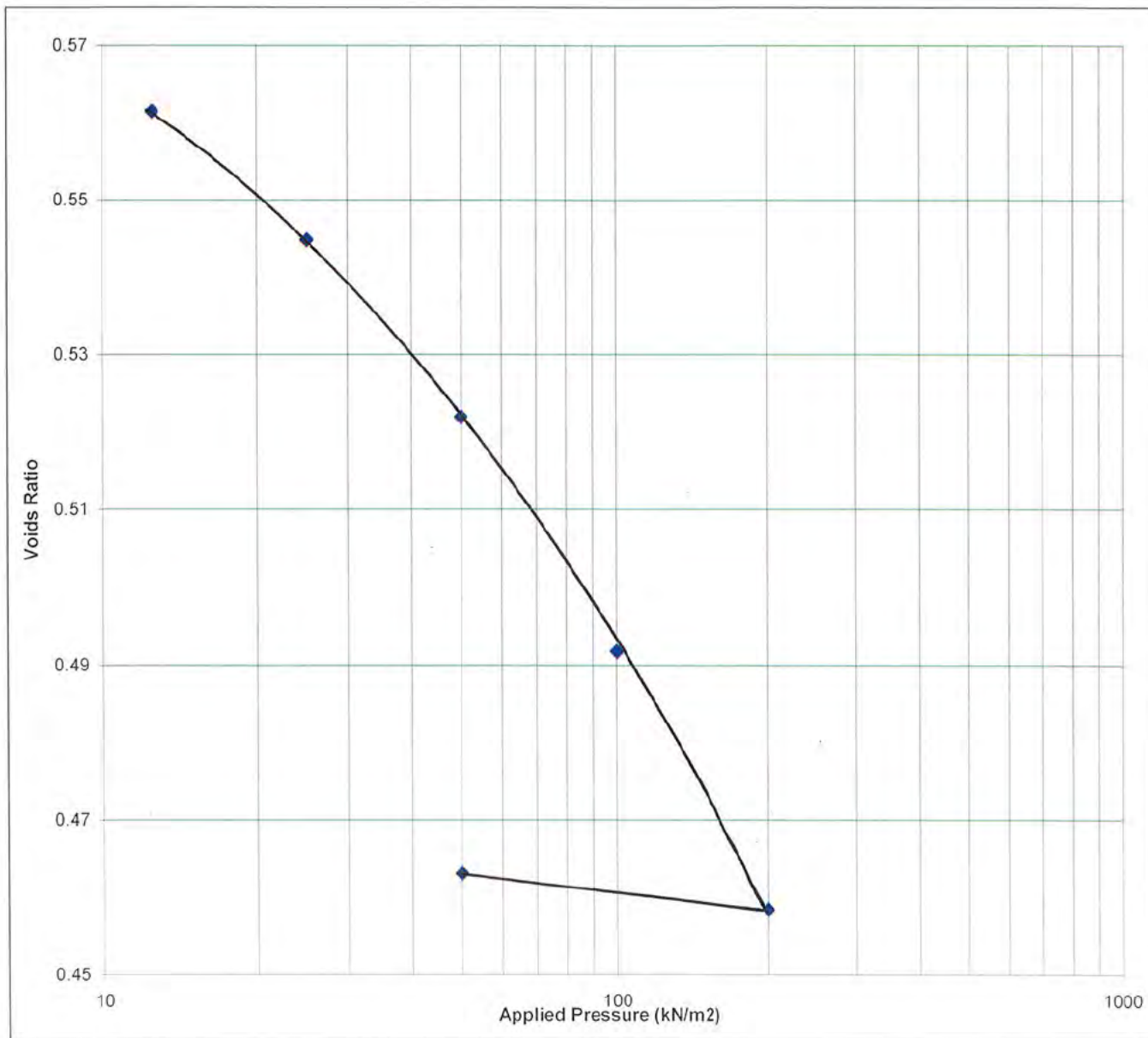
Contract Title: <b>A66 North Trans Pennine Scheme D Section 7</b>		Client: <b>AMEY OW Limited</b>	
	Signed: 	Name: <b>M. SELKIRK</b>	Page 1 of 2
	Date of Issue: 16/04/2021	Certificate No: 4322C/C	AEG Contract No: 4322C

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel 01727353000 Fax: 0172735999

## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BHBB022	Sample	U5	Depth (m)	1.50m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth (m)	1.50m



Contract Title:  
**A66 North Trans Pennine Scheme D Section 7**

Client:  
**AMEY OW Limited**



Signed:		Name:	M. SELKIRK
Date of Issue:	16/04/2021	Certificate No:	4322C/C
		AEG Contract No:	4322C

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## Shear Strength by Hand Vane

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Paltin Fall, Chestaile Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Earsom Wharf, Blackburn, BB1 5BL - Tel: 01772735300 Fax: 01772735999

## DETERMINATION OF SHEAR STRENGTH BY HAND VANE

For sample description please refer to Sample Description Sheet.

Exploratory Hole No.	Depth (m BGL)	Sample Type & No.	Vane Shear Strength	Remarks*	
BH BB014	1.50	U4	36kPa	TOP	
			20kPa		
			24kPa	Average	
			27kPa		
			80kPa		BOTTOM
			82kPa		
78kPa					
80kPa					
BH BB025	1.20	U5	29kPa	Average	
			30kPa		
			28kPa		
			29kPa		
			29kPa		

\* All specific depths are approximate within the sample.

Contract Title: A66 North Trans Pennine Scheme D Section 7	Client: AMEY OW Limited
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			Page 1 of 1	
			EG Contract No.: 4322C	
20/04/2021	Certificate No.4322C/HV01	4322C		



## Shear Strength by Direct Shear



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.** 4322C

**Borehole:** BH BB004

**Sample:** B7

**Depth:** 1.20 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.2	23.2	23.2
Initial Moisture Content	%	19.8	19.8	19.8
Initial Wet density	mg/m <sup>3</sup>	2.06	2.06	2.05
Initial Dry density	mg/m <sup>3</sup>	1.72	1.72	1.71
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	25	50	100
Height at end of Stage	mm	22.1	21.8	21.2
Duration	Day(s)	1.0	1.0	1.5

### SHEARING

Rate of Strain	mm/min	0.0056	0.0056	0.0056
Peak Shear Stress	kPa	14.3	31.0	59.5
Displacement at Peak Stress	mm	4.36	8.87	9.42
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	1.0	1.0	1.0
Final Moisture Content	%	17.2	17.1	16.3
Final Wet Density	mg/m <sup>3</sup>	2.12	2.15	2.18
Final Dry Density	mg/m <sup>3</sup>	1.81	1.83	1.87

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	2
Angle of Shearing Resistance phi'	Deg	30°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

**REMARKS:** Remoulded (2.5kg Rammer).

**DATE TESTED** 19/05/2021

**DATE OF ISSUE** 14/06/2021

**NAME** Michelle Selkirk

**APPROVED BY**





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

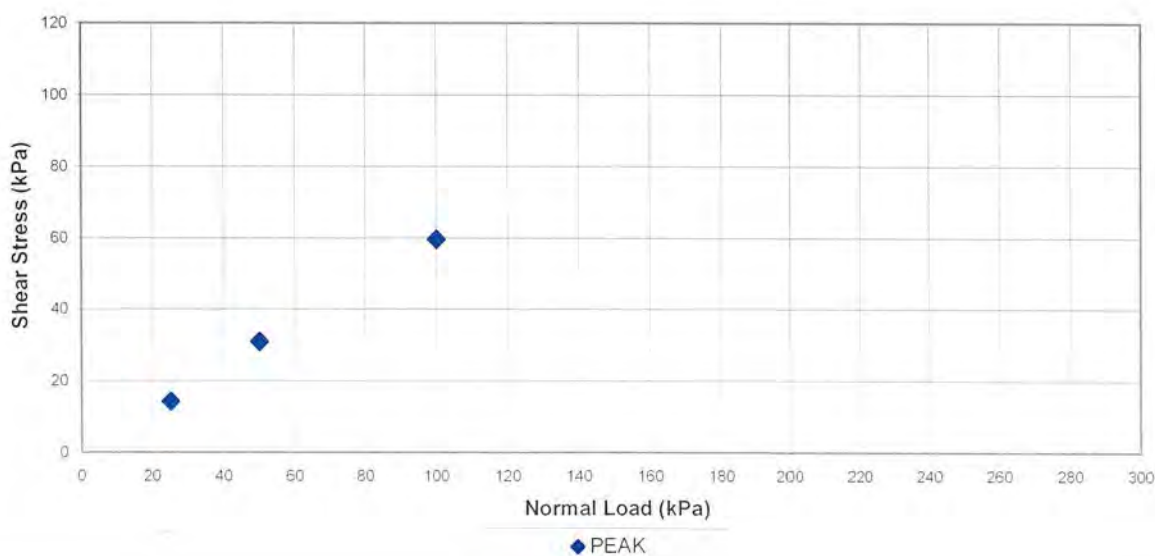
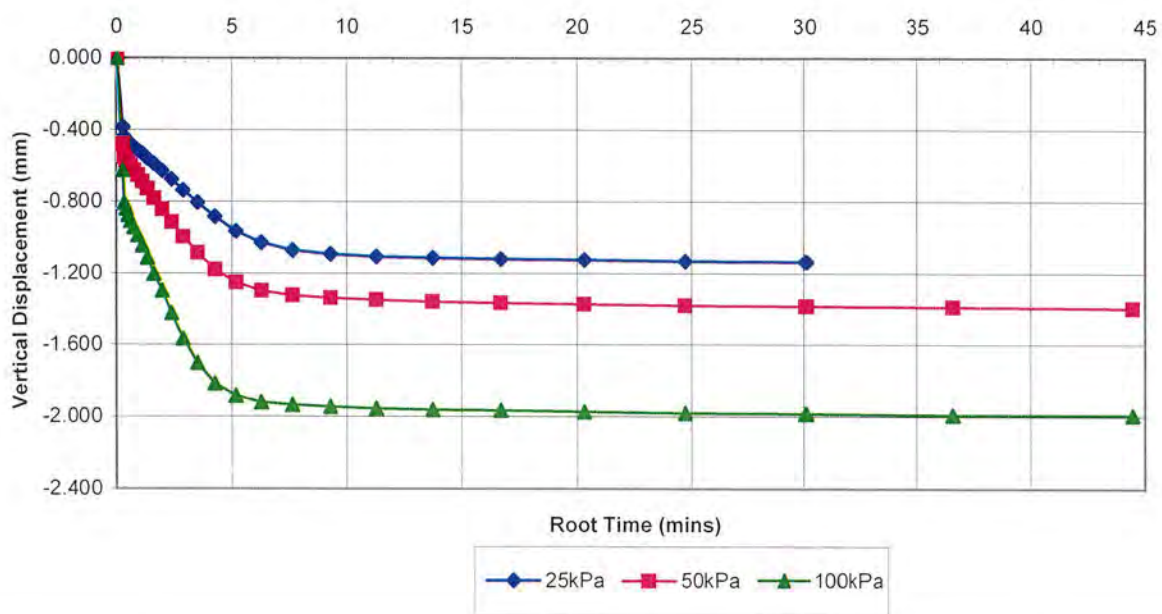
**Client:** AMEY OW Limited

**Job No.** 4322C

**Borehole:** BH BB004

**Sample:** B7

**Depth:** 1.20 m.





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

**Borehole:** BH BB004

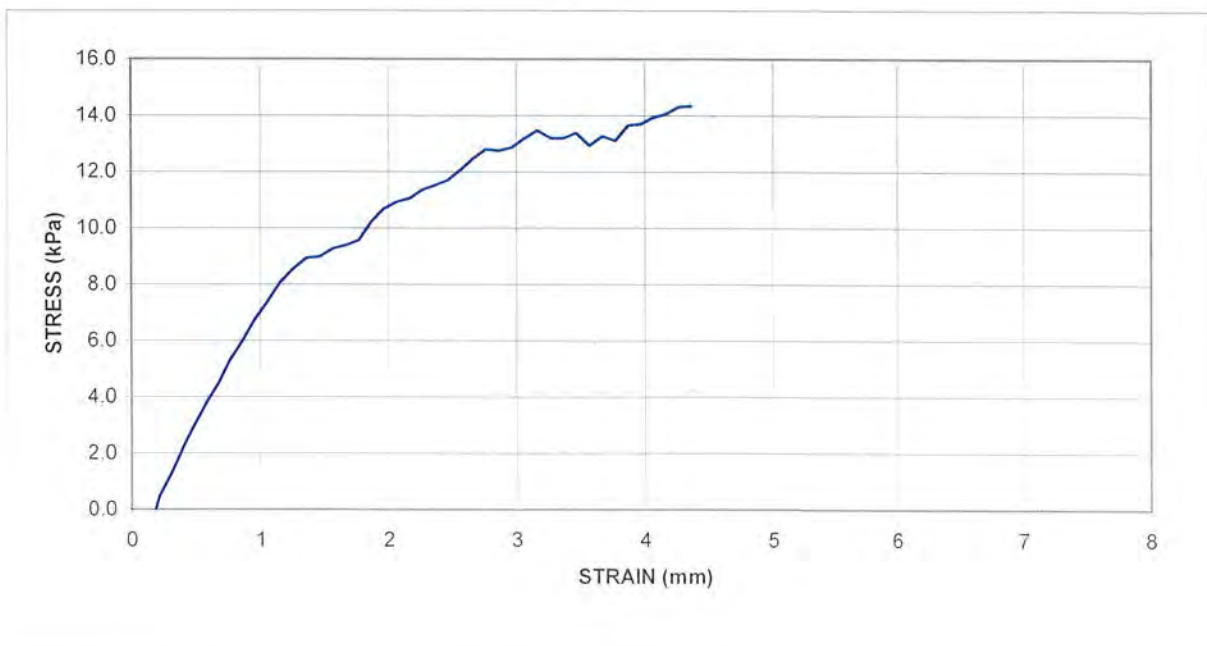
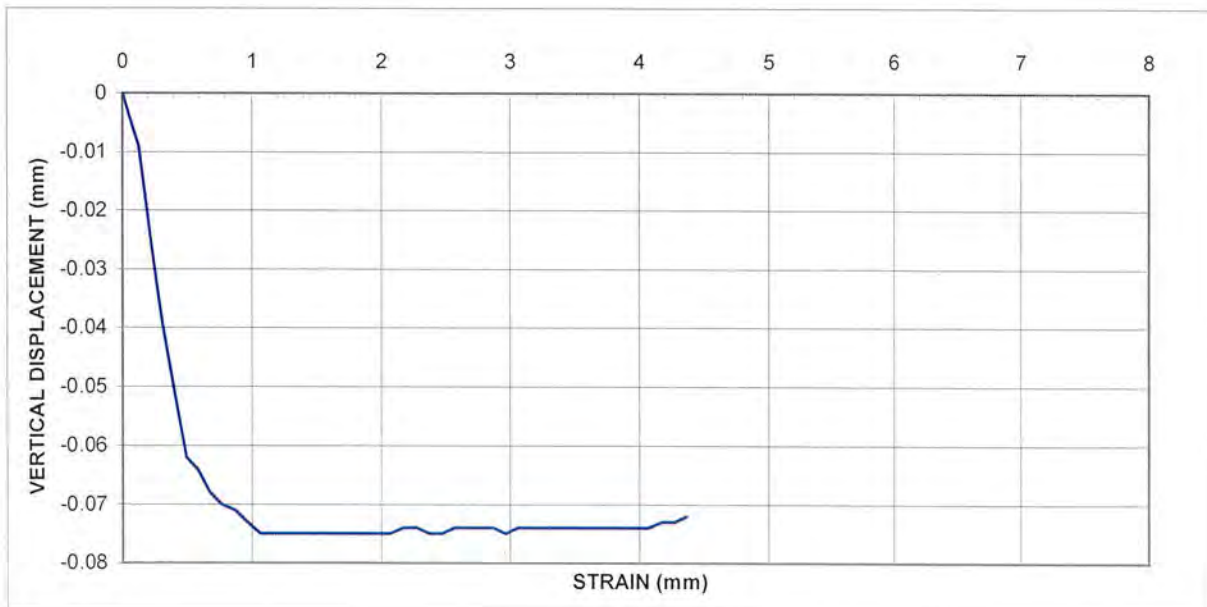
**Sample:** B7

**Depth:** 1.20 m.

**Stage Number** 1

**Pressure** 25 kPa

25 kPa







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Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4  
 (Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7  
**Client:** AMEY OW Limited

**Job No.:** 4322C

**Borehole:** BH BB004

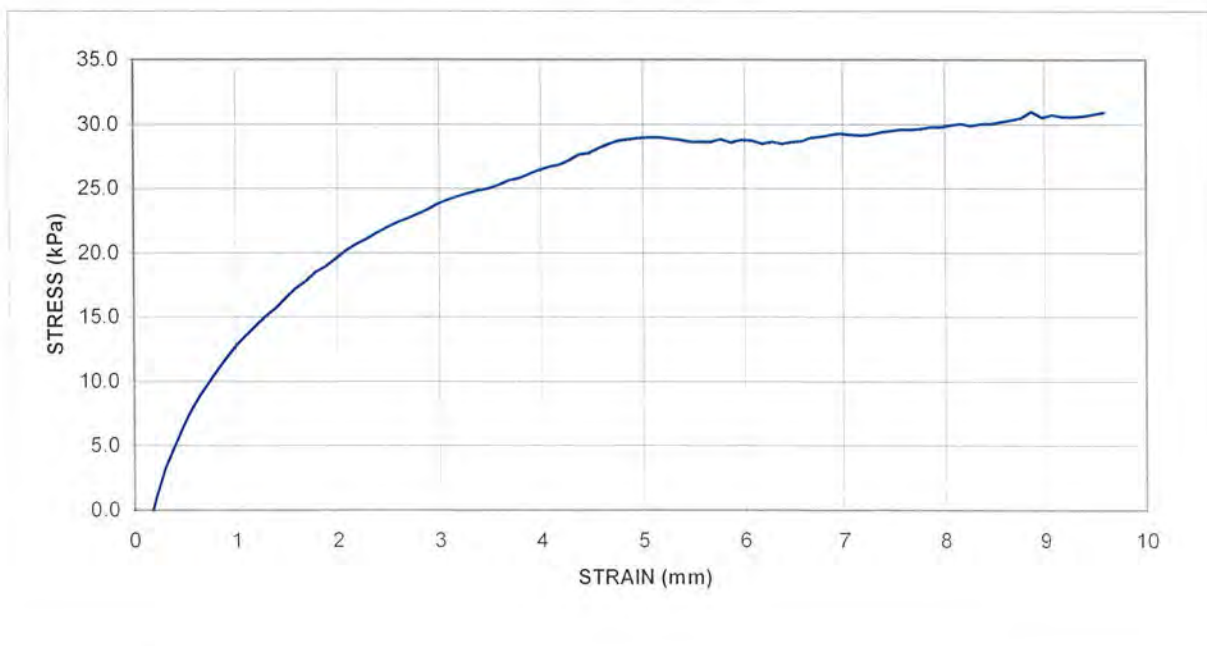
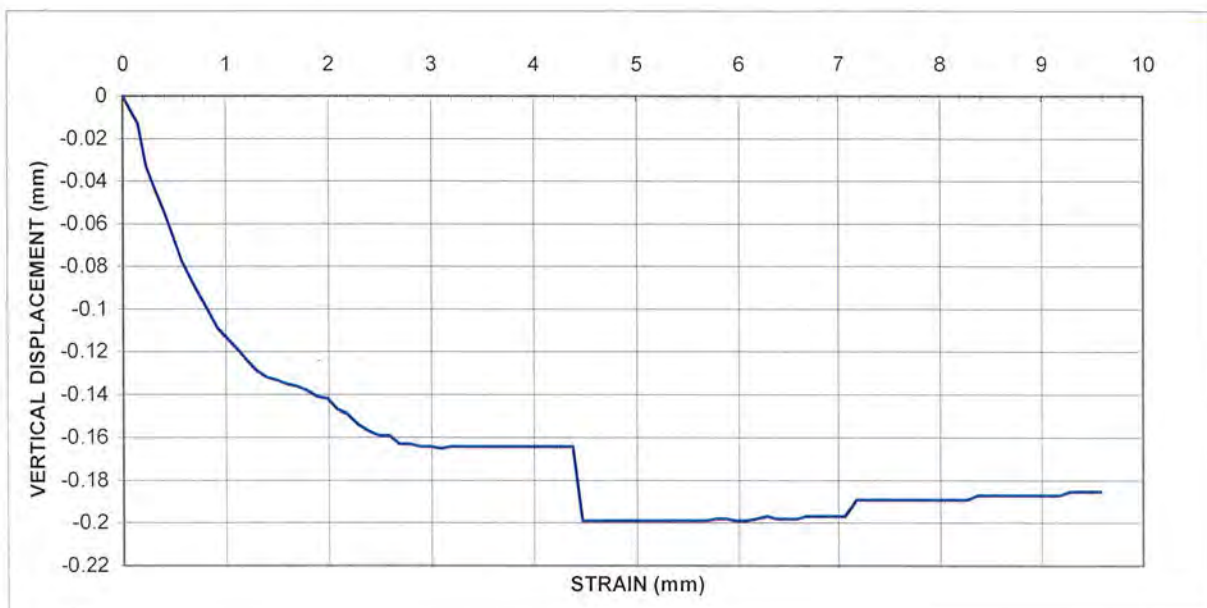
**Sample:** B7

**Depth:** 1.20 m.

**Stage Number** 2

**Pressure** 50 kPa

50 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

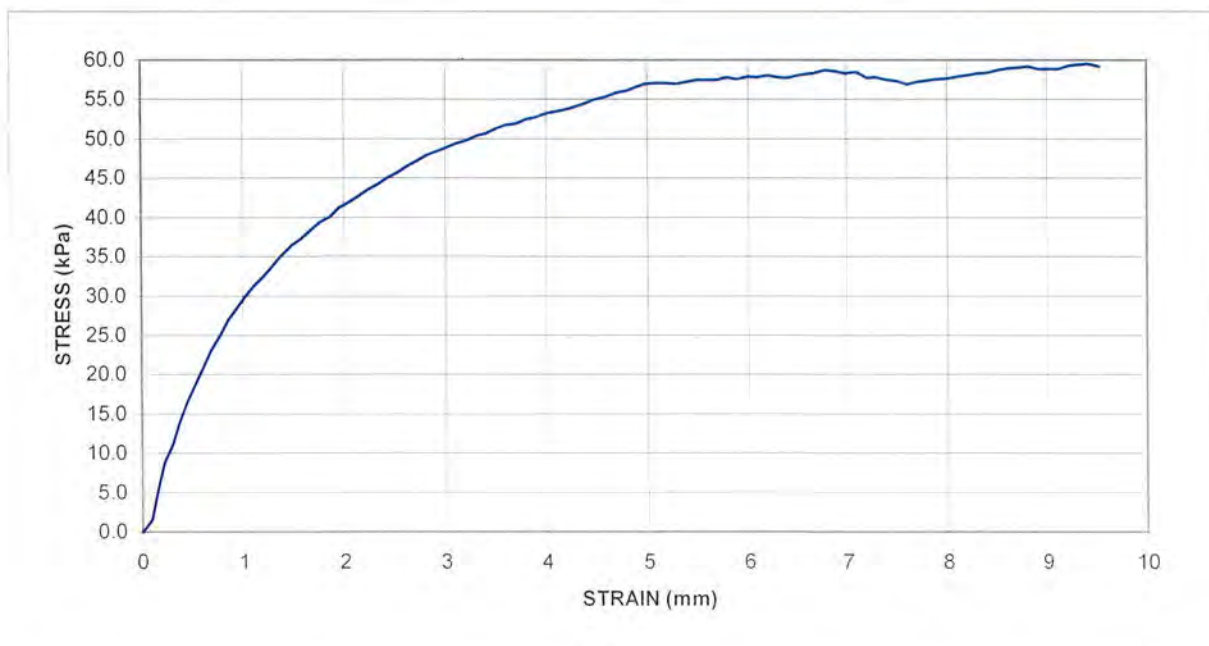
**Borehole:** BH BB004

**Sample:** B7

**Depth:** 1.20 m.

**Stage Number** 3

**Pressure** 100 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Felton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB004

**Sample:** B10

**Depth:** 2.50 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.2	23.2	23.3
Initial Moisture Content	%	18.1	18.1	18.1
Initial Wet density	mg/m <sup>3</sup>	2.08	2.07	2.08
Initial Dry density	mg/m <sup>3</sup>	1.76	1.76	1.76
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	20	40	60
Height at end of Stage	mm	22.5	22.2	22.1
Duration	Day(s)	1.0	1.0	1.0

### SHEARING

Rate of Strain	mm/min	0.008	0.008	0.008
Peak Shear Stress	kPa	9.0	23.5	34.2
Displacement at Peak Stress	mm	1.97	6.36	3.54
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	1.0	1.0	1.0
Final Moisture Content	%	18.1	17.3	16.6
Final Wet Density	mg/m <sup>3</sup>	2.14	2.16	2.17
Final Dry Density	mg/m <sup>3</sup>	1.81	1.84	1.86

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	1
Angle of Shearing Resistance phi'	Deg	28°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

**REMARKS:** Remoulded (4.5kg Rammer).

**DATE TESTED** 12/05/2021  
**DATE OF ISSUE** 24/05/2021

**NAME** Michelle Gill  
**APPROVED BY** [REDACTED]



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

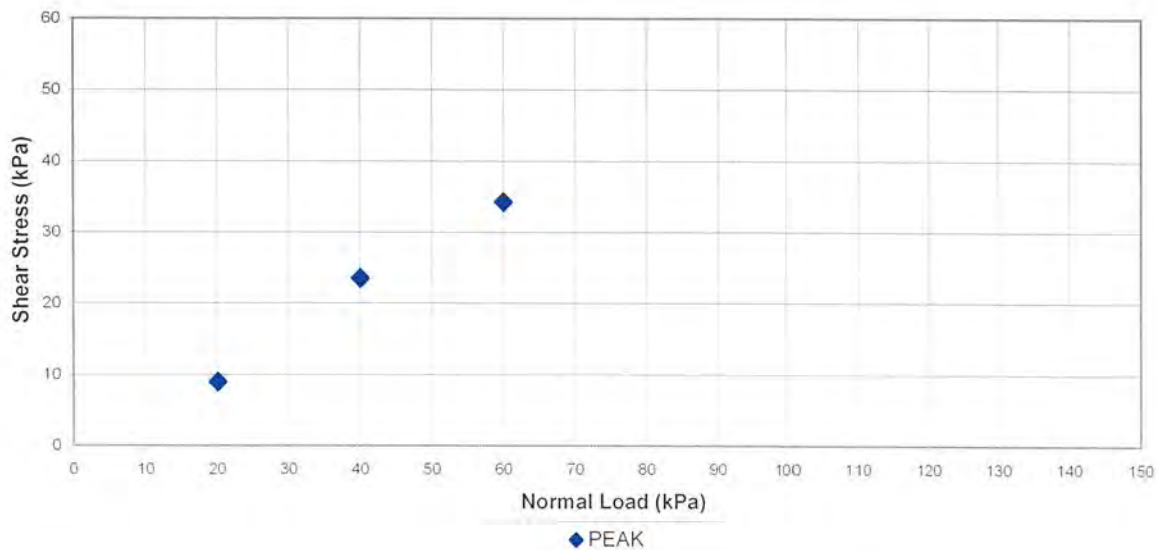
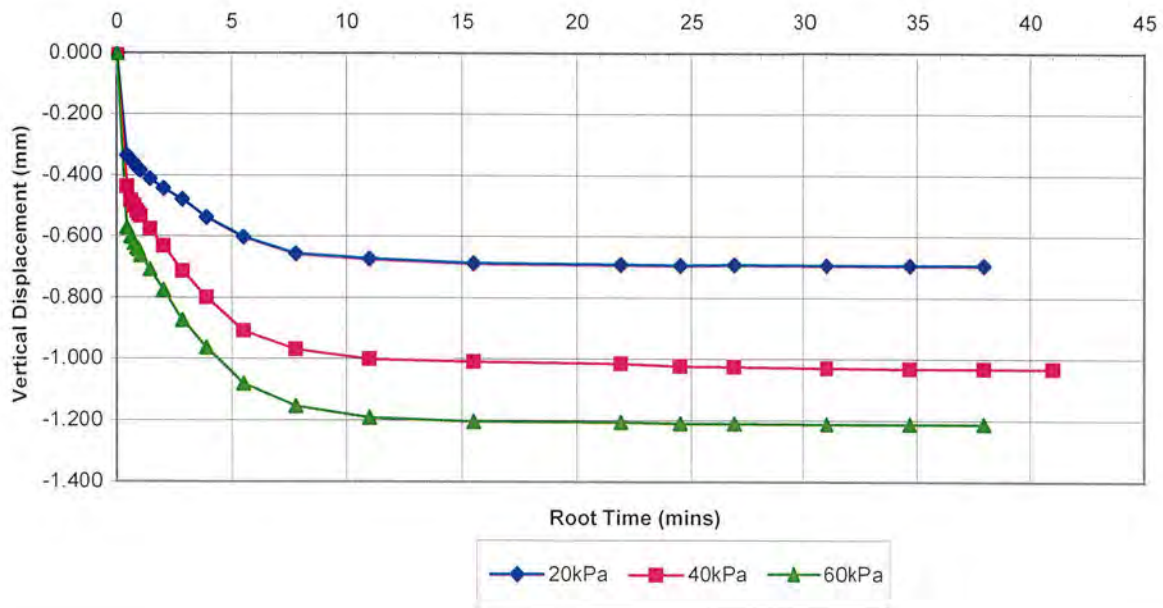
**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB004

**Sample:** B10

**Depth:** 2.50 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
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a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

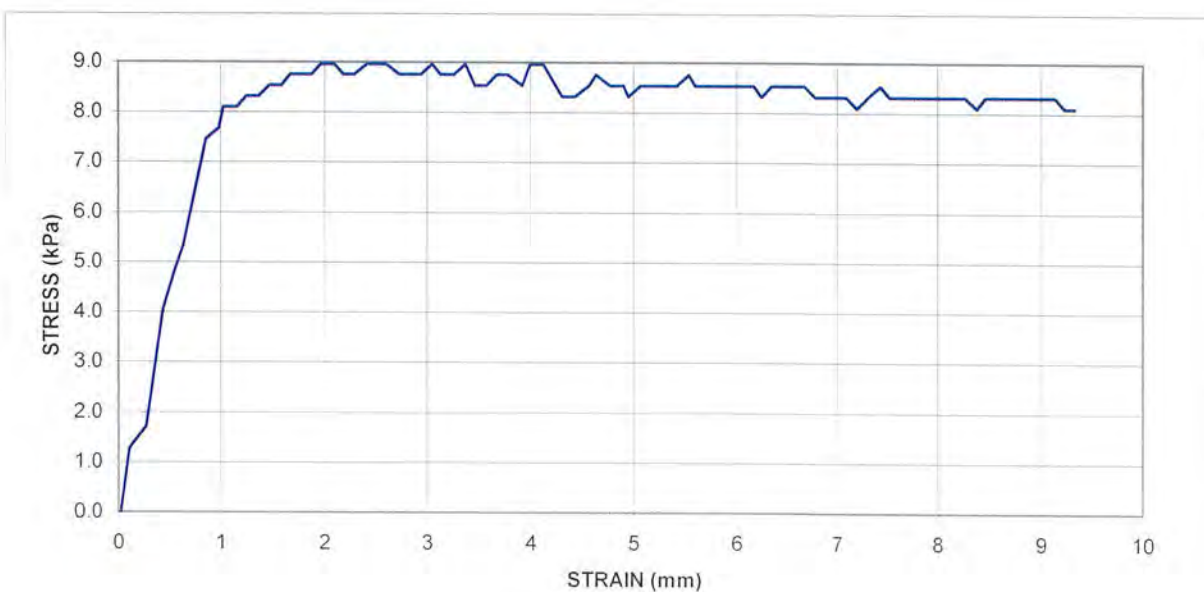
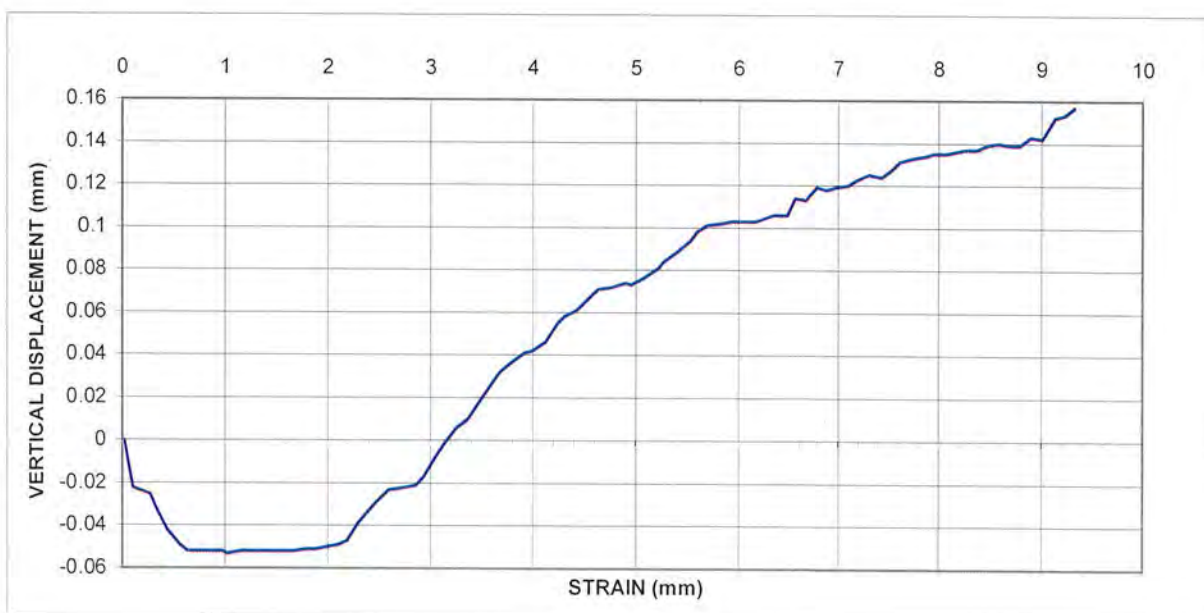
**Borehole:** BH BB004

**Sample:** B10

**Depth:** 2.50 m.

**Stage Number** 1

**Pressure** 20 kPa





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1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

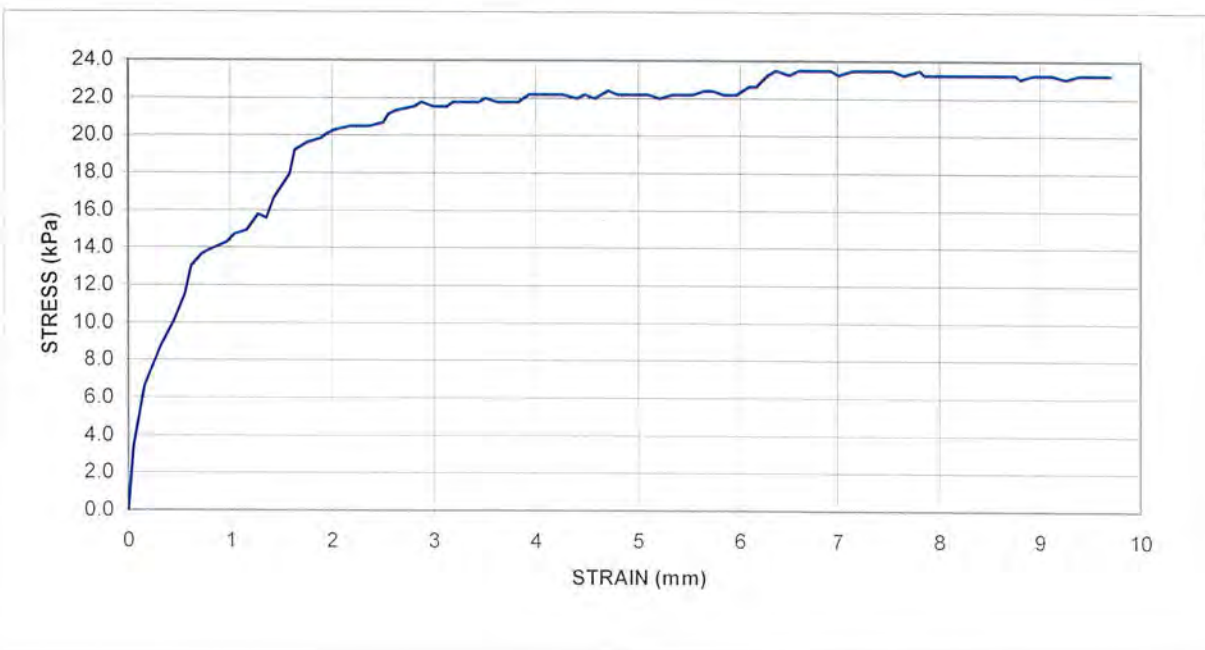
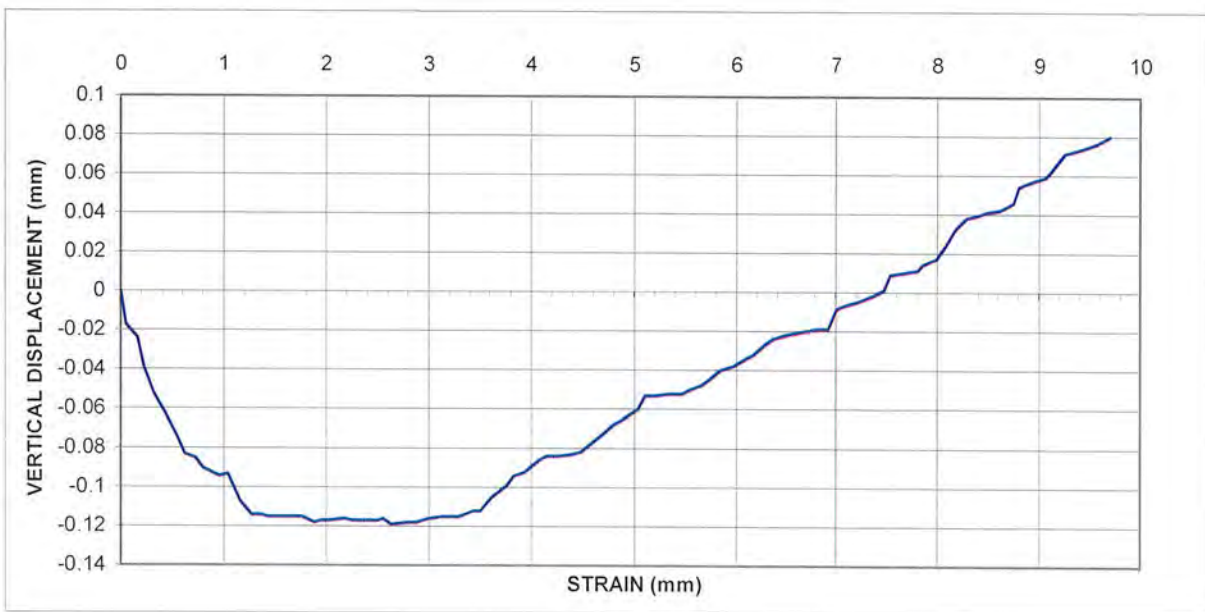
**Borehole:** BH BB004

**Sample:** B10

**Depth:** 2.50 m.

**Stage Number** 2

**Pressure** 40 kPa







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1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

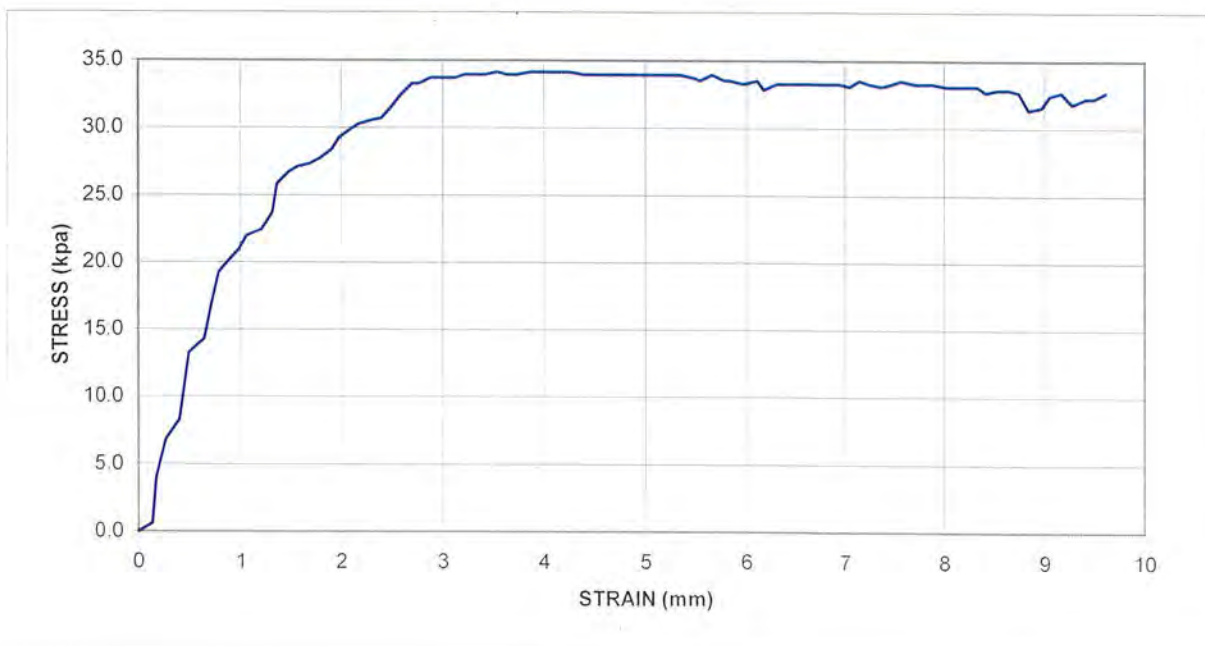
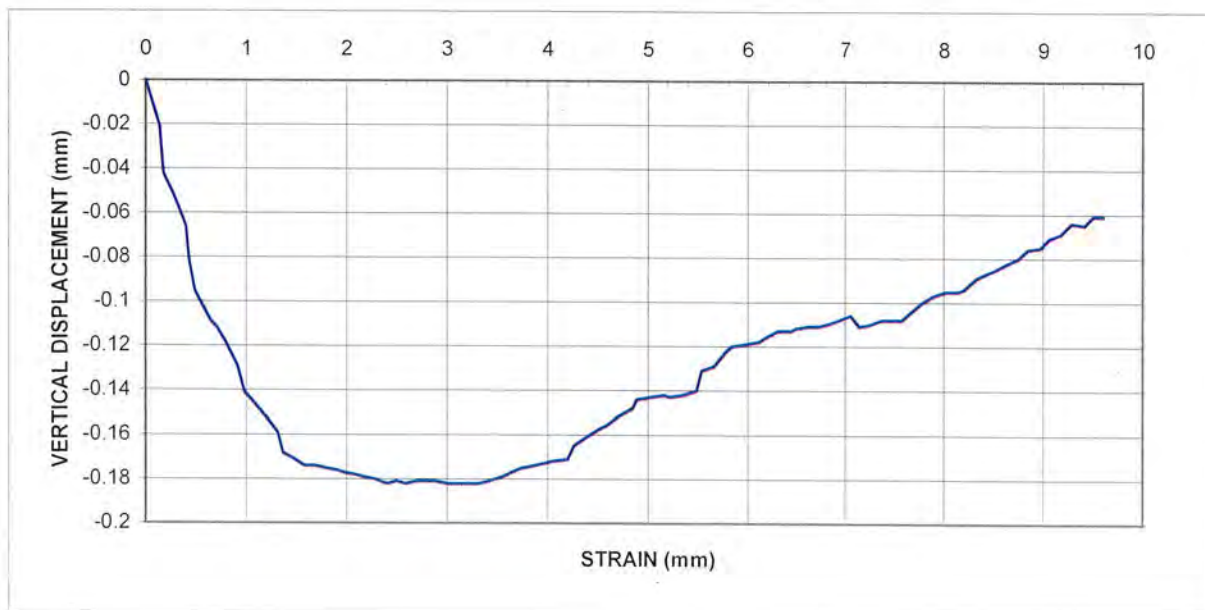
**Borehole:** BH BB004

**Sample:** B10

**Depth:** 2.50 m.

**Stage Number** 3

**Pressure** 60 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.** 4322C

**Borehole:** BH BB006

**Sample:** B8

**Depth:** 1.20 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.1	23.1	23.1
Initial Moisture Content	%	31.2	31.2	31.2
Initial Wet density	mg/m <sup>3</sup>	1.88	1.89	1.89
Initial Dry density	mg/m <sup>3</sup>	1.43	1.44	1.44
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	20.8	19.2	17.9
Duration	Day(s)	1.0	1.5	1.5

### SHEARING

Rate of Strain	mm/min	0.0050	0.0048	0.0048
Peak Shear Stress	kPa	15.1	46.3	99.6
Displacement at Peak Stress	mm	5.69	8.04	8.26
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	1.5	1.5	1.5
Final Moisture Content	%	26.5	24.5	23.3
Final Wet Density	mg/m <sup>3</sup>	2.02	2.16	2.29
Final Dry Density	mg/m <sup>3</sup>	1.59	1.73	1.86

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	0
Angle of Shearing Resistance phi'	Deg	24°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

**REMARKS:** Remoulded (2.5kg Rammer)

**DATE TESTED** 19/05/2021  
**DATE OF ISSUE** 15/06/2021

**NAME**  
**APPROVED BY**

Michelle Selkirk





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

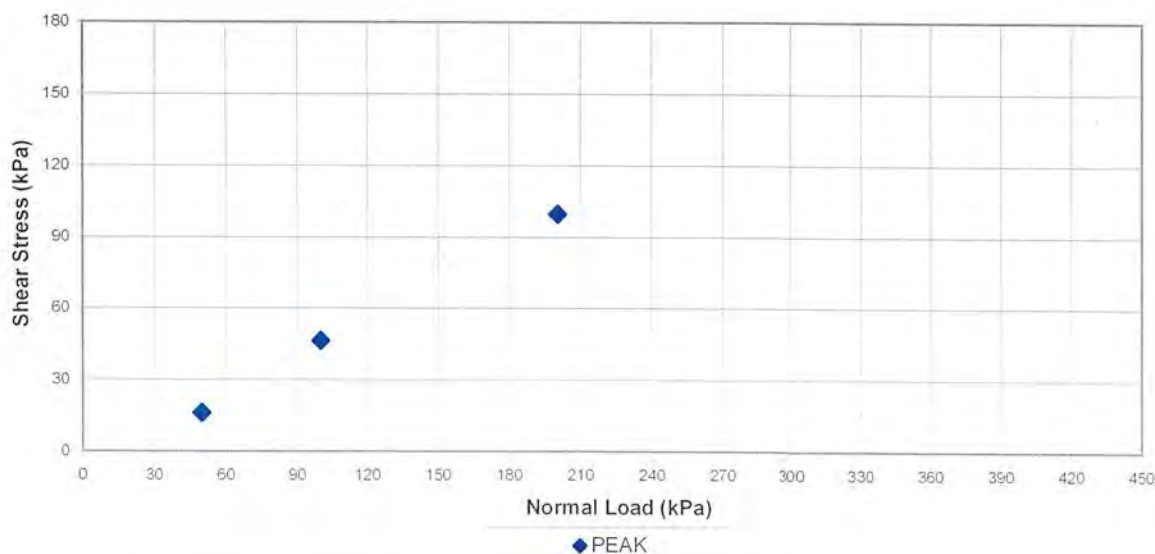
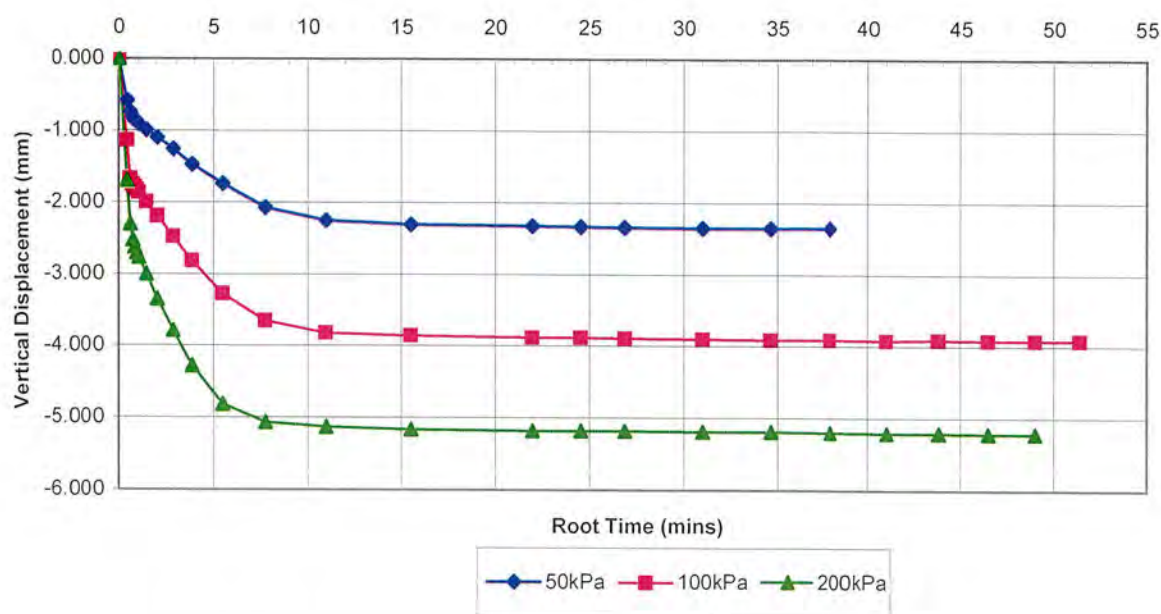
**Client:** AMEY OW Limited

**Job No.** 4322C

**Borehole:** BH BB006

**Sample:** B8

**Depth:** 1.20 m.





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

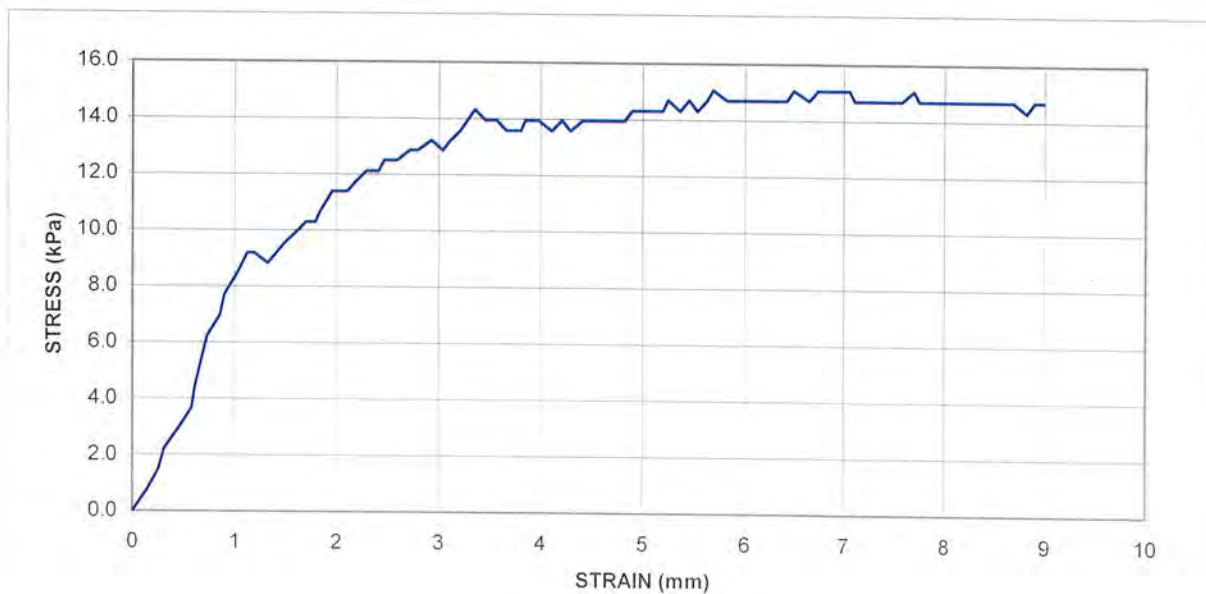
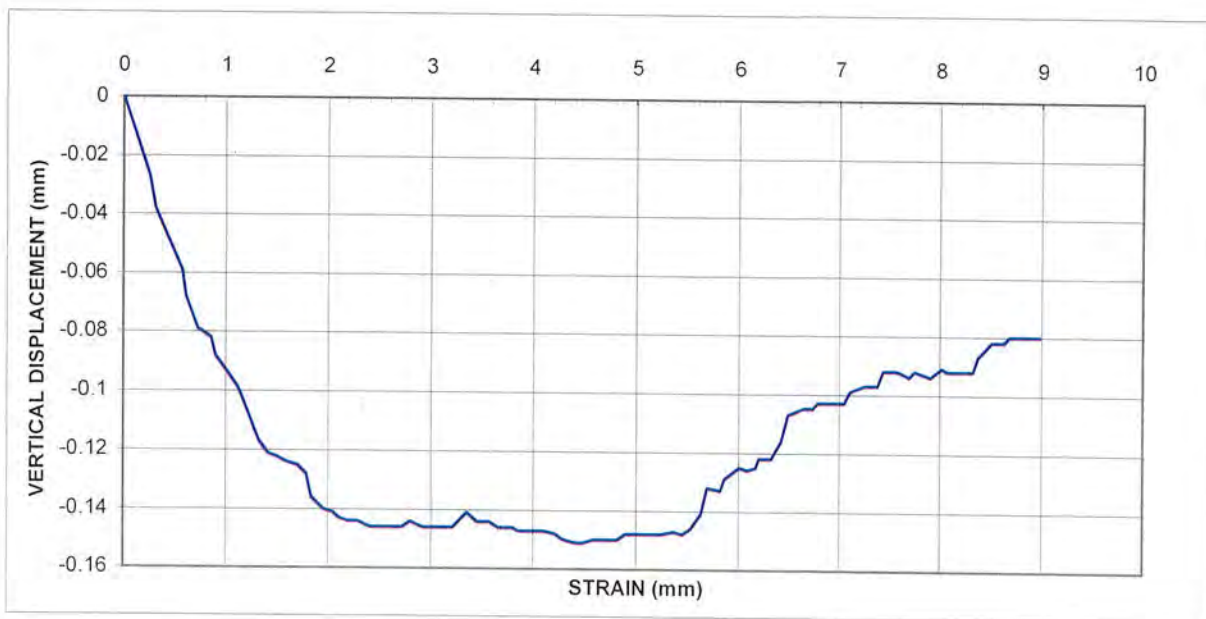
**Borehole:** BH BB006

**Sample:** B8

**Depth:** 1.20 m.

**Stage Number** 1

**Pressure** 50 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
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 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

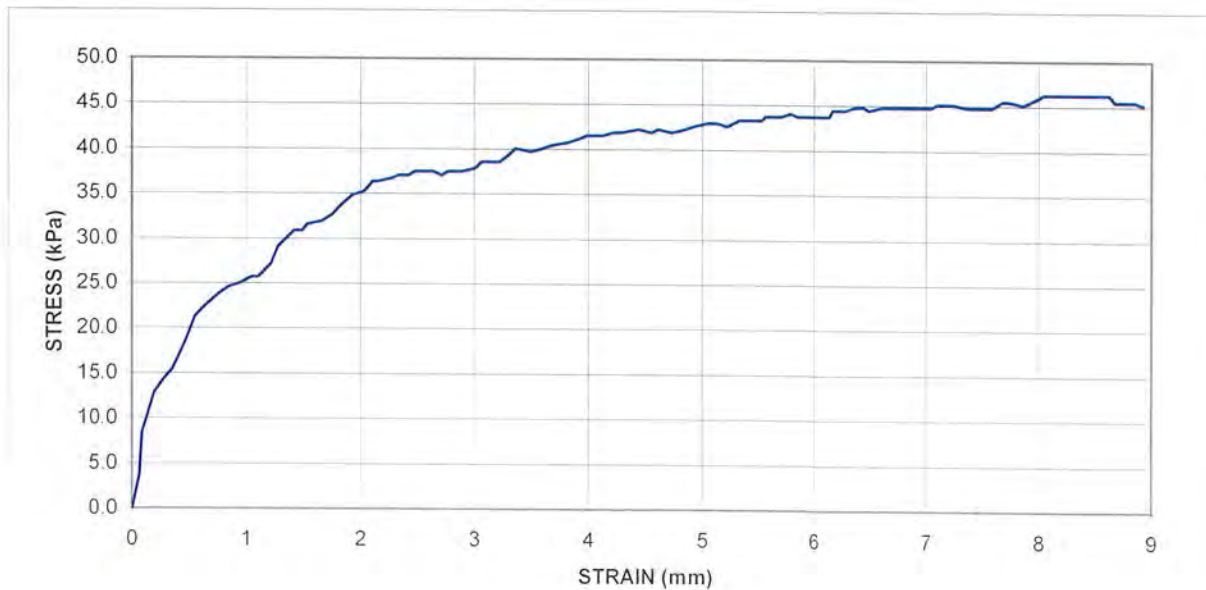
**Borehole:** BH BB006

**Sample:** B8

**Depth:** 1.20 m.

**Stage Number** 2

**Pressure** 100 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

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 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

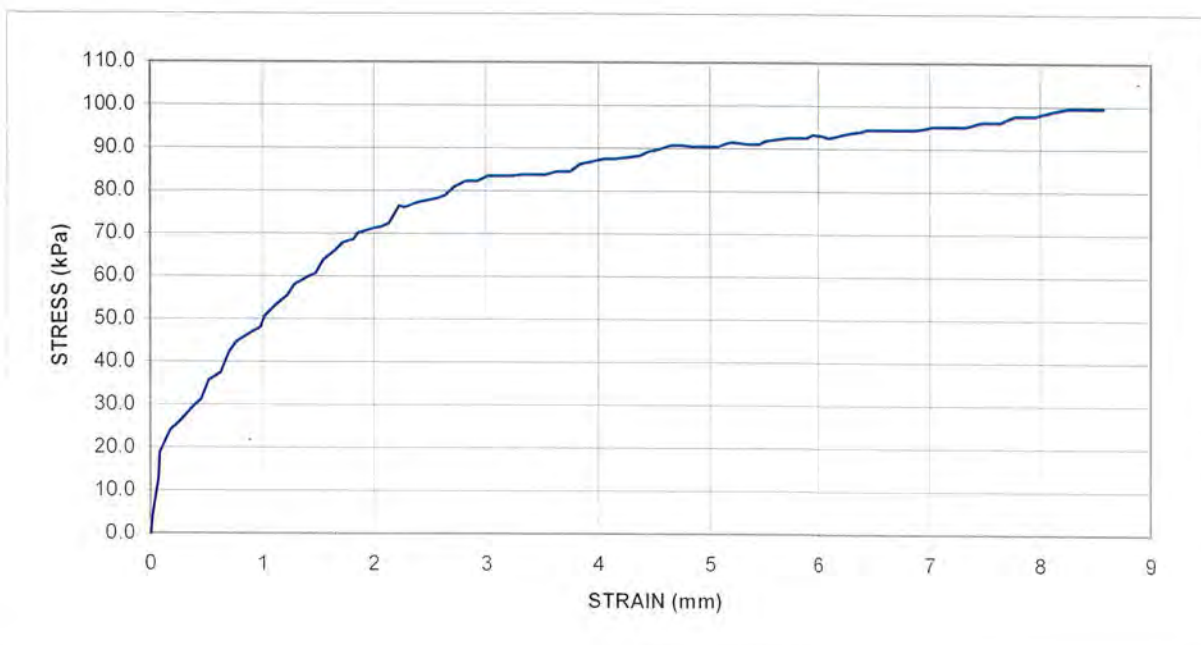
**Borehole:** BH BB006

**Sample:** B8

**Depth:** 1.20 m.

**Stage Number** 3

**Pressure** 200 kPa







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 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.** 4322C

**Borehole:** BH BB006

**Sample:** B15

**Depth:** 3.50 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.1	23.2	23.2
Initial Moisture Content	%	22.0	22.0	22.0
Initial Wet density	mg/m <sup>3</sup>	2.03	2.05	2.04
Initial Dry density	mg/m <sup>3</sup>	1.66	1.68	1.68
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	21.7	21.3	20.8
Duration	Day(s)	1.0	1.0	1.0

### SHEARING

Rate of Strain	mm/min	0.012	0.012	0.012
Peak Shear Stress	kPa	28.3	56.5	109.4
Displacement at Peak Stress	mm	4.93	9.00	7.87
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	19.5	18.2	17.1
Final Wet Density	mg/m <sup>3</sup>	2.11	2.15	2.19
Final Dry Density	mg/m <sup>3</sup>	1.77	1.82	1.87

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	3
Angle of Shearing Resistance phi 'r	Deg	28°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

**REMARKS:** Remoulded (2.5kg Rammer)

**DATE TESTED** 05/07/2021  
**DATE OF ISSUE** 29/07/2021

**NAME**  
**APPROVED BY**

Michelle Selkirk



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

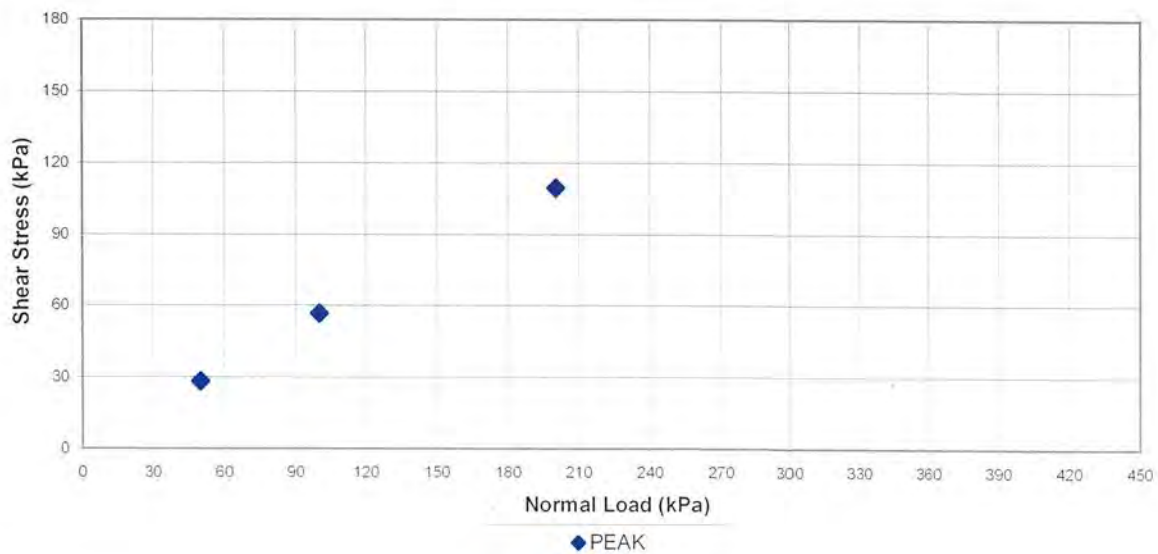
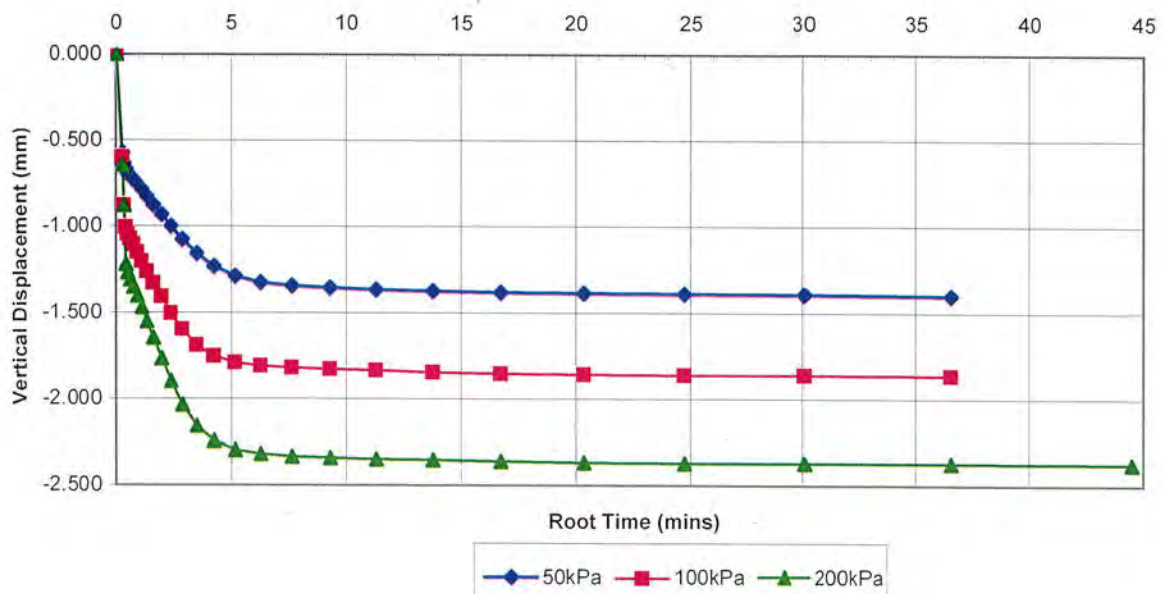
**Client:** AMEY OW Limited

**Job No.** 4322C

**Borehole:** BH BB006

**Sample:** B15

**Depth:** 3.50 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

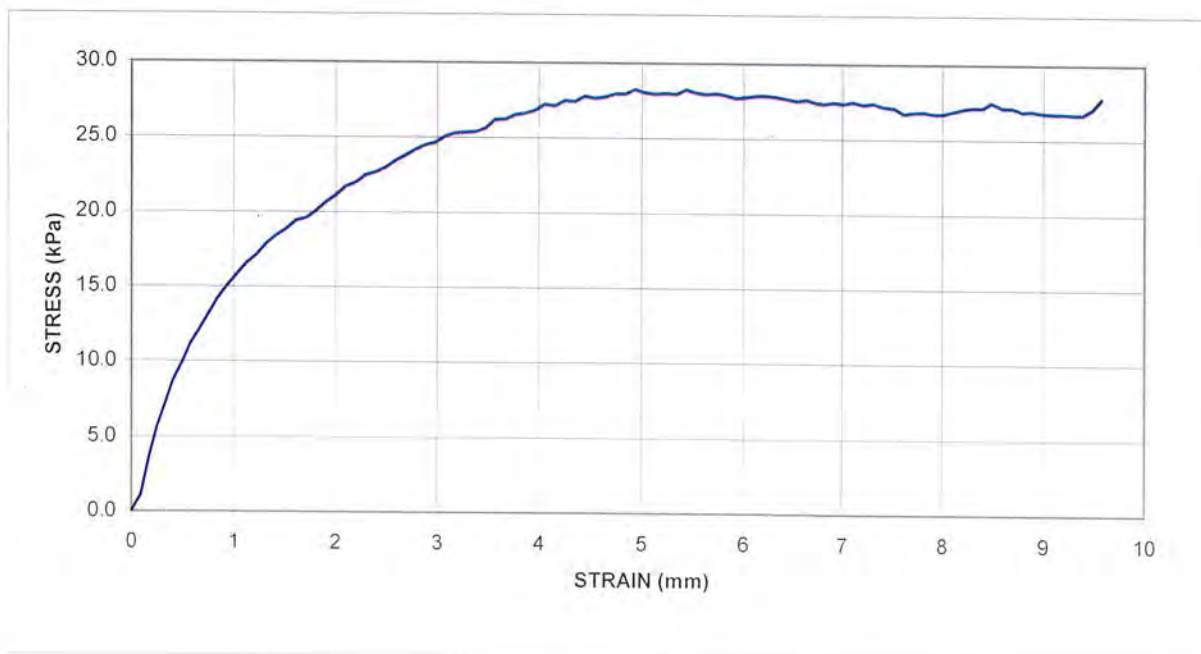
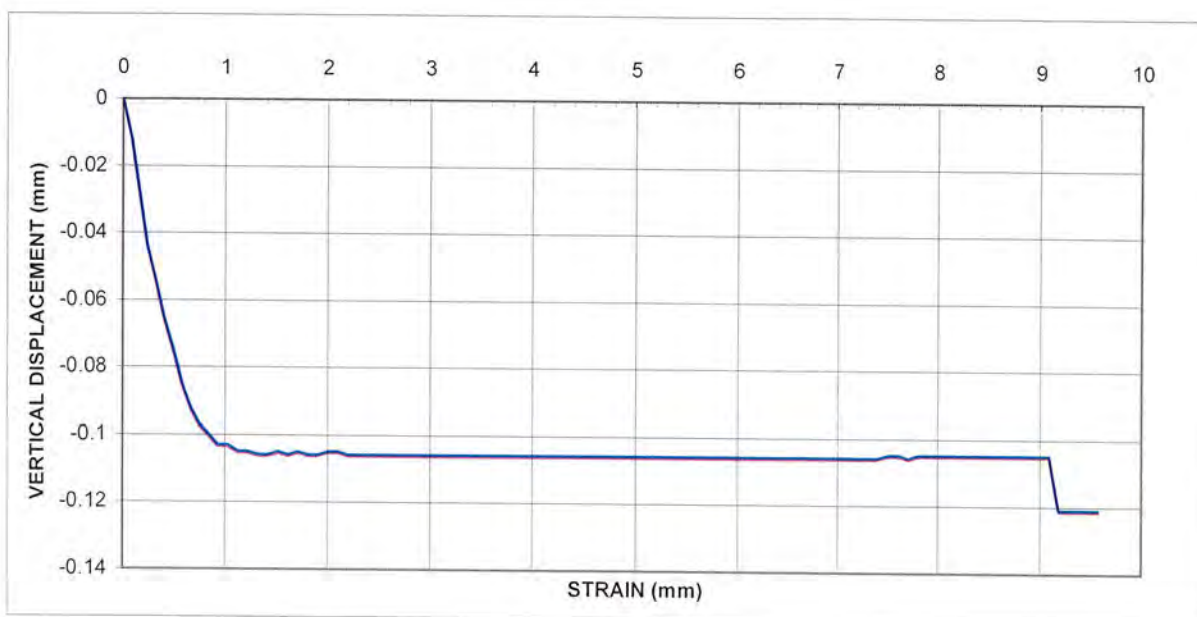
**Borehole:** BH BB006

**Sample:** B15

**Depth:** 3.50 m.

**Stage Number** 1

**Pressure** 50 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

1367

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

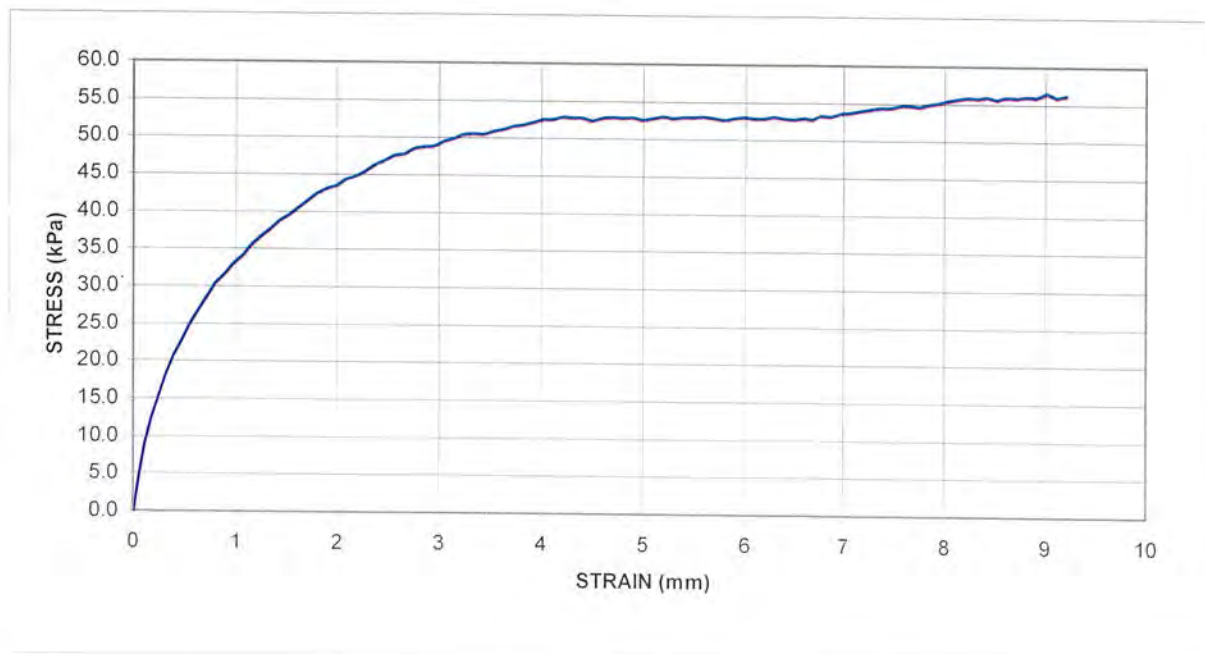
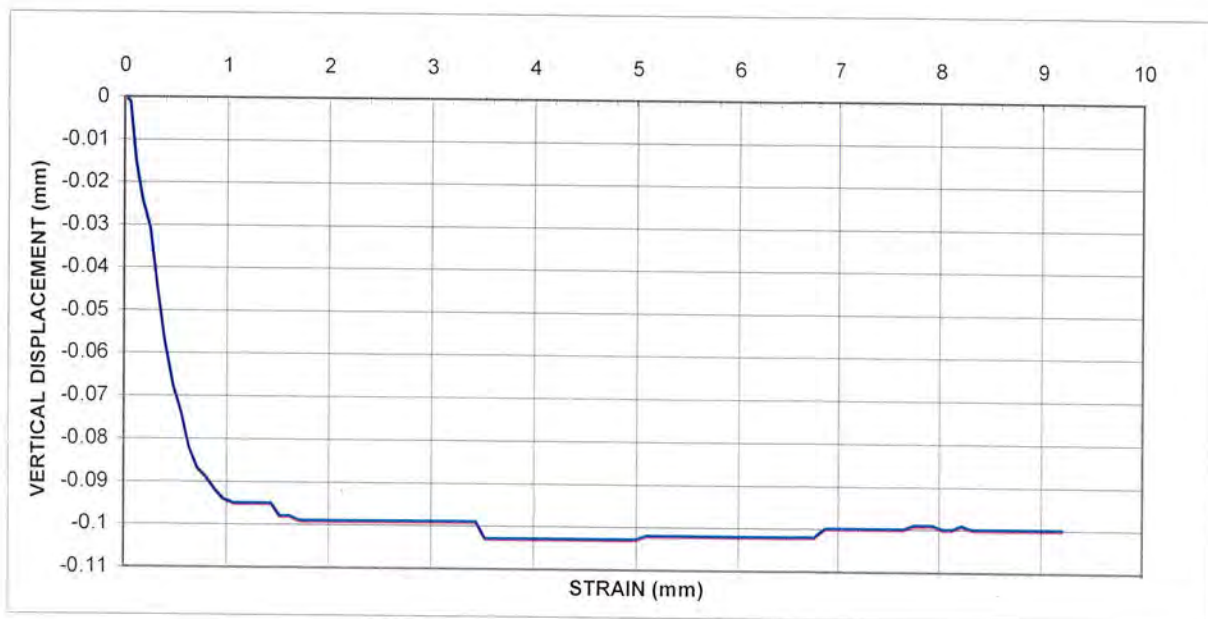
**Borehole:** BH BB006

**Sample:** B15

**Depth:** 3.50 m.

**Stage Number** 2

**Pressure** 100 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

1367

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

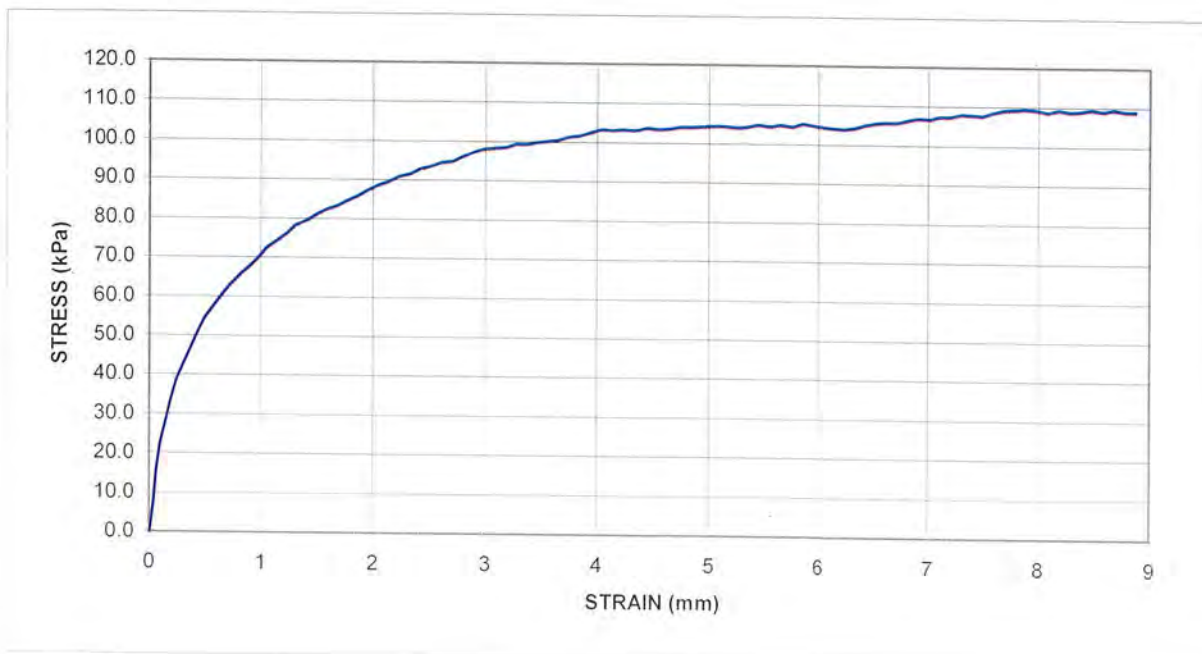
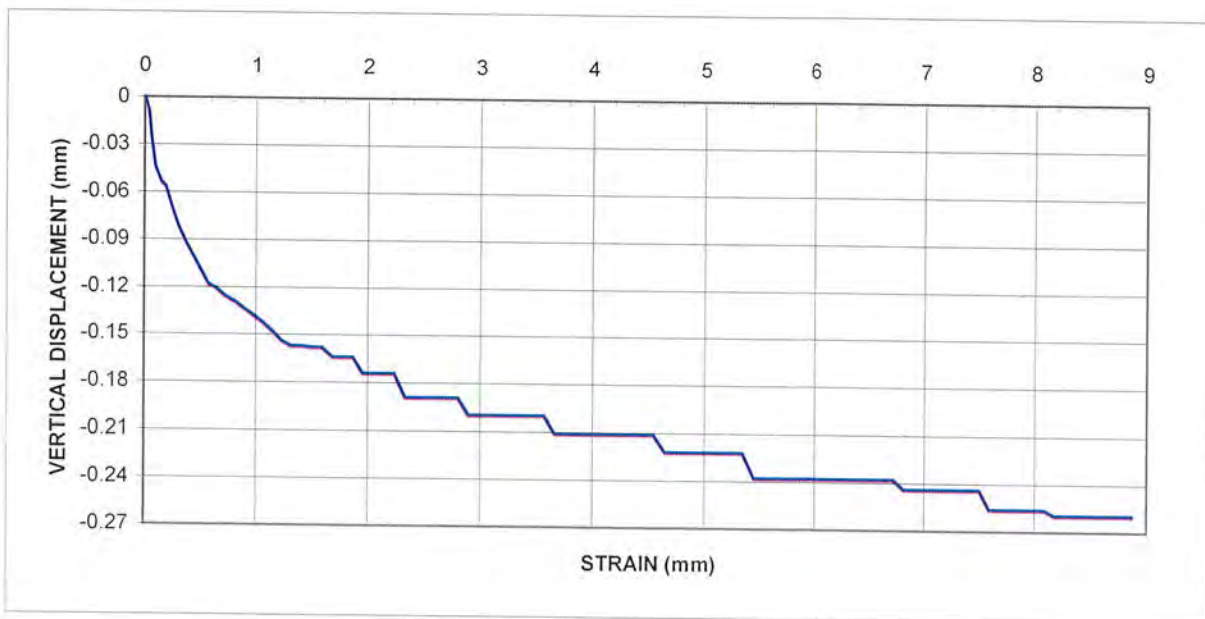
**Borehole:** BH BB006

**Sample:** B15

**Depth:** 3.50 m.

**Stage Number** 3

**Pressure** 200 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell

Chester-le-Street, Co.Durham. DH2 2RG

a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7**Client:** AMEY OW Limited**Job No:** 4322C**Borehole:** BH BB007**Sample:** B11**Depth:** 3.20 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.2	23.2	23.2
Initial Moisture Content	%	12.7	12.7	12.7
Initial Wet density	mg/m <sup>3</sup>	2.16	2.18	2.15
Initial Dry density	mg/m <sup>3</sup>	1.92	1.94	1.91
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	22.6	22.4	22.0
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.038	0.037	0.038
Peak Shear Stress	kPa	36.5	70.0	128.3
Displacement at Peak Stress	mm	3.44	3.46	4.44
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	14.4	13.4	12.9
Final Wet Density	mg/m <sup>3</sup>	2.26	2.28	2.28
Final Dry Density	mg/m <sup>3</sup>	1.97	2.01	2.02

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	10
Angle of Shearing Resistance phi'	Deg	30°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

**REMARKS:** Remoulded (2.5kg Rammer).

DATE TESTED 20/05/2021

DATE OF ISSUE 14/06/2021

NAME

Michelle Selkirk

APPROVED BY







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

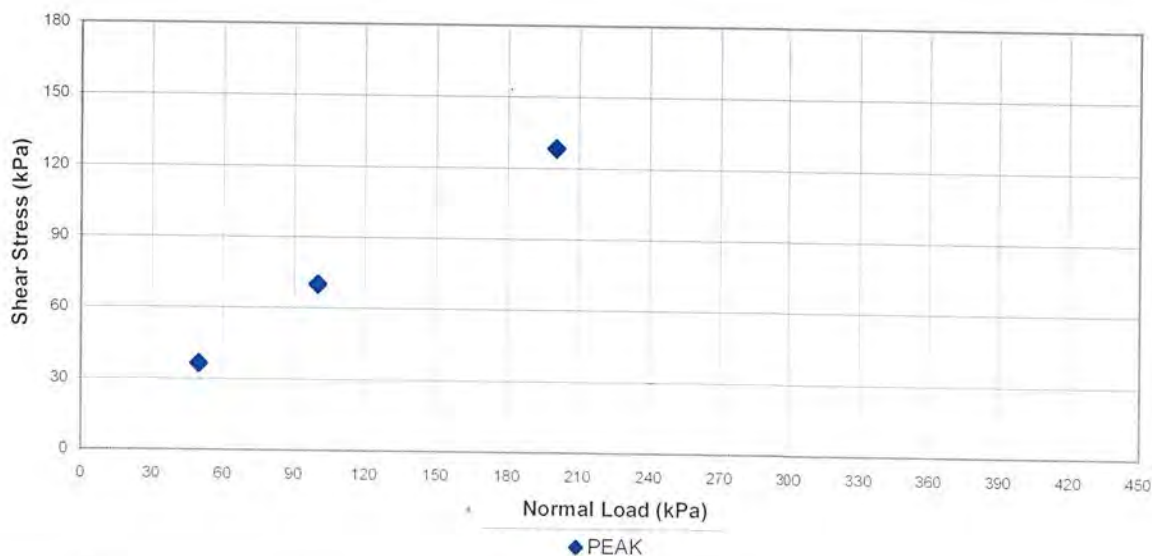
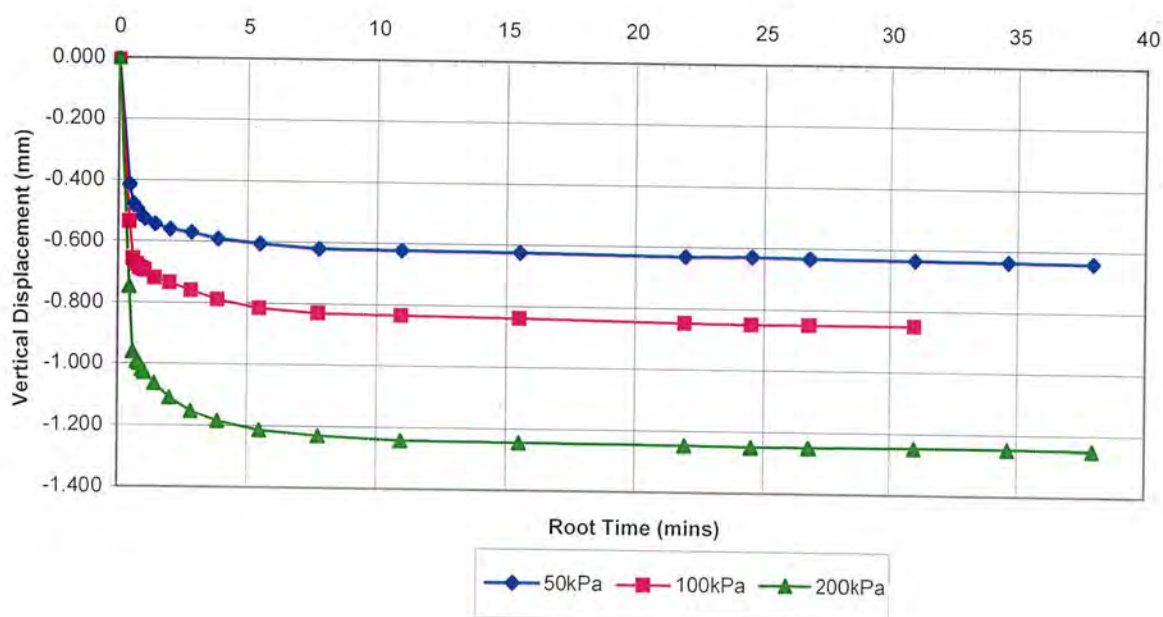
**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB007

**Sample:** B11

**Depth:** 3.20 m.





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7  
**Client:** AMEY OW Limited

**Job No.:** 4322C

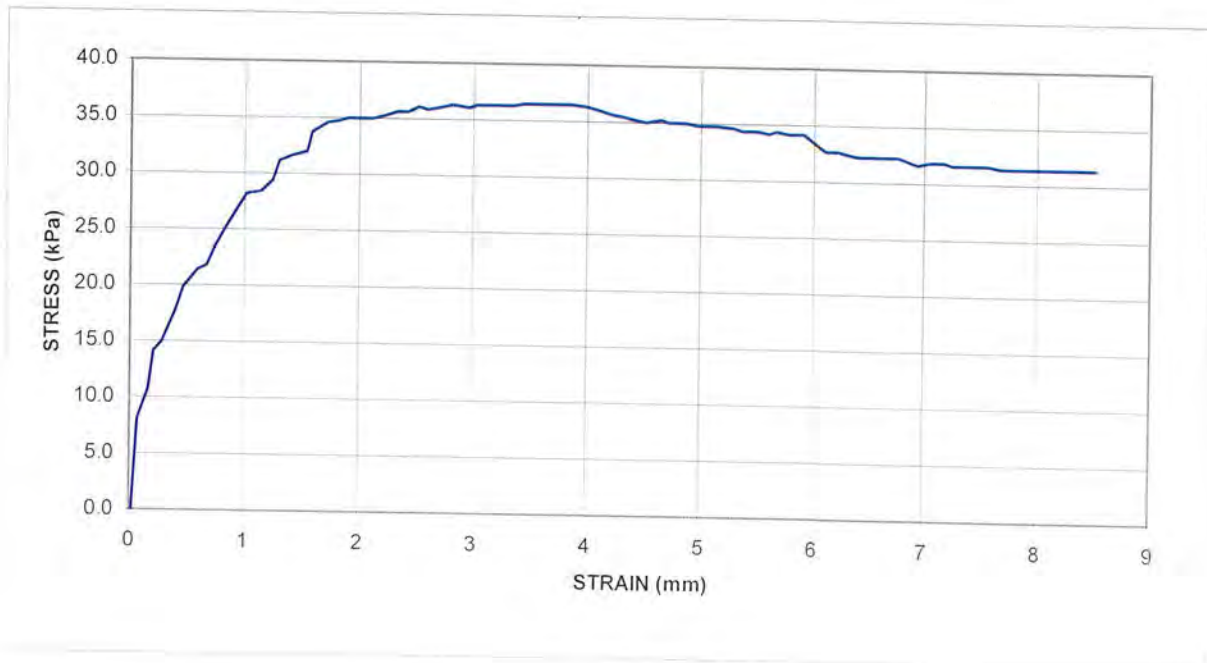
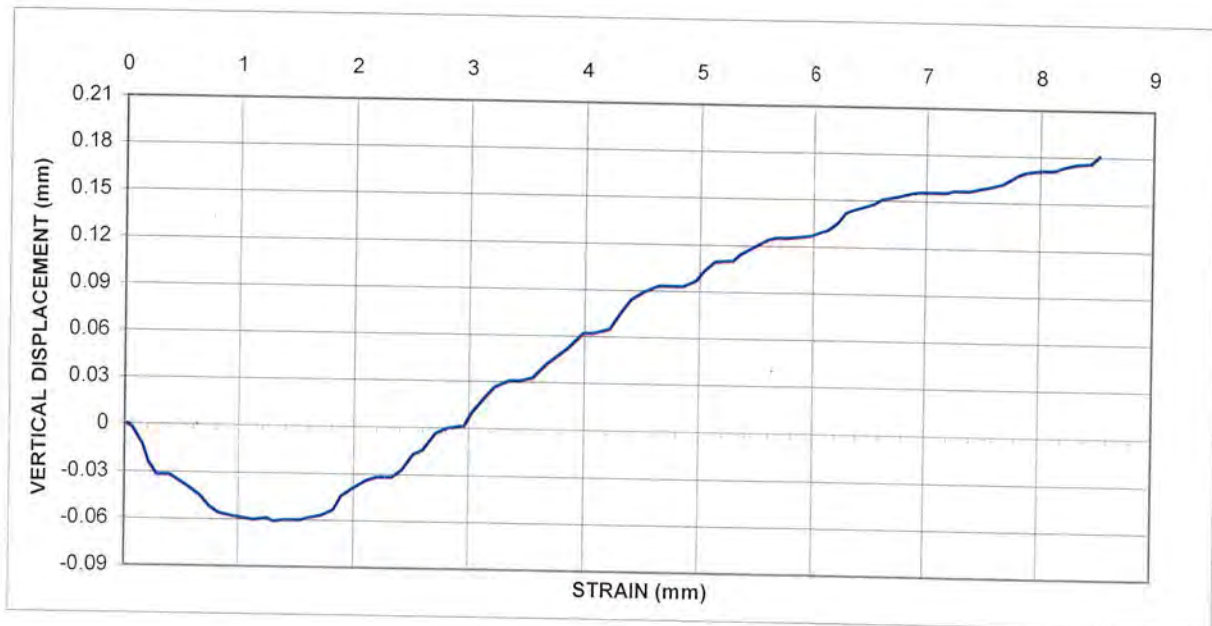
**Borehole:** BH BB007

**Sample:** B11

**Depth:** 3.20 m.

**Stage Number** 1

**Pressure** 50 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

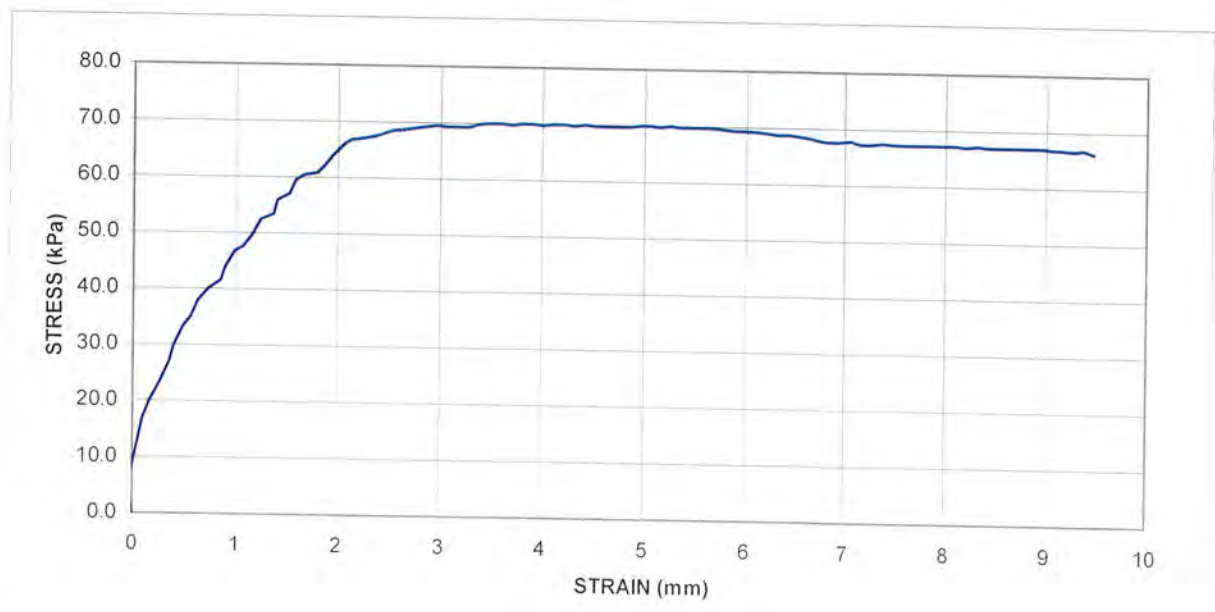
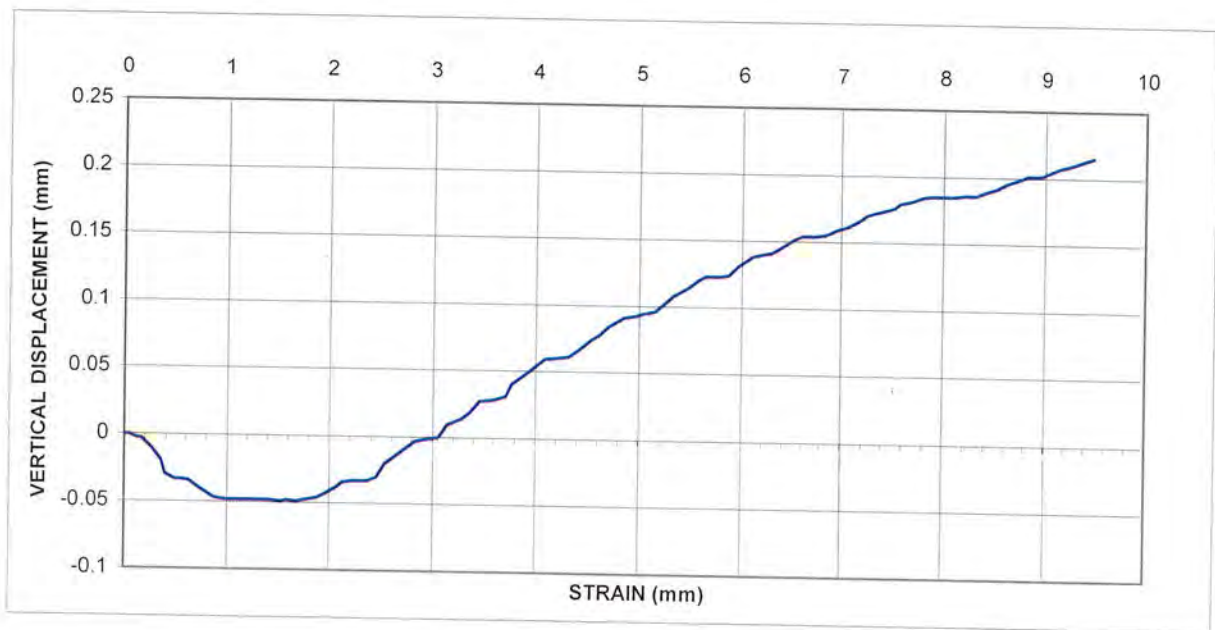
**Borehole:** BH BB007

**Sample:** B11

**Depth:** 3.20 m.

**Stage Number** 2

**Pressure** 100 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

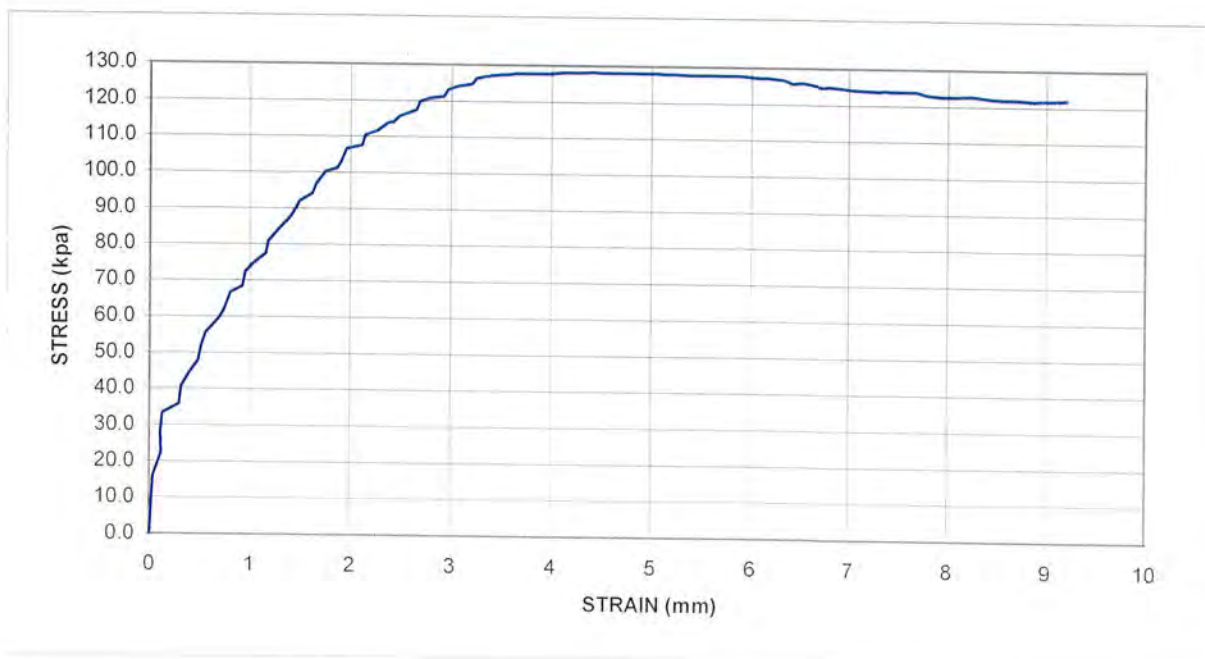
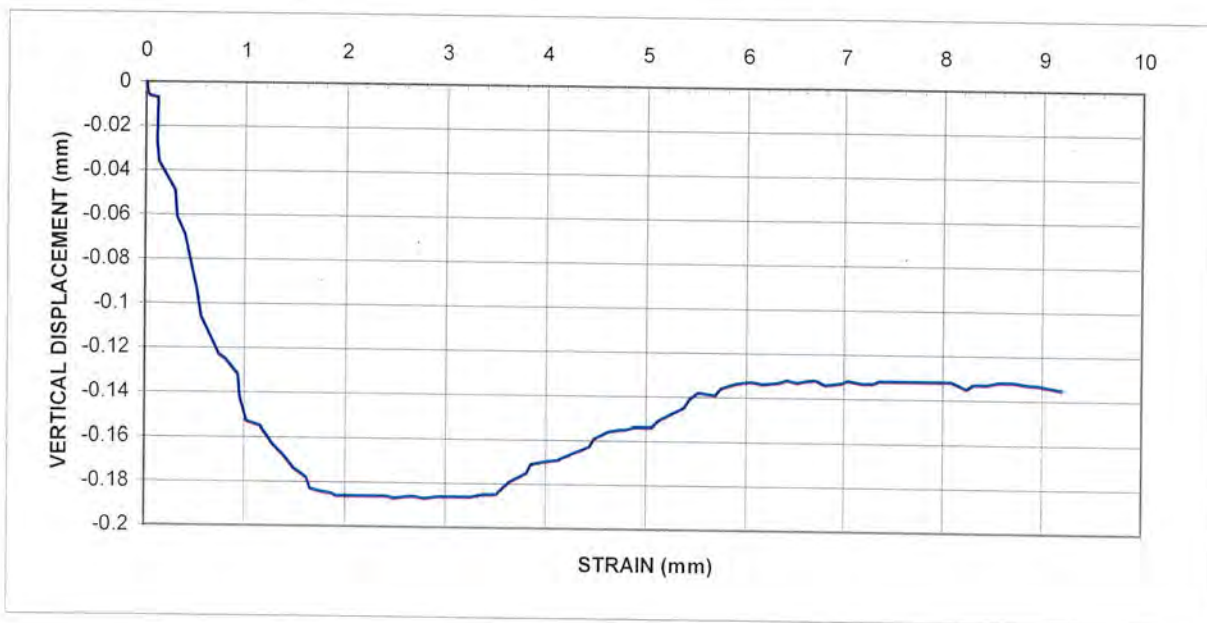
**Borehole:** BH BB007

**Sample:** B11

**Depth:** 3.20 m.

**Stage Number** 3

**Pressure** 200 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB008

**Sample:** B11

**Depth:** 2.50 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.2	23.2	23.2
Initial Moisture Content	%	21.4	21.4	21.4
Initial Wet density	mg/m <sup>3</sup>	2.04	2.06	2.06
Initial Dry density	mg/m <sup>3</sup>	1.68	1.69	1.70
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	22.1	21.9	21.4
Duration	Day(s)	1.0	1.0	1.0

### SHEARING

Rate of Strain	mm/min	0.038	0.038	0.038
Peak Shear Stress	kPa	31.4	60.8	115.5
Displacement at Peak Stress	mm	2.86	4.51	4.21
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	19.7	18.4	17.5
Final Wet Density	mg/m <sup>3</sup>	2.11	2.12	2.16
Final Dry Density	mg/m <sup>3</sup>	1.75	1.79	1.84

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	6
Angle of Shearing Resistance phi'	Deg	28°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi'r	Deg	N/A

### REMARKS:

DATE TESTED 21/06/2021  
 DATE OF ISSUE 16/07/2021

NAME Michelle Selkirk  
 APPROVED BY [REDACTED]



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367

## Consolidated Drained Shear Box Test BS 1377 : PART 7 : 1990 Clause 4 (Specimen(s) Tested Submerged)



1367

**Site:** A66 North Trans Pennine Scheme D Section 7

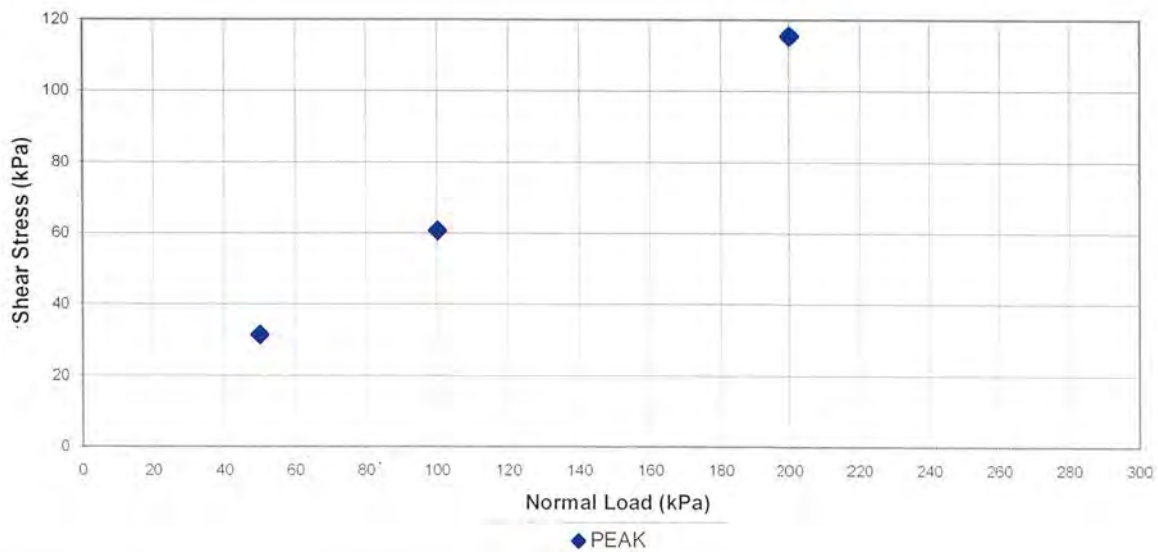
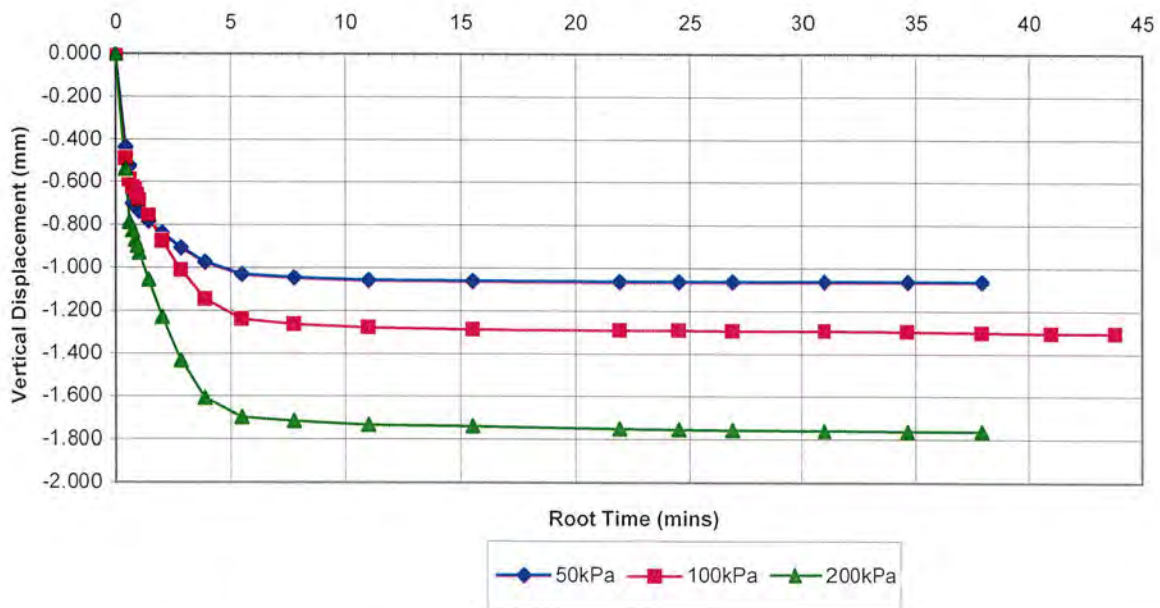
**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB008

**Sample:** B11

**Depth:** 2.50 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

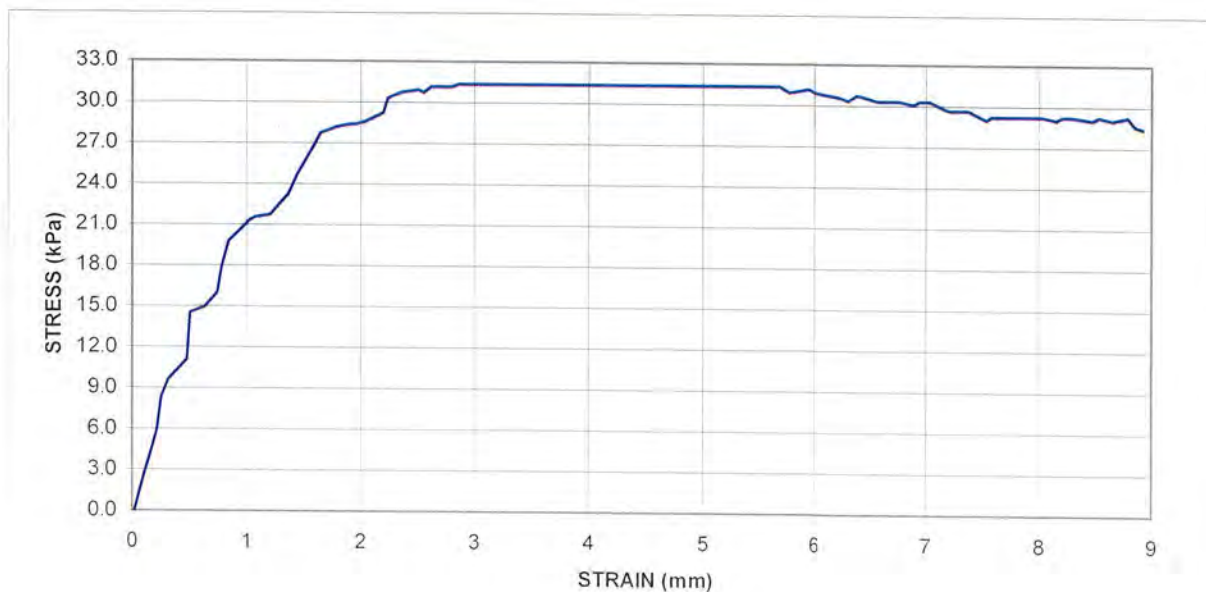
**Borehole:** BH BB008

**Sample:** B11

**Depth:** 2.50 m.

**Stage Number** 1

**Pressure** 50 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

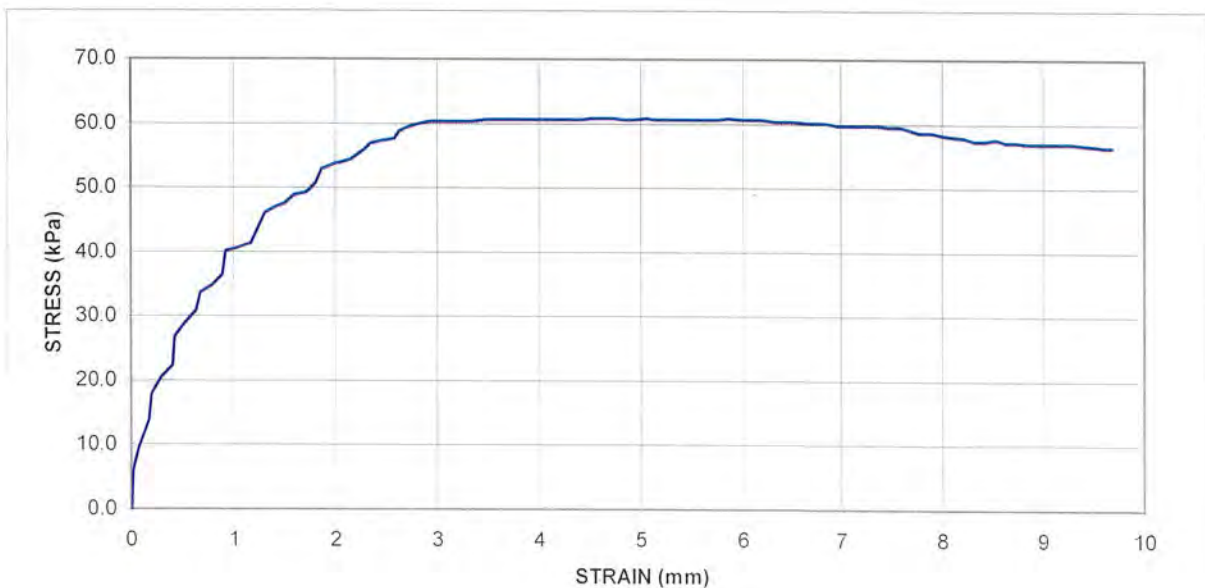
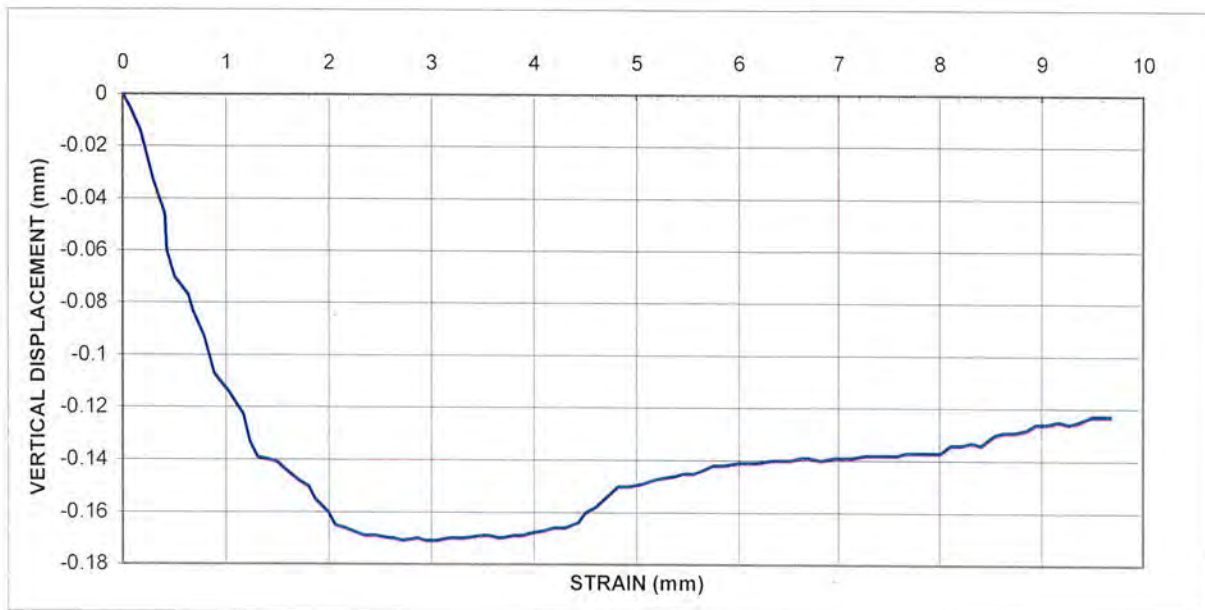
**Borehole:** BH BB008

**Sample:** B11

**Depth:** 2.50 m.

**Stage Number** 2

**Pressure** 100 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

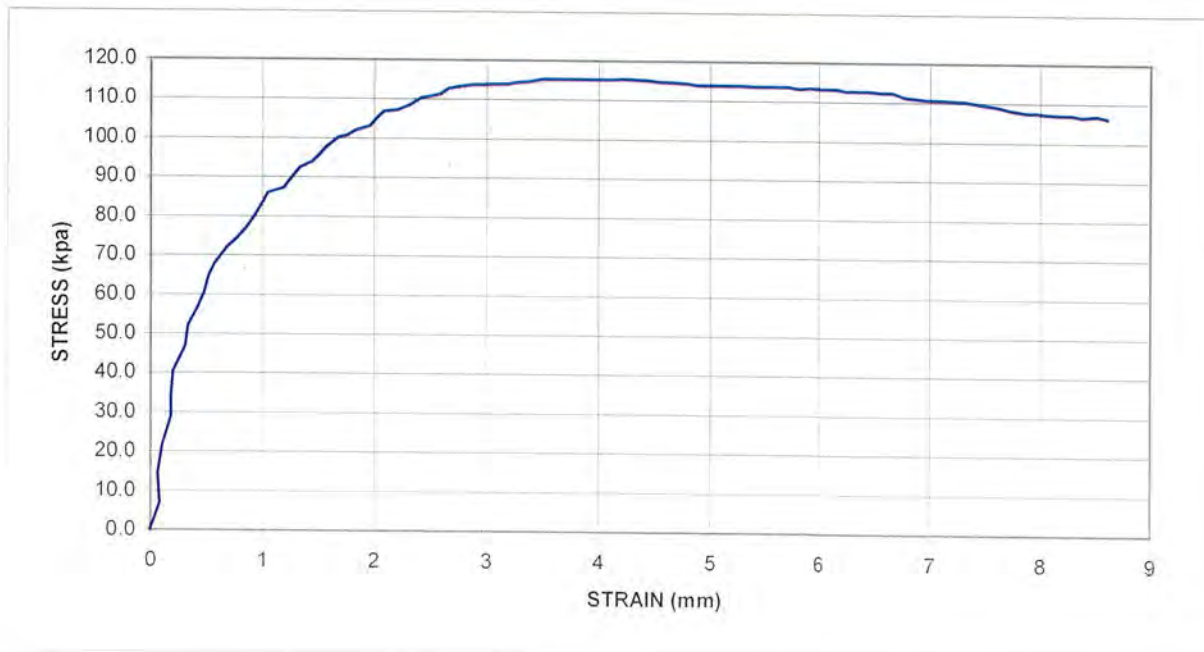
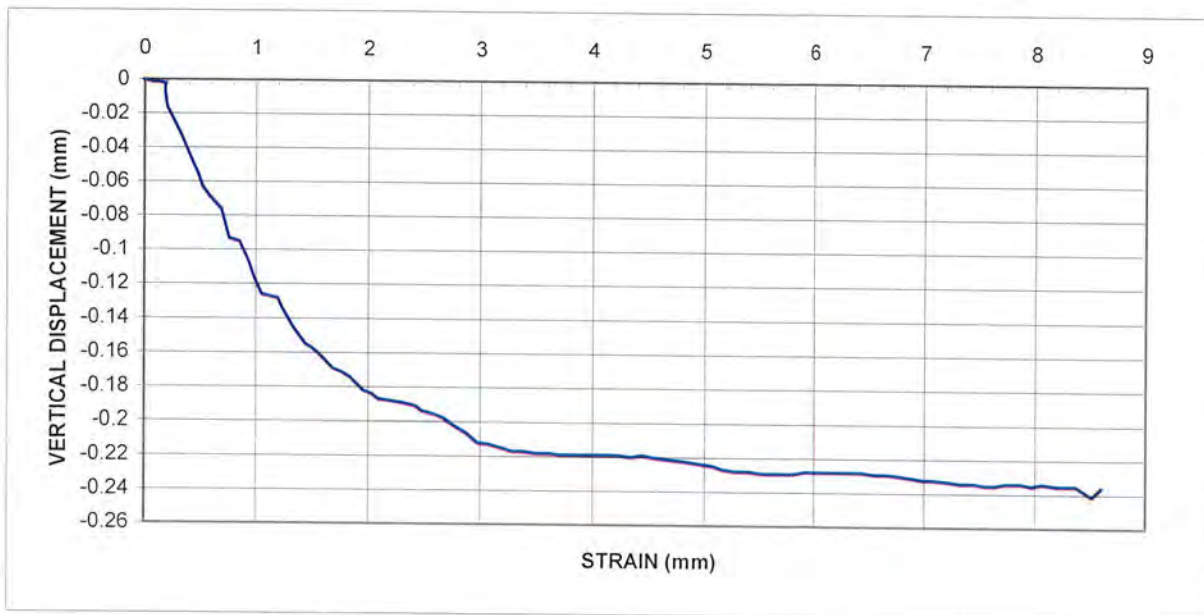
**Borehole:** BH BB008

**Sample:** B11

**Depth:** 2.50 m.

**Stage Number** 3

**Pressure** 200 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB009

**Sample:** B6

**Depth:** 1.50 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.1	23.1	23.1
Initial Moisture Content	%	17.5	17.5	17.5
Initial Wet density	mg/m <sup>3</sup>	2.06	2.06	2.06
Initial Dry density	mg/m <sup>3</sup>	1.75	1.76	1.76
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	25	50	100
Height at end of Stage	mm	22.8	22.4	22.0
Duration	Day(s)	0.5	0.5	1.0

### SHEARING

Rate of Strain	mm/min	0.038	0.038	0.038
Peak Shear Stress	kPa	17.1	35.2	62.5
Displacement at Peak Stress	mm	3.19	2.91	3.67
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	19.4	18.7	17.9
Final Wet Density	mg/m <sup>3</sup>	2.12	2.15	2.17
Final Dry Density	mg/m <sup>3</sup>	1.77	1.81	1.84

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	7
Angle of Shearing Resistance phi 'r	Deg	29°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

**REMARKS:** Remoulded (2.5kg Rammer).

**DATE TESTED** 28/05/2021

**DATE OF ISSUE** 15/06/2021

**NAME**

**APPROVED BY**

Michelle Selkirk



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

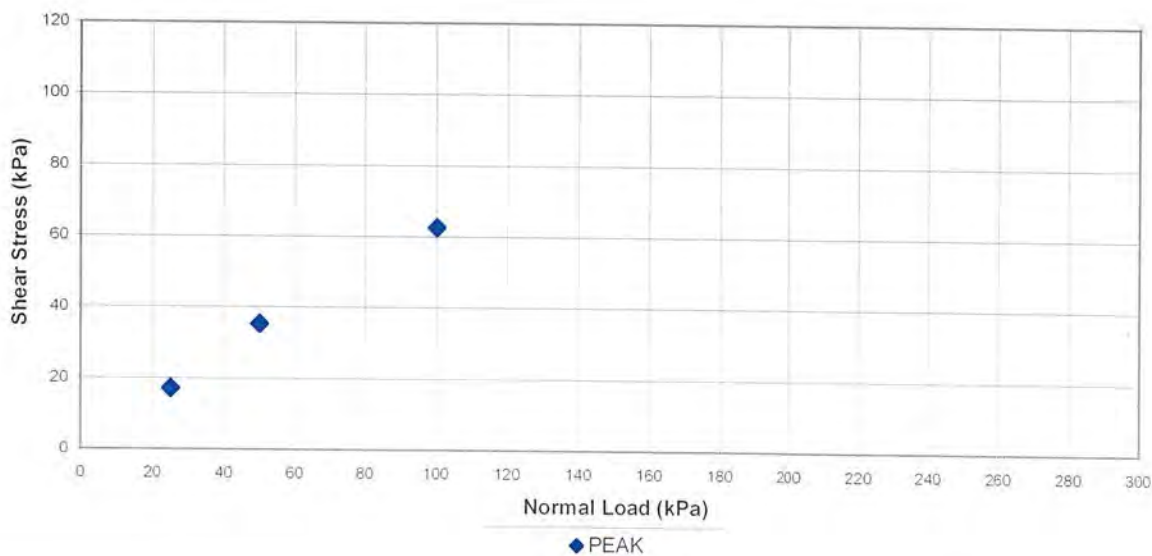
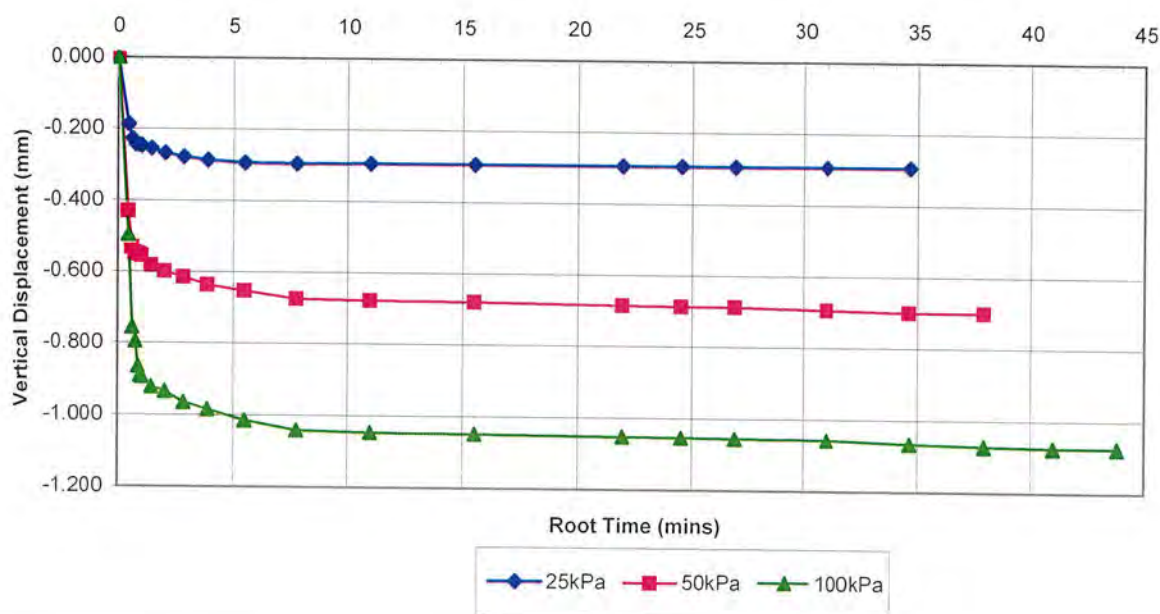
**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB009

**Sample:** B6

**Depth:** 1.50 m.







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

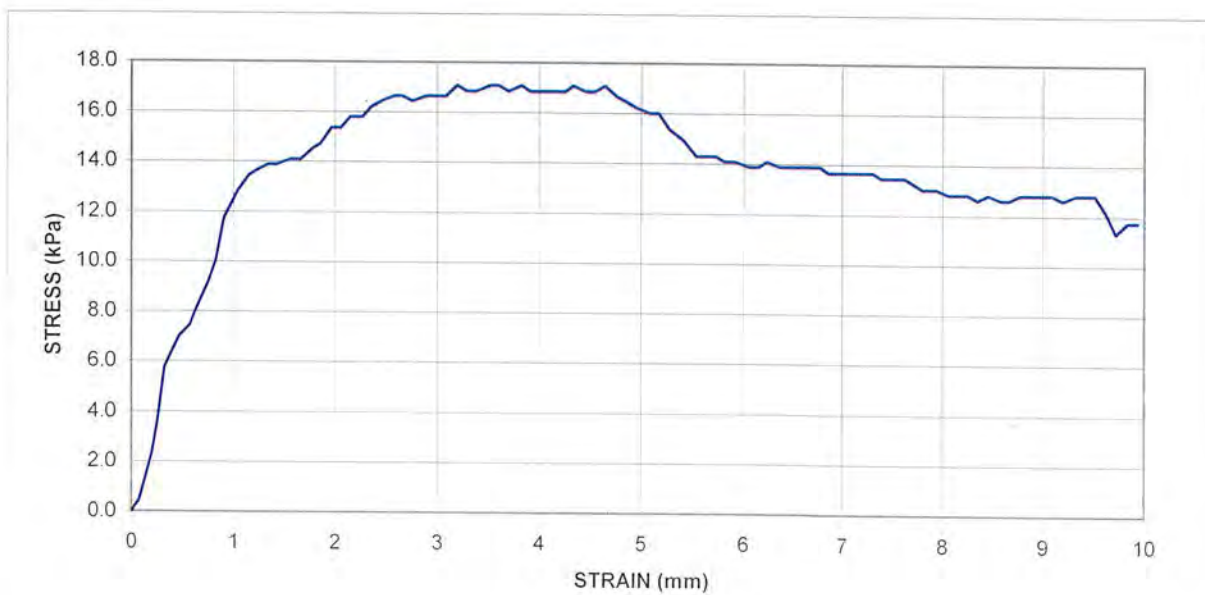
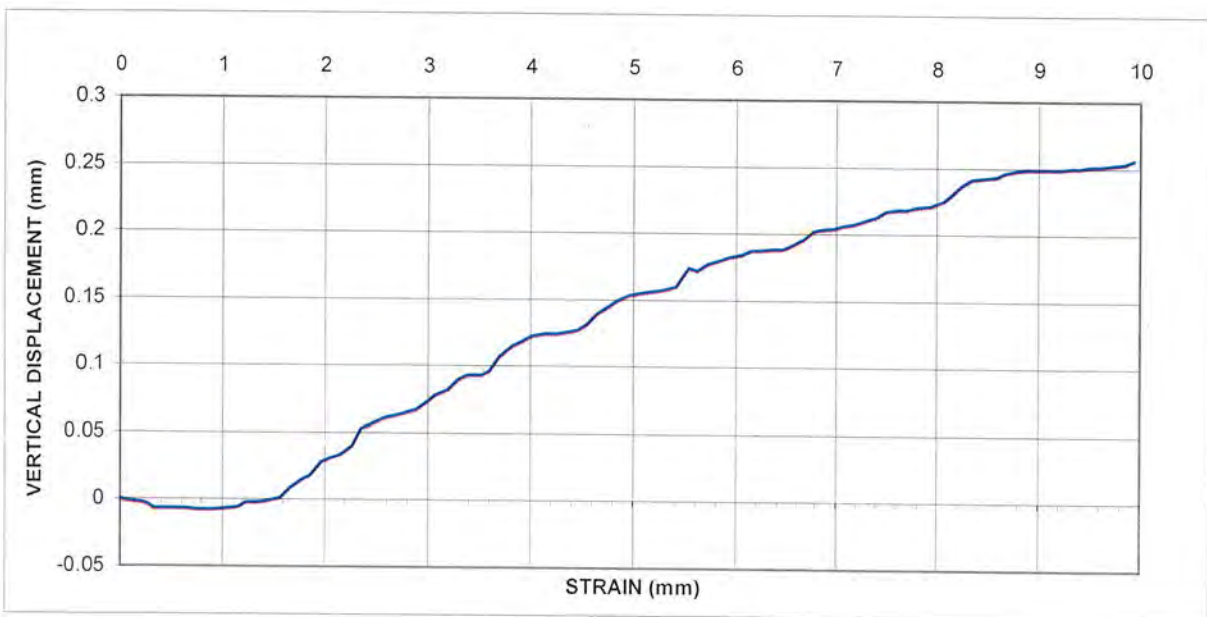
**Borehole:** BH BB009

**Sample:** B6

**Depth:** 1.50 m.

**Stage Number** 1

**Pressure** 25 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

**Borehole:** BH BB009

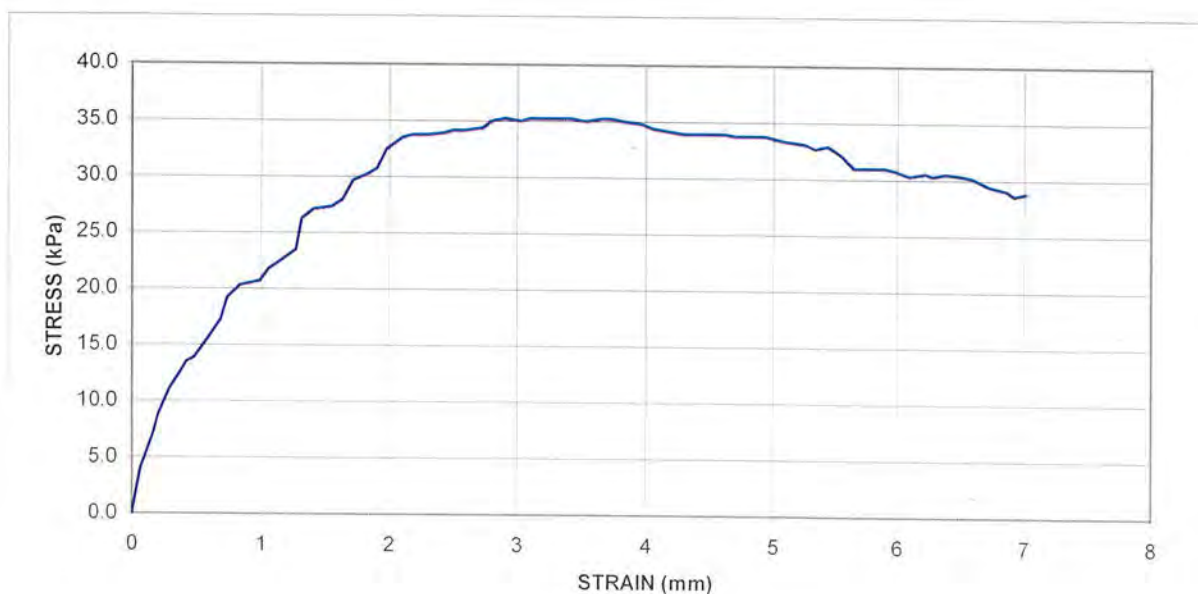
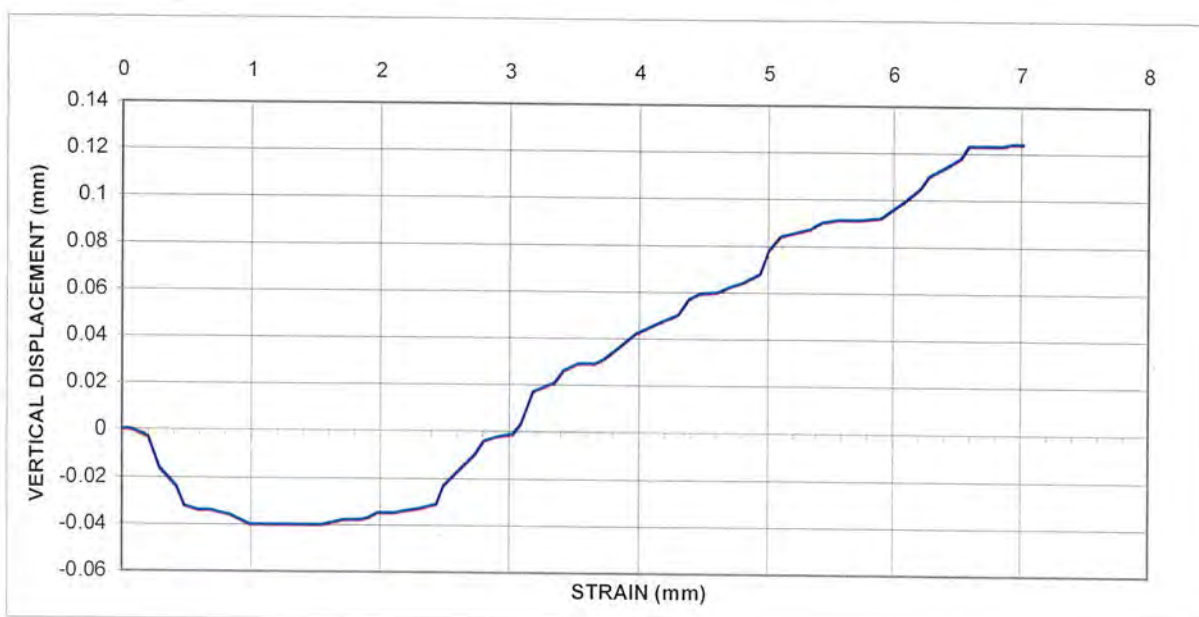
**Sample:** B6

**Depth:** 1.50 m.

**Stage Number** 2

**Pressure** 50 kPa

50 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co. Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

**Borehole:** BH BB009

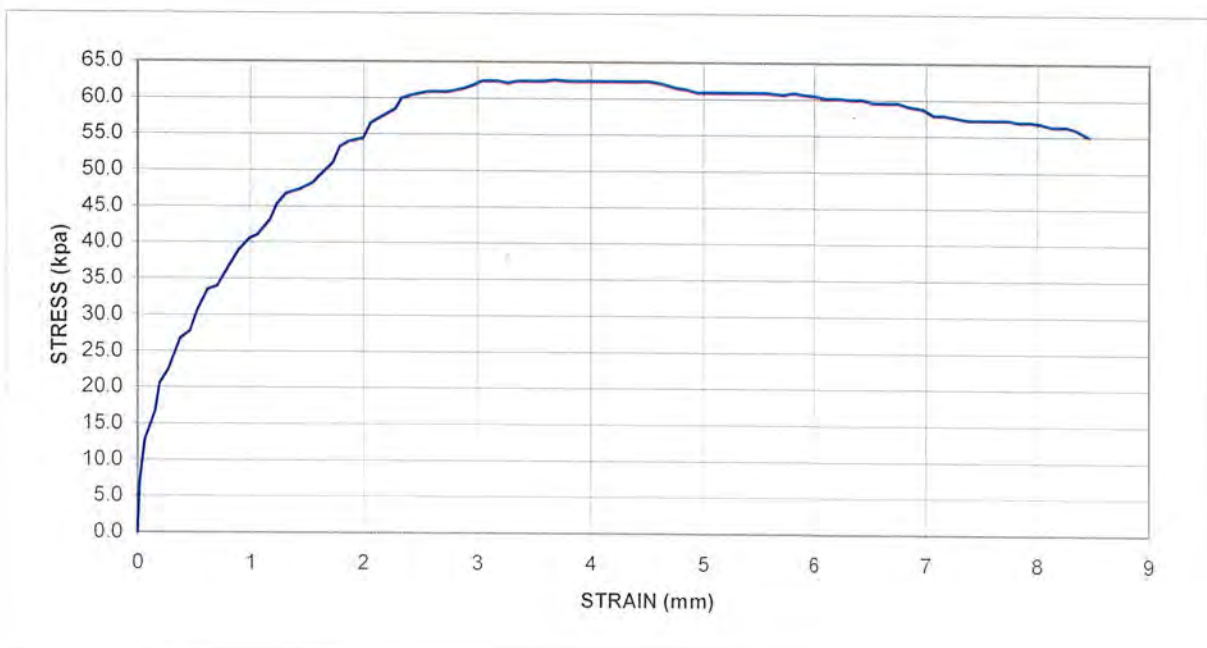
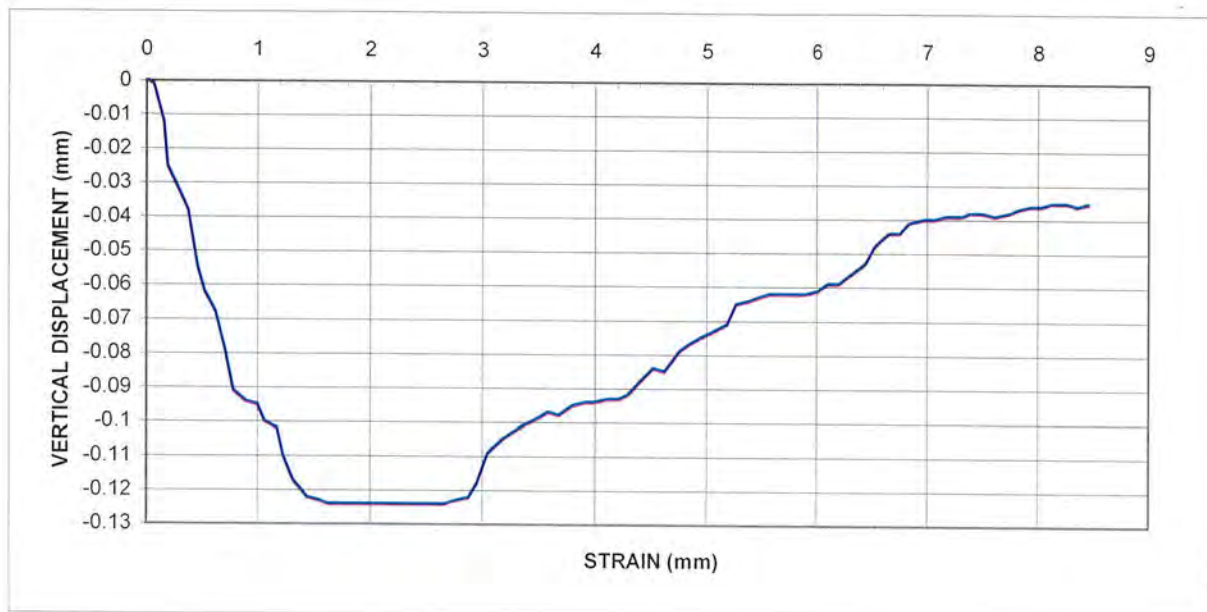
**Sample:** B6

**Depth:** 1.50 m.

**Stage Number** 3

**Pressure**

100 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB013

**Sample:** B16

**Depth:** 3.40 m

For sample description please refer to sample description sheet

Stage Number		1	2	3
Specific Depth	m.	N/A	N/A	N/A
Length	mm	60.0	60.0	60.0
Height	mm	23.1	23.2	23.2
Initial Moisture Content	%	9.7	9.7	9.7
Initial Wet density	mg/m <sup>3</sup>	2.09	2.22	2.20
Initial Dry density	mg/m <sup>3</sup>	1.90	2.02	2.01
Particle Density (Assumed)	mg/m <sup>3</sup>	2.65	2.65	2.65

### CONSOLIDATION

Normal Stress	kPa	50	100	200
Height at end of Stage	mm	22.7	22.7	22.4
Duration	Day(s)	0.5	0.5	0.5

### SHEARING

Rate of Strain	mm/min	0.039	0.038	0.037
Peak Shear Stress	kPa	33.9	102.5	147.9
Displacement at Peak Stress	mm	2.03	2.46	2.60
Rate for Residual Runs	mm/min	N/A	N/A	N/A
Residual Shear Stress	kPa	N/A	N/A	N/A
Duration	Day(s)	0.5	0.5	0.5
Final Moisture Content	%	14.7	12.9	12.7
Final Wet Density	mg/m <sup>3</sup>	2.23	2.34	2.34
Final Dry Density	mg/m <sup>3</sup>	1.94	2.07	2.08

### PEAK SHEAR STRESS PARAMETERS

Apparent Cohesion C'	kPa	18
Angle of Shearing Resistance phi 'r	Deg	33°

### RESIDUAL PARAMETERS

Apparent Cohesion C'	kPa	N/A
Angle of Shearing Resistance phi 'r	Deg	N/A

### REMARKS:

DATE TESTED 29/06/2021  
 DATE OF ISSUE 16/07/2021

NAME  
 APPROVED BY

Michelle Selkirk



# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

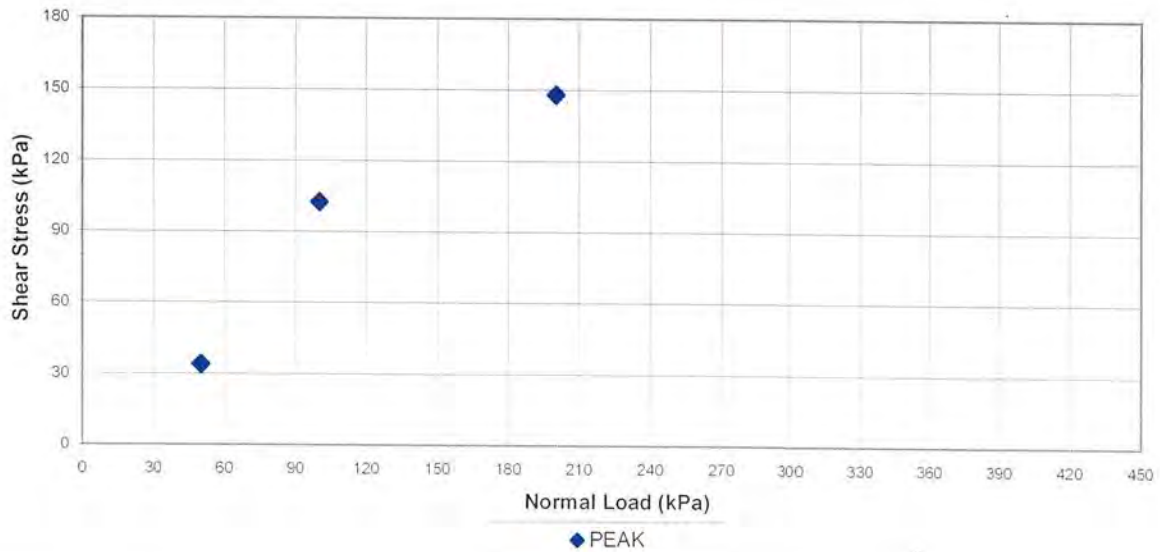
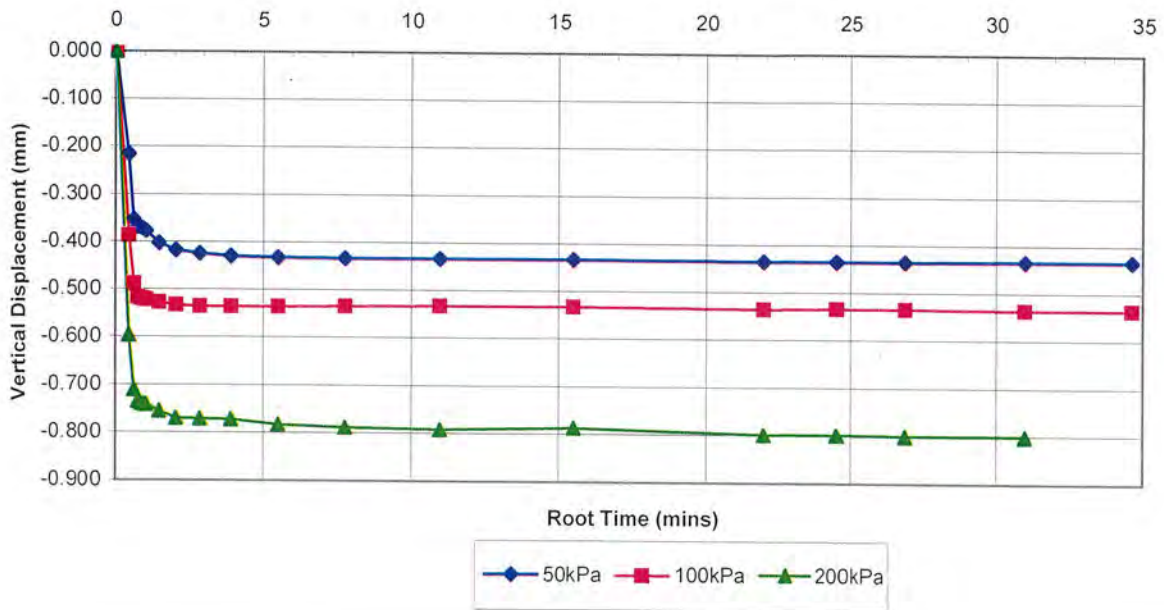
**Client:** AMEY OW Limited

**Job No:** 4322C

**Borehole:** BH BB013

**Sample:** B16

**Depth:** 3.40 m.





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co.Durham. DH2 2RG  
a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

**Borehole:** BH BB013

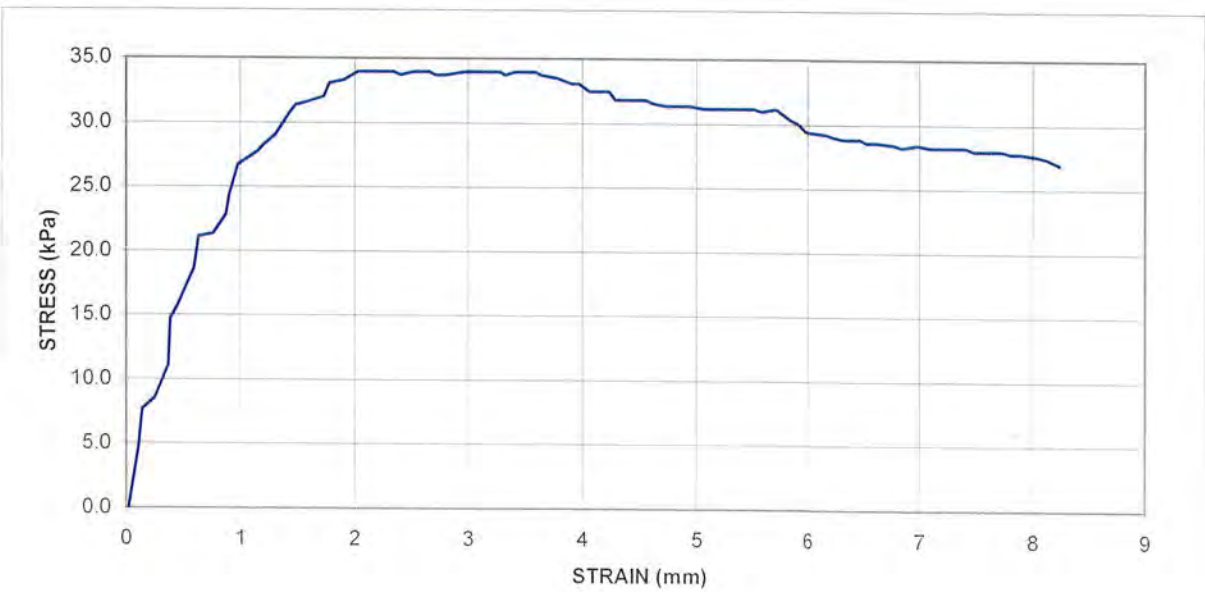
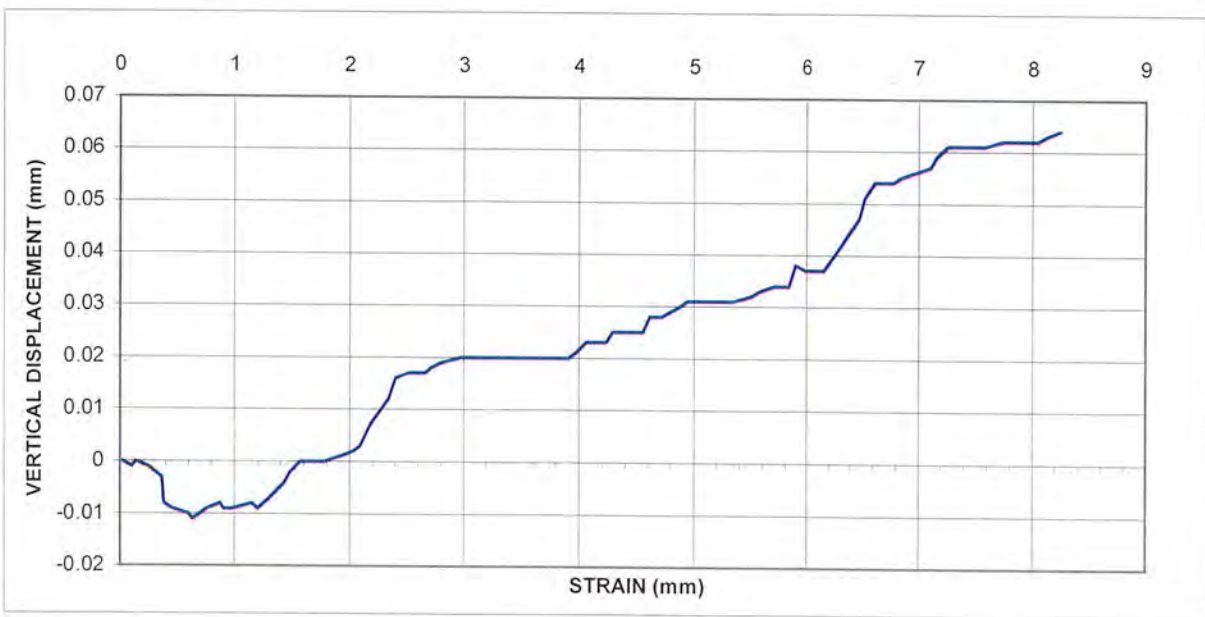
**Sample:** B16

**Depth:** 3.40 m.

**Stage Number** 1

**Pressure** 50 kPa

50 kPa







# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co. Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



1367

## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

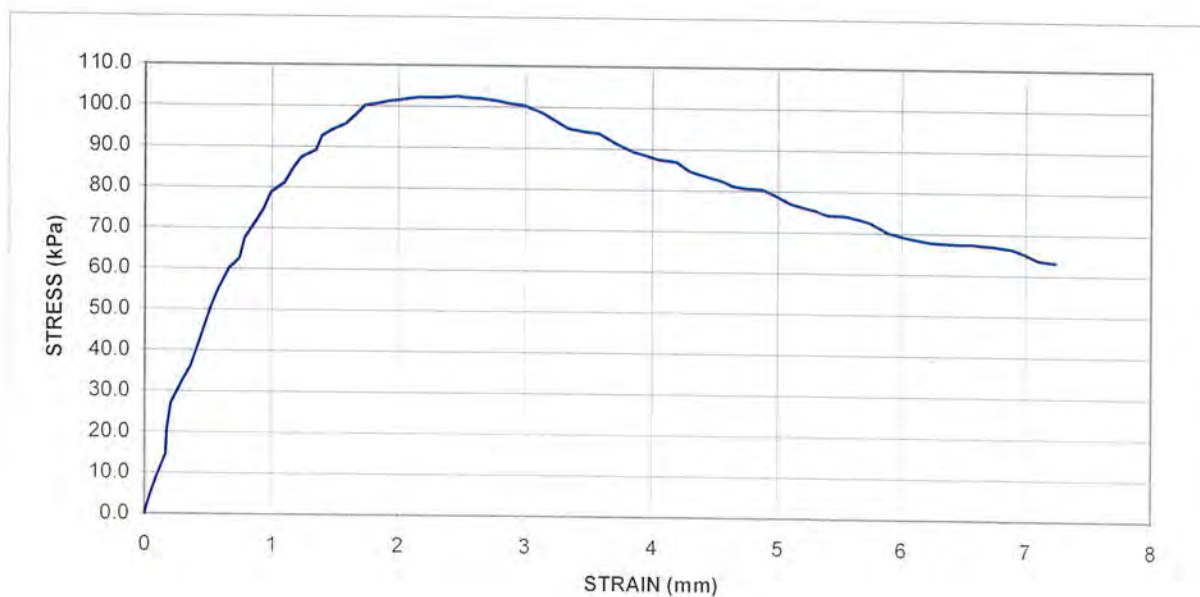
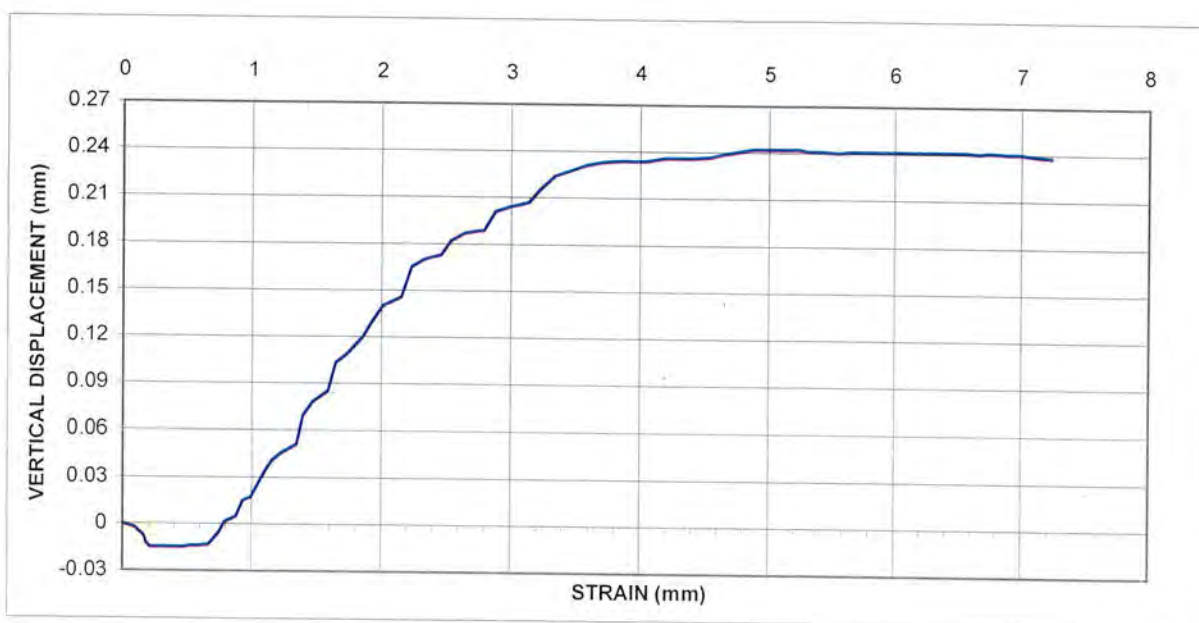
**Borehole:** BH BB013

**Sample:** B16

**Depth:** 3.40 m.

**Stage Number** 2

**Pressure** 100 kPa





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
 Chester-le-Street, Co.Durham. DH2 2RG  
 a UKAS LABORATORY Testing No. 1367



## Consolidated Drained Shear Box Test

BS 1377 : PART 7 : 1990 Clause 4

(Specimen(s) Tested Submerged)

1367

**Site:** A66 North Trans Pennine Scheme D Section 7

**Client:** AMEY OW Limited

**Job No.:** 4322C

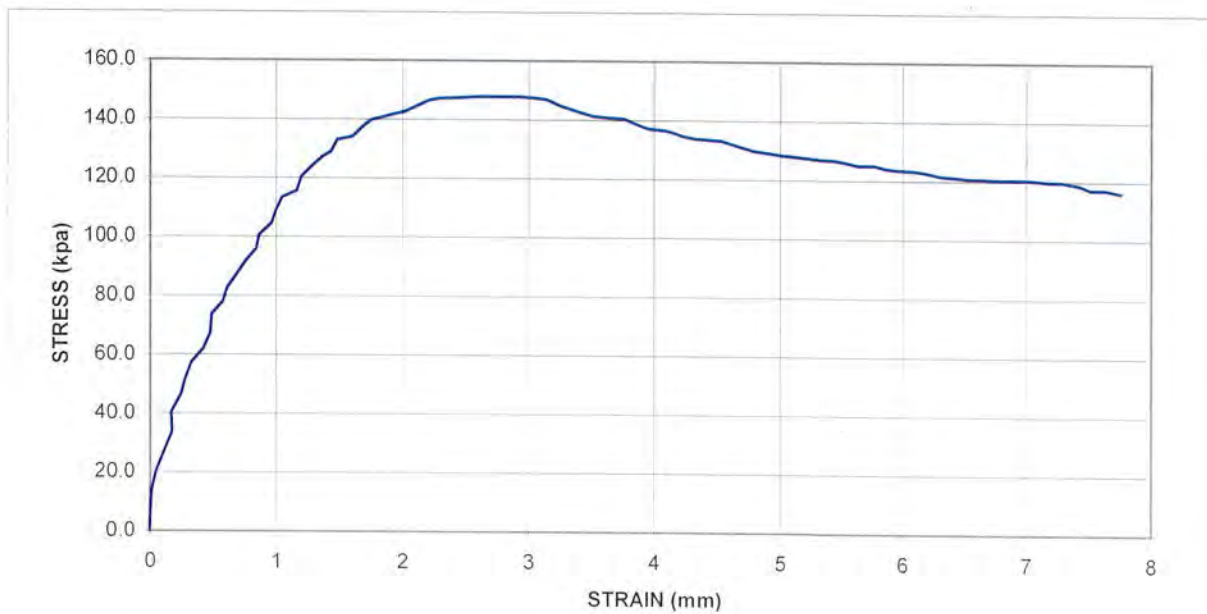
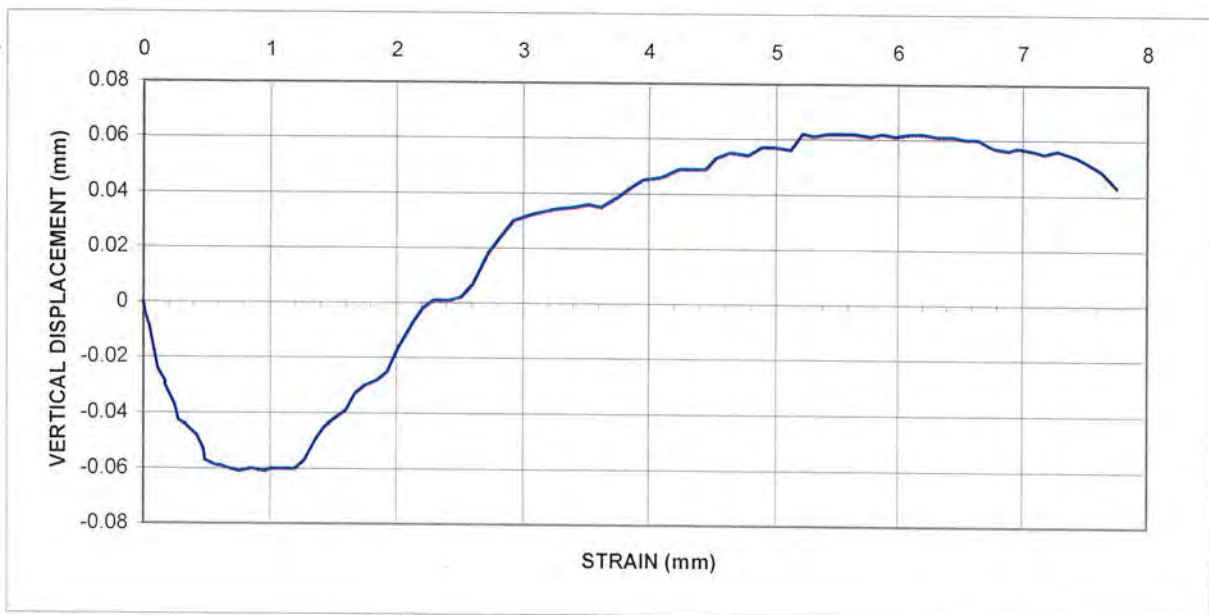
**Borehole:** BH BB013

**Sample:** B16

**Depth:** 3.40 m.

**Stage Number** 3

**Pressure** 200 kPa



**Undrained Shear Strength in Triaxial Cell  
without Pore Water Pressure Measurement**



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Shalva Cell (Industrial Estate), Palace Farm, Claxtedon, Stratford, Co. Durham, RU4 2PC. Tel: 01854 287 4700 Fax: 01854 287 4710  
Regional Office: Unit 20, Business Development Centre, Easingham Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 996

## UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

BS 1377 : Part 7 : Clauses 8 & 9 : 1990 Part 2 Clause 3.2

Exploratory Hole	Sample ID	Sample Depth (m)	Sample Type	Specific Depth (m)	Diameter (mm)	Length (mm)	Prep. Method	Stage No.	Initial Moisture Content (%)	Bulk Density (Mg/m <sup>3</sup> )	Dry Density (Mg/m <sup>3</sup> )	Membrane Thickness (mm)	Membrane Correction (kPa)	Cell Pressure (kPa)	Corrected Deviator Stress (kPa)	Failure Strain (%)	Mode of Failure	cu (kPa)	Date Tested
BH BB014	U4	1.50	U4	1.50	101.1	211.6	UNDISTURBED	1	21	2.09	1.73	0.3	1.13	20	112	20.0	C	56	25/03/2021
BH BB021	U12	3.00	U12	3.10	103.8	210.7	UNDISTURBED	1	17	2.20	1.89	0.3	0.77	30	27	12.5	P	13	18/03/2021
BH BB021	U12	3.00	U12	3.10			UNDISTURBED	2					0.90	60	28	15.5		14	18/03/2021
BH BB021	U12	3.00	U12	3.10			UNDISTURBED	3					1.00	120	29	18.0		14	18/03/2021
BH BB022	U5	1.50	U5	1.70	103.4	209.3	UNDISTURBED	1	17	2.26	1.94	0.4	1.01	25	50	12.0	C	25	01/04/2021
BH BB022	U5	1.50	U5	1.70			UNDISTURBED	2					1.15	50	54	14.5		27	01/04/2021
BH BB022	U5	1.50	U5	1.70			UNDISTURBED	3					1.47	100	55	20.0		28	01/04/2021

For description of sample please refer to the Laboratory Sample Description Sheet. Please note that the sample is not representative of the total. Latex membrane used.



Date of issue :- 20/04/2021

Certificate No :- TXL/4322C/1

Signed :-

Client :-

AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Page 1 of 1

G Contract No :- 4322C



1367

**Consolidated Undrained Shear Strength in Triaxial Cell with  
Measurement of Pore Water Pressure**

# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate,  
Pelton Fell, Chester le Street, DH2 2RG.

CONSOLIDATED UNDRAINED TRIAXIAL WITH MEASUREMENT OF PORE WATER PRESSURE

B.S. 1377 : Part 8 : 1990 : Clauses 3,4,5,6 and 7

PROJECT No : 4322C      CLIENT : AMEY OW Limited

PROJECT : A66 North Trans Pennine Scheme D Section 7

HOLE : BH BB008

SAMPLE No : U6

DEPTH (m) : 1.50

### TEST SPECIMEN PREPARATION

: Undisturbed  
Specific Depth (m) : 1.74  
Orientation within original sample : Vertical  
Description : Please refer to sample description sheet.

### TEST SPECIMEN DETAILS

	Stage No	1	2	3
Length	mm	201.7		
Diameter	mm	101.9		
Moisture Content	%	23		
Bulk Density	Mg/m <sup>3</sup>	1.92		

### SATURATION STAGE

Drainage Conditions : Both ends and radial boundary  
Final Cell Pressure kPa 320  
Final Pore Pressure kPa 309.8  
Final Pore Pressure Parameter B 0.985  
Duration day(s) 4

### CONSOLIDATION STAGE

	kPa	320	340	360
Cell Pressure	kPa	320	340	360
Back Pressure	kPa	300	300	300
Effective Pressure	kPa	20	40	60
Final Pore Pressure	kPa	304.1	302.3	304.4
Duration	day(s)	1	2	2

### SHEARING STAGE

	kPa	320	340	360
Cell Pressure	kPa	320	340	360
Rate of Axial Displacement	mm/min	0.0042	0.0042	0.0051
Final Moisture Content	%	22.6		
Final Bulk Density	Mg/m <sup>3</sup>	1.91		

### CONDITIONS AT FAILURE

	Criterion	Maximum stress ratio		
Pore Pressure	kPa	312	322	331
Minor Effective Principal Stress	kPa	8	18	29
Deviator Stress	kPa	20	40	68
Major Effective Principal Stress	kPa	28	58	97
Effective Principal Stress Ratio		3.33	3.23	3.36
Pore Pressure Parameter A		0.39	0.49	0.40
Axial Strain	%	3.2	5.7	16.9
Correction applied to Principal Stress	kPa	2.84	4.5	6.1
Duration	Days	1	1	4

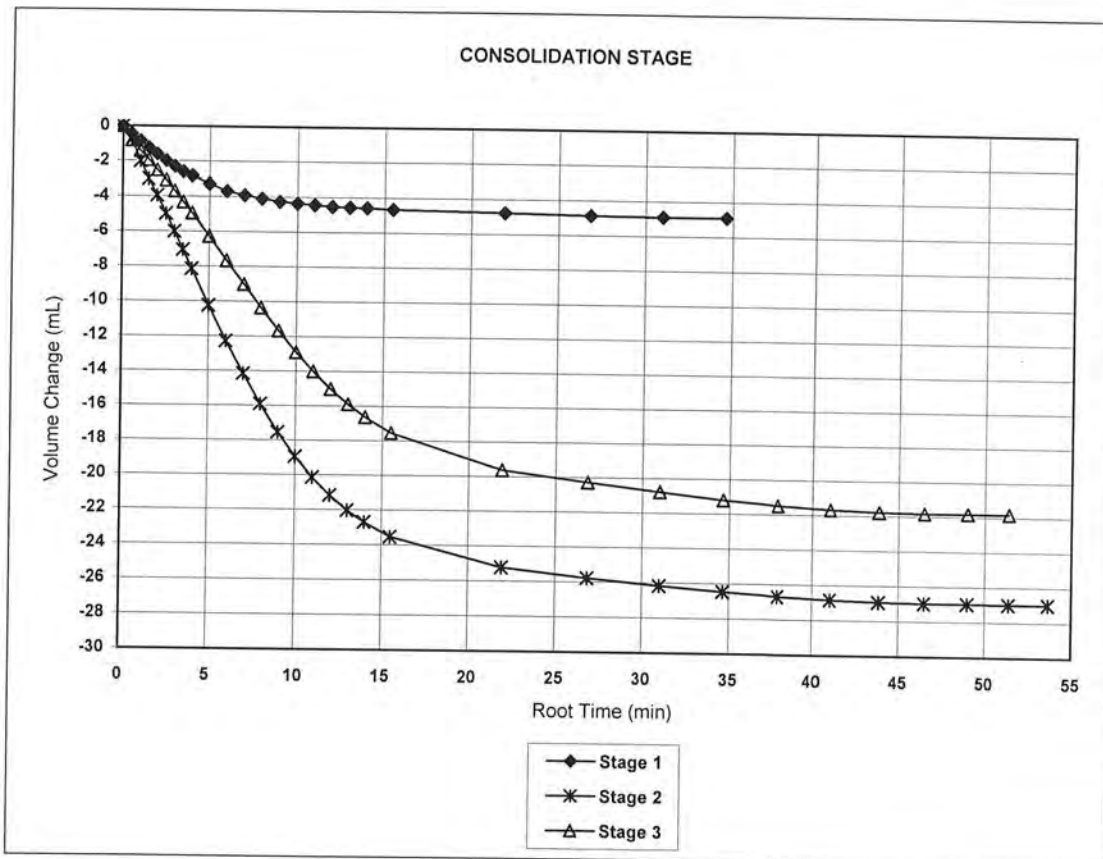
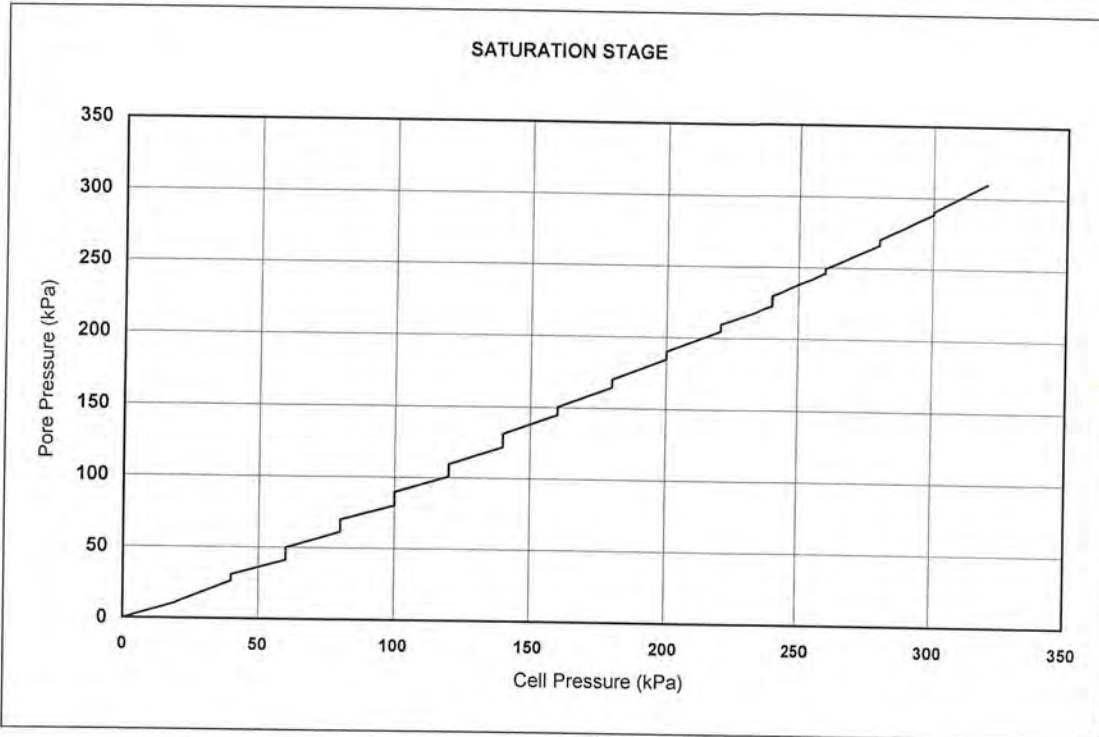
Apparent Cohesion

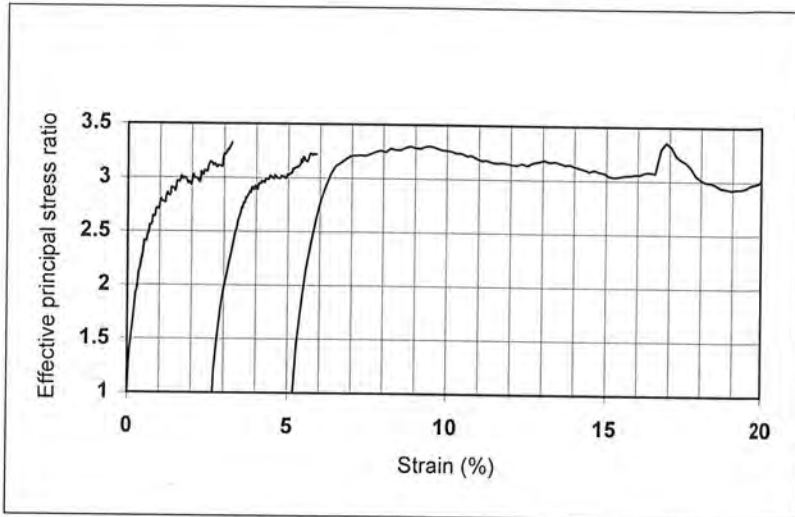
c' 1

Angle of Shearing Resistance

degrees 32





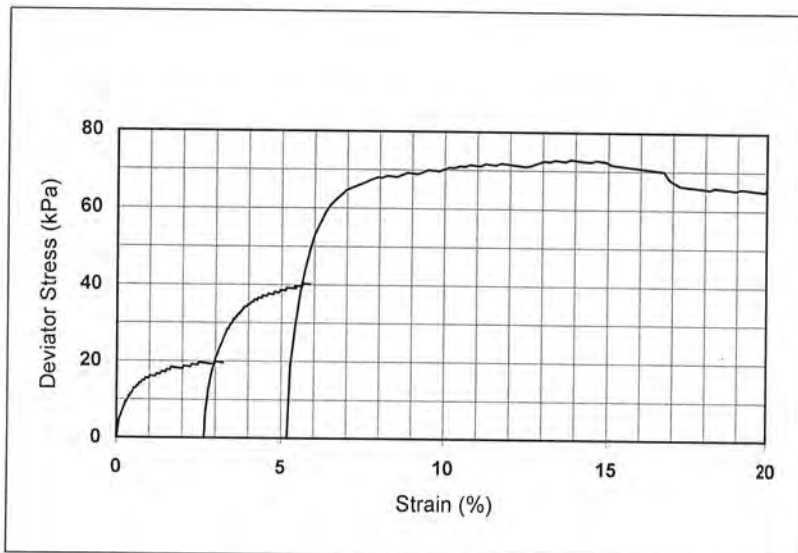


Failure Conditions

At maximum stress ratio

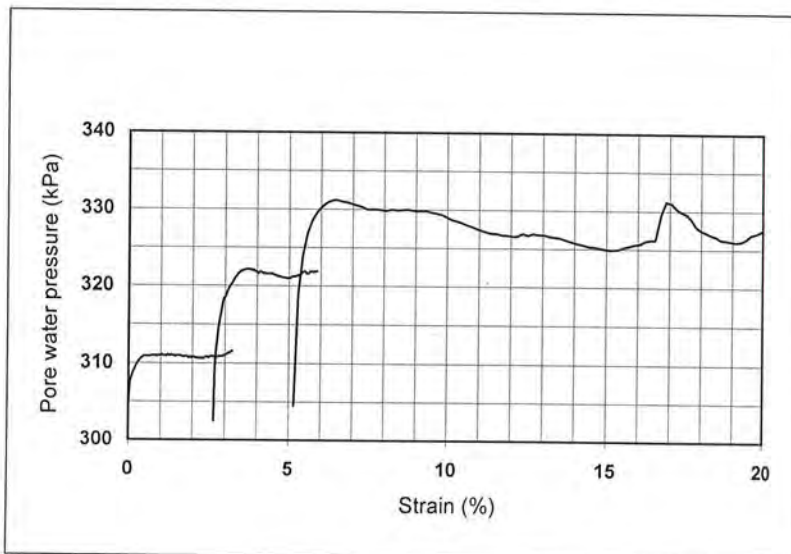
Stage 1

strain                      3.24 %  
 deviator stress          19.5 kPa  
 stress ratio              3.33



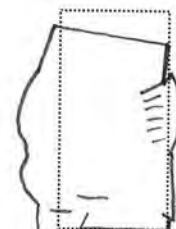
Stage 2

strain                      5.70 %  
 deviator stress          40.3 kPa  
 stress ratio              3.23



Stage 3

strain                      16.89 %  
 deviator stress          67.9 kPa  
 stress ratio              3.36



**FAILURE MODE**

PROJECT No : 4322C

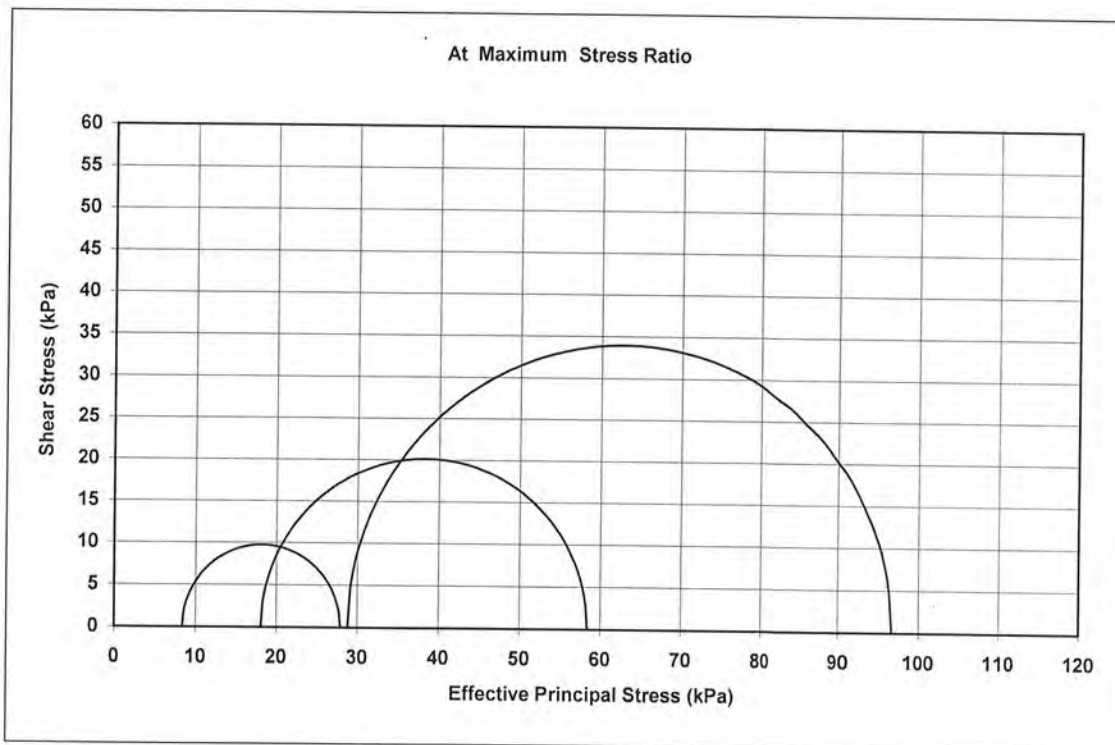
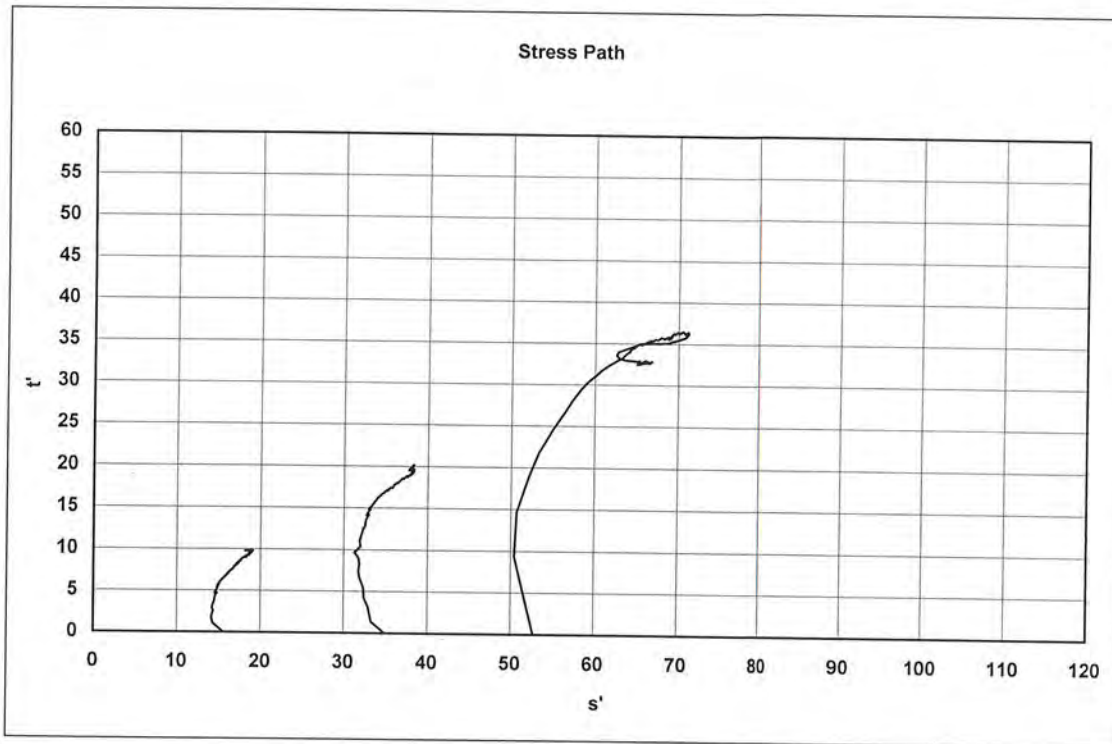
CLIENT : AMEY OW Limited

PROJECT : A66 North Trans Pennine Scheme D Section 7

HOLE : BH BB008

SAMPLE No : U6

DEPTH (m) : 1.50





# ALLIED EXPLORATION AND GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate,  
Pelton Fell, Chester le Street, DH2 2RG.

CONSOLIDATED UNDRAINED TRIAXIAL WITH MEASUREMENT OF PORE WATER PRESSURE

B.S. 1377 : Part 8 : 1990 : Clauses 3,4,5,6 and 7

PROJECT No : 4322C      CLIENT : AMEY OW Limited

PROJECT : A66 North Trans Pennine Scheme D Section 7

HOLE : BH BB020

SAMPLE No : U8

DEPTH (m) : 2.00

### TEST SPECIMEN PREPARATION

: Undisturbed  
Specific Depth (m) : 2.23  
Orientation within original sample : Vertical  
Description : Please refer to sample description sheet.

### TEST SPECIMEN DETAILS

	Stage No	1	2	3
Length	mm	200.8		
Diameter	mm	102.4		
Moisture Content	%	9.4		
Bulk Density	Mg/m <sup>3</sup>	2.30		

### SATURATION STAGE

Drainage Conditions : Both ends and radial boundary  
Final Cell Pressure kPa 320  
Final Pore Pressure kPa 308  
Final Pore Pressure Parameter B 0.93  
Duration day(s) 4

### CONSOLIDATION STAGE

	kPa	320	340	360
Cell Pressure	kPa	320	340	360
Back Pressure	kPa	300	300	300
Effective Pressure	kPa	20	40	60
Final Pore Pressure	kPa	300	300	301
Duration	day(s)	1	1	2

### SHEARING STAGE

	kPa	320	340	360
Cell Pressure	kPa	320	340	360
Rate of Axial Displacement	mm/min	0.00419	0.00418	0.00506
Final Moisture Content	%	9.8		
Final Bulk Density	Mg/m <sup>3</sup>	2.31		

### CONDITIONS AT FAILURE

	Criterion	Maximum stress ratio		
Pore Pressure	kPa	307	307	307
Minor Effective Principal Stress	kPa	13	33	53
Deviator Stress	kPa	44	81	108
Major Effective Principal Stress	kPa	57	114	161
Effective Principal Stress Ratio		4.44	3.42	3.05
Pore Pressure Parameter A		0.16	0.08	0.06
Axial Strain	%	1.2	2.8	4.5
Correction applied to Principal Stress	kPa	1.0	2.5	4.0
Duration	Days	1	1	4

Apparent Cohesion c' 7

Angle of Shearing Resistance

degrees 27

PROJECT No : 4322C

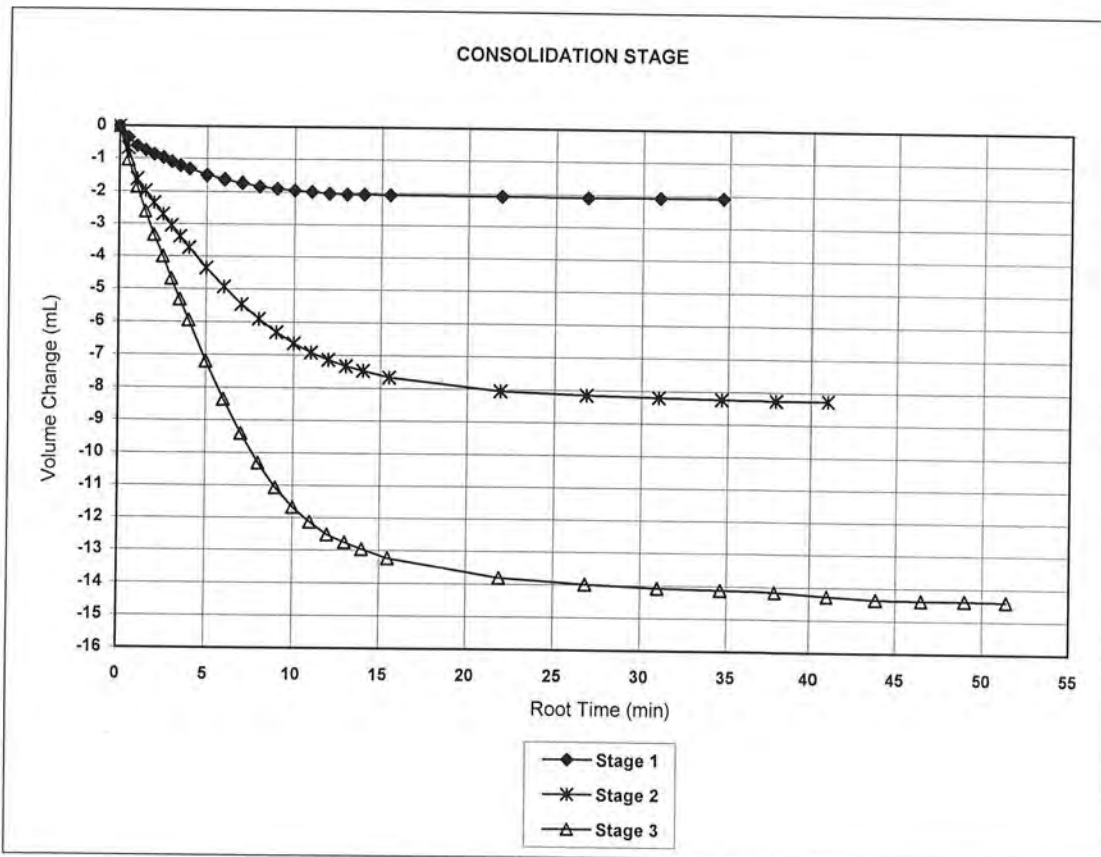
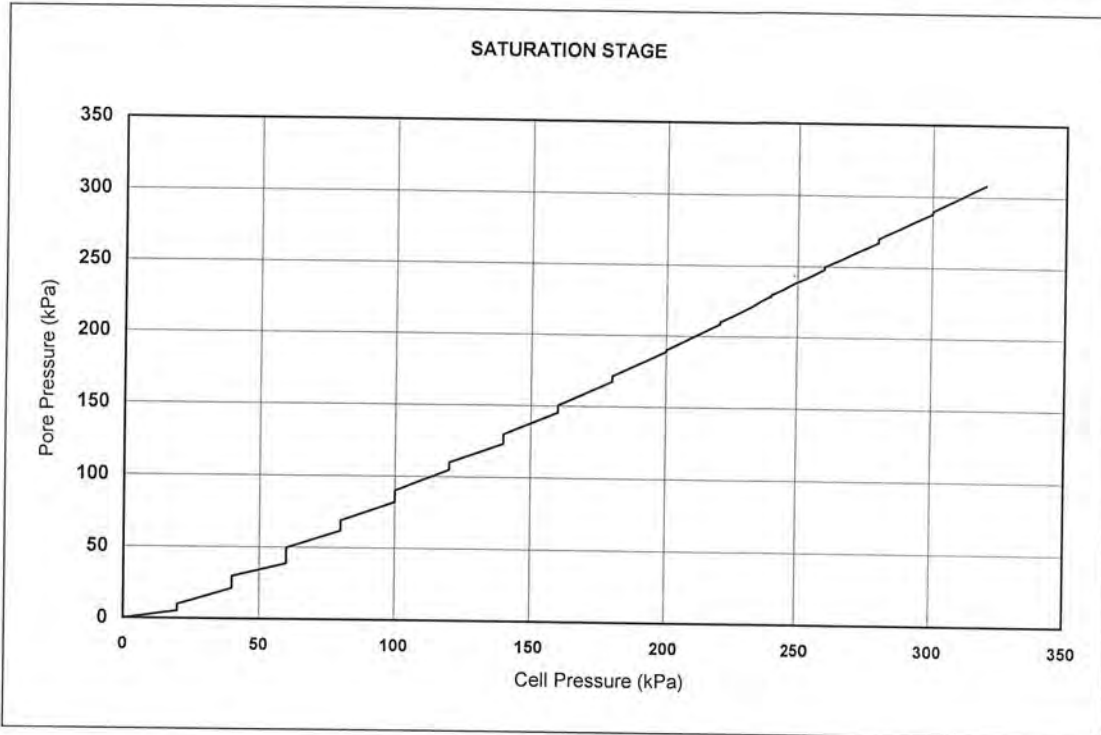
CLIENT : AMEY OW Limited

PROJECT : A66 North Trans Pennine Scheme D Section 7

HOLE : BH BB020

SAMPLE No : U8

DEPTH (m) : 2.00

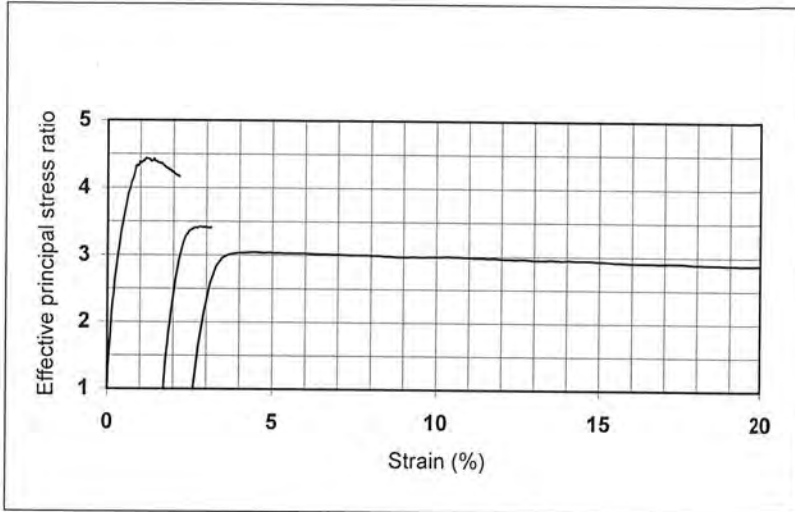


Failure Conditions

At maximum stress ratio

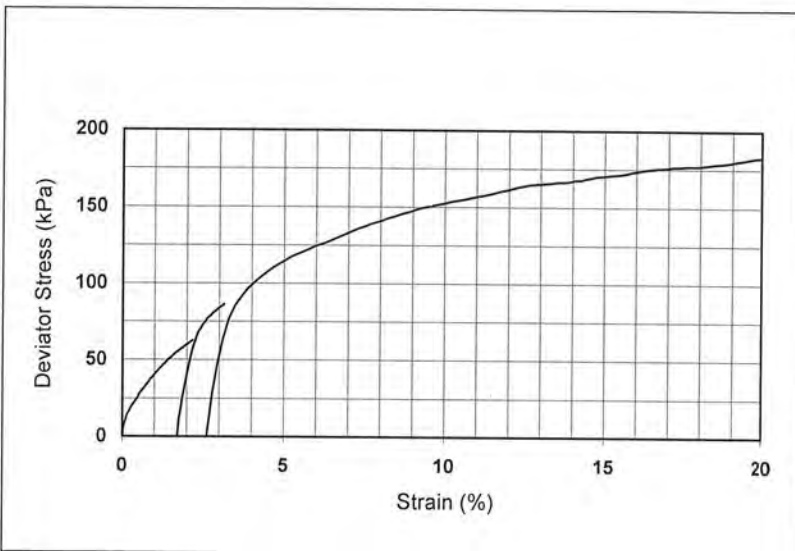
Stage 1

strain                      1.17 %  
 deviator stress          44.4 kPa  
 stress ratio              4.44



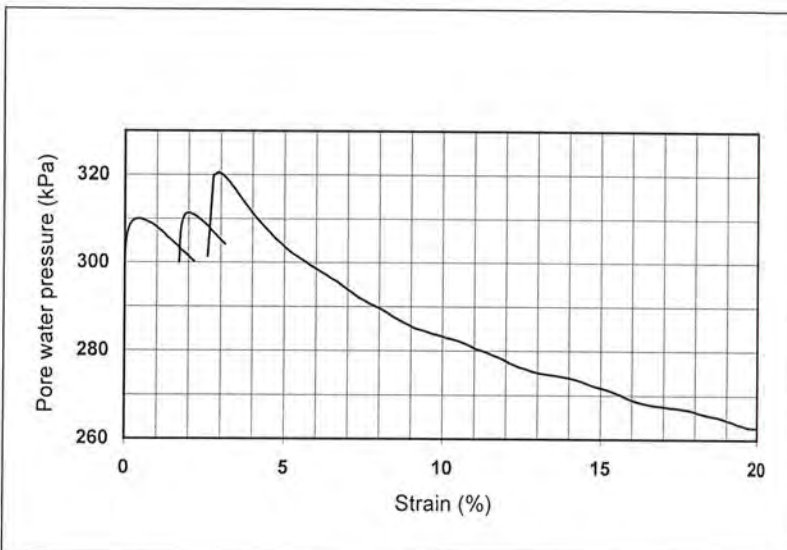
Stage 2

strain                      2.80 %  
 deviator stress          80.7 kPa  
 stress ratio              3.42



Stage 3

strain                      4.54 %  
 deviator stress          108.4 kPa  
 stress ratio              3.05



FAILURE MODE



PROJECT No : 4322C

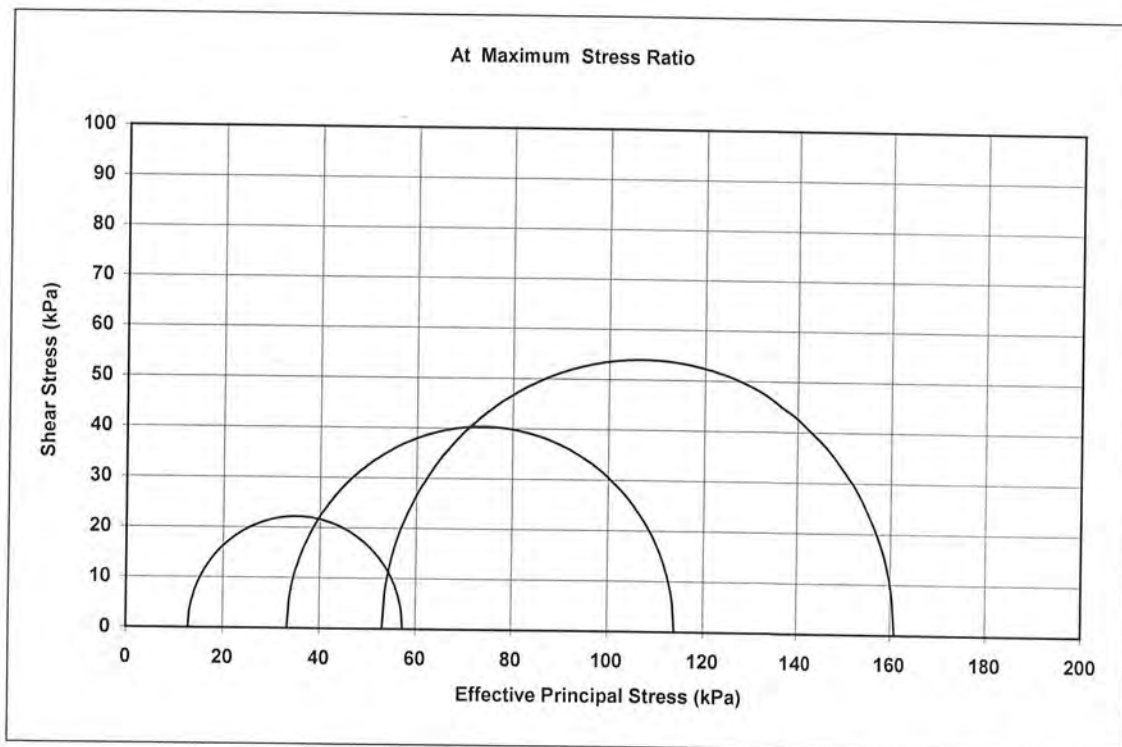
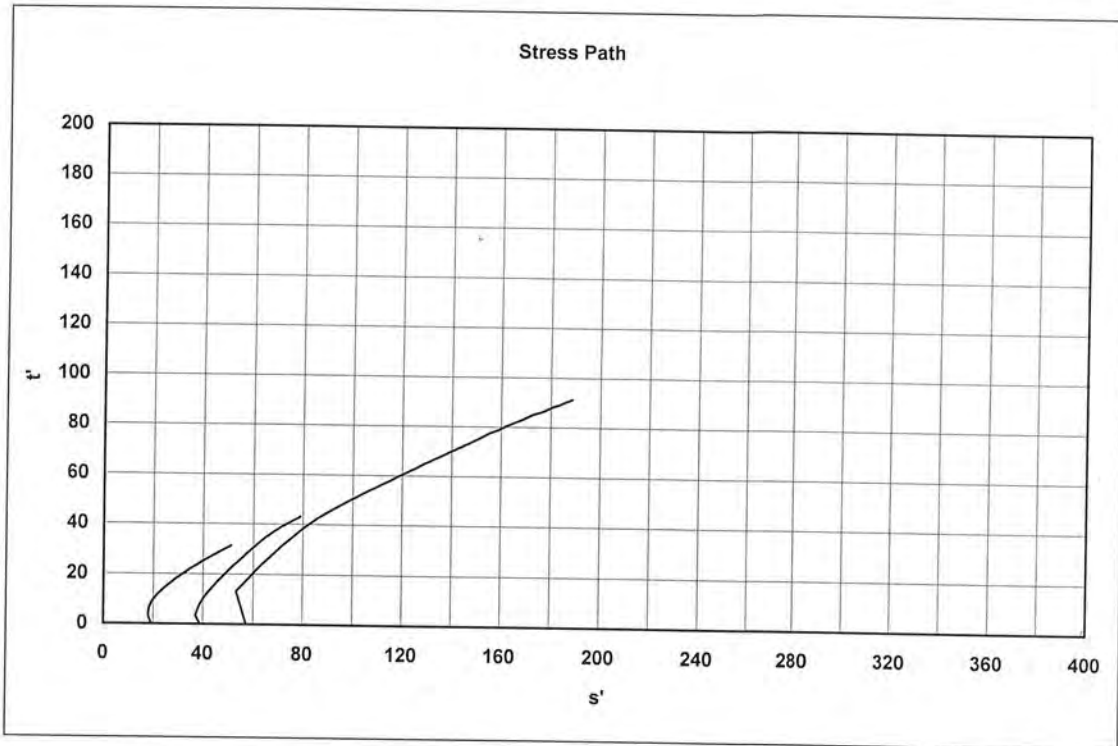
CLIENT : AMEY OW Limited

PROJECT : A66 North Trans Pennine Scheme D Section 7

HOLE : BH BB020

SAMPLE No : U8

DEPTH (m) : 2.00



## Moisture Content of Rock

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Felton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20 Business Development Centre, Earsom Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## MOISTURE CONTENT CERTIFICATE

ISRM : 1981

Exploratory Hole No.	Sample Depth (m)	Sample ID	Moisture Content (%)	Date Tested	Remarks
BH BB009	9.20	C22	3.7	24/03/2021	
BH BB010	1.20	C11	3.5	24/03/2021	
BH BB010	4.10	C14	5.4	24/03/2021	
BH BB011	2.45	C7	4.3	10/03/2021	
BH BB011	4.40	C9	4.9	10/03/2021	
BH BB012	2.00	C9	6.1	24/03/2021	
BH BB012	5.10	C13	5.7	24/03/2021	
BH BB012	6.40	C14	5.8	24/03/2021	
BH BB018	1.20	C4	0.3	17/03/2021	
BH BB018	6.40	C10	0.2	17/03/2021	
BH BB018	7.50	C12	0.4	17/03/2021	
BH BB020	5.50	C16	2.9	24/03/2021	
BH BB023	17.00	C29	1.3	17/03/2021	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- <b>A66 North Trans Pennine Scheme D Section 7</b>	Client :- <b>AMEY OW Limited</b>
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	Signed [Redacted Signature]	Date of 31/03/2021	RMC/4322C/1	No. :- <b>4322C</b>	Page 1 of 1 
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## Determination of Point Load Index

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stables Gill Industrial Estate, Pelton Fell, Chastleton Street, Co. Durham, DH2 2PG. Tel: 0191 367 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eamam Wharf, Blackburn, BB1 3BL. Tel: 01752 735 300 Fax: 01752 735 595

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB003	11.24	Axial	86.3	38.5	20.5	4229.4	4.84	1.13	5.449	Mudstone	18/02/2021
BH BB003	11.24	Diametral	88.6	86.3	1.5	7451.1	0.2	1.28	0.252	Mudstone	18/02/2021
BH BB003	11.70	Axial	86.1	59.0	13.6	6467.2	2.1	1.24	2.598	Mudstone	18/02/2021
BH BB003	11.70	Diametral	155.6	84.5	10.4	7136.9	1.46	1.27	1.845	Mudstone	18/02/2021
BH BB003	12.20	Axial	86.6	65.7	22.3	7246.5	3.1	1.27	3.9	Mudstone	18/02/2021
BH BB003	13.50	Axial	86.4	50.9	41.7	5595.0	7.46	1.2	8.944	Mudstone	18/02/2021
BH BB003	13.50	Diametral	123.5	84.2	26.2	7093.0	3.7	1.26	4.674	Mudstone	18/02/2021
BH BB003	14.10	Axial	86.0	59.1	6.5	6472.9	1	1.24	1.241	Mudstone	18/02/2021
BH BB003	14.10	Diametral	118.5	85.4	1.1	7286.3	0.15	1.27	0.189	Mudstone	18/02/2021
BH BB003	14.65	Axial	86.4	40.3	4.1	4434.3	0.93	1.14	1.063	Mudstone	18/02/2021
BH BB003	14.65	Diametral	117.4	84.6	1.0	7160.5	0.14	1.27	0.174	Mudstone	18/02/2021
BH BB007	7.00	Axial	85.7	25.5	2.3	2782.5	0.84	1.02	0.857	Mudstone	17/03/2021
BH BB007	7.27	Axial	85.6	22.5	1.1	2452.3	0.45	1	0.445	Mudstone	17/03/2021
BH BB007	7.30	Axial	86.1	39.3	2.9	4308.3	0.67	1.13	0.763	Mudstone	17/03/2021

NOTES - + Tested specimen measured using calibrated vernier callipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :- 22/04/2021	Certificate No :- PL/4322C/1	Signed :- [Redacted]	Page 1 of 15
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7		AEG Contract No :- 4322C



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stella Call Industrial Estate, Pailon Fell, Cheltenham, Gloucestershire, Co. Dunham, HQ 29G, Tel: 0191 367 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blaxburn, BB1 4BL, Tel: 01772 735 300 Fax: 01772 735 995

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB007	7.55	Axial	86.3	43.3	1.6	4757.8	0.33	1.16	0.382	Mudstone	17/03/2021
BH BB007	7.60	Axial	86.3	37.9	2.1	4164.5	0.5	1.12	0.565	Mudstone	17/03/2021
BH BB007	7.70	Axial	86.4	28.1	1.7	3091.2	0.54	1.05	0.57	Mudstone	17/03/2021
BH BB007	7.75	Axial	86.5	12.5	2.0	1376.7	1.41	0.87	1.235	Mudstone	17/03/2021
BH BB007	7.90	Axial	86.7	30.1	2.3	3322.7	0.68	1.07	0.726	Mudstone	17/03/2021
BH BB007	8.00	Axial	87.0	19.7	2.1	2182.2	0.95	0.97	0.92	Mudstone	17/03/2021
BH BB007	8.03	Axial	86.7	31.8	2.9	3510.4	0.82	1.08	0.884	Mudstone	17/03/2021
BH BB008	6.10	Axial	85.9	24.7	1.0	2701.5	0.38	1.02	0.382	Mudstone	20/03/2021
BH BB008	6.20	Irregular Lump	60.4	17.4	0.7	1338.1	0.55	0.87	0.475	Mudstone #	20/03/2021
BH BB008	6.25	Axial	85.8	22.7	1.2	2479.8	0.47	1	0.474	Mudstone	20/03/2021
BH BB008	6.30	Axial	85.4	28.4	1.3	3088.1	0.41	1.05	0.429	Mudstone	20/03/2021
BH BB008	6.34	Axial	84.5	14.0	1.4	1506.2	0.95	0.89	0.847	Mudstone	20/03/2021
BH BB008	6.60	Axial	86.2	49.2	1.4	5399.9	0.26	1.19	0.309	Mudstone #	20/03/2021
BH BB008	6.65	Axial	86.1	34.9	1.5	3825.9	0.38	1.1	0.419	Mudstone	20/03/2021

NOTES - + Tested specimen measured using calibrated vernier callipers # - Invalid Failure (Did not pass through both points) - Too soft to register a reading



Date of issue :-

22/04/2021

Certificate No :-

PL/4322C/2

Signed :-

[Redacted Signature]

Client :-

AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 7

Page 2 of 15

Contract No :-

4322C



1367



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Poldon Hill, Chesham, Bucks, UK. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Epsom Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB008	6.70	Irregular Lump	76.9	24.3	1.4	2379.3	0.59	0.99	0.581	Mudstone	20/03/2021
BH BS008	6.86	Irregular Lump	72.6	34.9	1.1	3226.1	0.35	1.06	0.369	Mudstone #	20/03/2021
BH BB008	6.90	Axial	84.7	25.5	1.4	2750.0	0.5	1.02	0.506	Mudstone	20/03/2021
BH BB008	9.50	Axial	86.7	58.7	12.6	6479.9	1.94	1.24	2.402	Siltstone #	20/03/2021
BH BB008	9.60	Axial	86.9	46.8	33.6	5178.2	6.49	1.18	7.641	Siltstone	20/03/2021
BH BB008	9.65	Diametral	111.3	64.9	15.8	4212.0	3.76	1.12	4.226	Siltstone	20/03/2021
BH BB008	9.65	Axial	66.1	48.4	36.5	4073.4	8.97	1.12	10.006	Siltstone	20/03/2021
BH BB008	9.71	Axial	66.5	50.4	20.4	4267.4	4.78	1.13	5.392	Siltstone	20/03/2021
BH BB008	10.00	Irregular Lump	101.3	43.8	15.3	5649.3	2.7	1.2	3.249	Siltstone	20/03/2021
BH BB008	10.05	Irregular Lump	86.8	40.7	19.7	4498.1	4.38	1.14	4.996	Siltstone	22/03/2021
BH BB008	10.10	Diametral	163.6	82.8	35.9	6855.8	5.24	1.25	6.577	Siltstone	22/03/2021
BH BB008	10.10	Axial	86.4	74.7	3.5	8217.6	0.42	1.31	0.562	Siltstone	22/03/2021
BH BB008	10.20	Axial	85.9	63.8	45.6	6977.9	6.53	1.26	8.228	Siltstone	22/03/2021
BH BB009	7.00	Irregular Lump	71.1	31.0	2.0	2806.4	0.7	1.03	0.723	Mudstone	20/03/2021

NOTES - +Tested specimen measured using calibrated vernier

Date of issue :-

22/04/2021

Certificate No :-

PL4322C/3

Sig

Client :-

AMEY OW Limited

Contract Title :-

Page 3 of 15

Contract No :-

4322C



1367

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Call Industrial Estate, Pellan Fell, Chetwode-Street, Co. Durham, DH2 2PG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blackburn, BB1 3BL - Tel: 01772 735 360 Fax: 01772 725 595

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB009	7.10	Axial	77.1	23.6	1.0	2316.7	0.42	0.98	0.412	Mudstone #	20/03/2021
BH BB009	7.25	Axial	84.5	23.2	1.8	2496.1	0.74	1	0.738	Mudstone	20/03/2021
BH BB009	7.30	Irregular Lump	86.0	28.5	1.8	3120.7	0.57	1.05	0.603	Mudstone	20/03/2021
BH BB009	7.34	Irregular Lump	57.2	19.6	1.2	1427.5	0.81	0.88	0.716	Mudstone	20/03/2021
BH BB009	7.37	Axial	80.8	23.7	1.0	2438.2	0.41	0.99	0.404	Mudstone	20/03/2021
BH BB009	7.39	Irregular Lump	84.1	27.1	1.6	2901.9	0.56	1.03	0.576	Mudstone #	20/03/2021
BH BB009	7.40	Irregular Lump	63.9	30.2	1.6	2457.1	0.63	1	0.63	Mudstone	20/03/2021
BH BB009	7.43	Irregular Lump	85.5	38.7	2.0	4213.0	0.47	1.12	0.527	Mudstone	20/03/2021
BH BB009	7.46	Axial	87.2	26.8	2.0	2975.5	0.66	0.689	0.689	Mudstone	20/03/2021
BH BB009	9.90	Diametral	118.4	86.1	32.3	7413.2	4.35	1.28	5.561	Siltstone	22/03/2021
BH BB009	9.90	Axial	86.3	45.8	7.5	5032.5	1.48	1.17	1.734	Siltstone #	22/03/2021
BH BB009	9.95	Axial	86.3	53.4	38.8	5867.6	6.62	1.21	8.022	Siltstone	22/03/2021
BH BB009	10.01	Diametral	126.5	86.2	22.7	7430.4	3.06	1.28	3.907	Siltstone	22/03/2021
BH BB009	10.01	Axial	86.5	55.6	30.0	6123.5	4.91	1.22	6.002	Siltstone	22/03/2021

NOTES - + Tested specimen measured using calibrated vernier callipers # - Invalid Failure (Did not pass through both points) ! - Too soft to register a reading

	Date of issue :- 22/04/2021	Certificate No :- PL/4322C/4	Page 4 of 15	
	Client :- AMEY CW Limited			



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Szeja Gill Industrial Estate, Pulton Fell, Chester-le-Street, Co. Durham, DH2 2BG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20 Business Development Centre, Easingham Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 996

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB009	10.09	Axial	86.5	56.2	35.0	6189.6	5.66	1.23	6.935	Siltstone	22/03/2021
BH BB009	10.15	Diametral	123.8	86.3	11.2	7447.7	1.51	1.28	1.927	Siltstone	22/03/2021
BH BB009	10.15	Axial	86.8	58.5	27.0	6465.3	4.17	1.24	5.165	Siltstone #	22/03/2021
BH BB009	10.30	Diametral	177.1	85.9	17.1	7378.8	2.32	1.28	2.957	Siltstone	22/03/2021
BH BB009	10.41	Axial	86.7	58.8	30.0	6490.9	4.61	1.24	5.719	Siltstone	22/03/2021
BH BB010	2.75	Axial	84.4	24.7	1.5	2654.3	0.58	1.01	0.588	Mudstone #	20/03/2021
BH BB010	2.90	Axial	86.9	24.6	1.3	2721.9	0.48	1.02	0.485	Mudstone	20/03/2021
BH BB010	3.04	Axial	86.2	35.5	1.6	3896.2	0.4	1.1	0.446	Mudstone	20/03/2021
BH BB010	3.10	Irregular Lump	58.5	26.1	1.1	1944.1	0.59	0.94	0.556	Mudstone	20/03/2021
BH BB010	3.14	Axial	85.8	28.0	1.1	3058.8	0.35	1.05	0.367	Mudstone	20/03/2021
BH BB010	3.30	Irregular Lump	49.1	32.3	1.1	2019.3	0.57	0.95	0.542	Mudstone	20/03/2021
BH BB010	3.45	Irregular Lump	58.3	35.9	1.2	2664.9	0.44	1.01	0.45	Mudstone	20/03/2021
BH BB010	3.50	Irregular Lump	69.1	40.3	2.2	3545.6	0.62	1.08	0.667	Mudstone	20/03/2021
BH BB010	3.60	Irregular Lump	78.4	58.1	1.6	5799.7	0.27	1.21	0.33	Mudstone	20/03/2021

NOTES - + Tested specimen measured using calibrated vernier calipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :-	22/04/2021	Certificate No :- PL/4322C/5	Signature 	Page 5 of 15	
	Client :-	AMEY OW Limited				



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stuba Gill Industrial Estate, Palace Fold, Chester-le-Street, Co. Durham, DH9 2BC. Tel: 0191 387 3700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eastam Wharf, Blaxburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 995

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB010	3.65	Irregular Lump	79.8	61.2	1.2	6218.2	0.2	1.23	0.246	Mudstone #	20/03/2021
BH BB010	3.73	Irregular Lump	78.2	42.7	0.7	4251.5	0.16	1.13	0.185	Mudstone	20/03/2021
BH BB010	3.95	Irregular Lump	81.1	37.3	1.0	3851.6	0.25	1.1	0.275	Mudstone	20/03/2021
BH BB010	4.30	Axial	85.4	23.5	1.0	2555.3	0.4	1	0.403	Mudstone	20/03/2021
BH BB010	4.40	Irregular Lump	59.2	33.1	1.0	2494.9	0.4	1	0.398	Mudstone	20/03/2021
BH BB010	4.75	Irregular Lump	67.3	42.6	1.7	3650.4	0.48	1.09	0.52	Mudstone	20/03/2021
BH BB010	4.85	Irregular Lump	84.7	37.7	2.1	4065.7	0.52	1.12	0.579	Mudstone	20/03/2021
BH BB010	4.92	Irregular Lump	71.4	56.2	0.7	5109.1	0.15	1.17	0.17	Mudstone	20/03/2021
BH BB011	2.30	Axial	84.7	39.6	1.3	4270.6	0.3	1.13	0.343	Mudstone	21/04/2021
BH BB011	2.45	Axial	86.3	40.7	1.5	4472.1	0.34	1.14	0.382	Mudstone	10/03/2021
BH BB011	4.40	Axial	86.4	43.4	1.0	4774.3	0.21	1.16	0.242	Mudstone	10/03/2021
BH BB011	4.55	Axial	84.8	39.8	0.2	4297.2	0.05	1.13	0.053	Mudstone	21/04/2021
BH BB012	1.80	Irregular Lump	45.1	20.0	0.4	1148.5	0.33	0.84	0.28	Mudstone	20/03/2021
BH BB012	1.90	Irregular Lump	58.1	22.1	0.3	1634.9	0.15	0.91	0.14	Mudstone #	20/03/2021

NOTES - +Tested specimen measured using calibrated vernier callipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :-	22/04/2021	Certificate No :- PL/4322C/6	Signed :- 	Page 6 of 15	
	Client :-	AMEY OW Limited				

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gallinerosi Estate, Polton Fell, Cheswick Street, Co. Durham, DH2 2BC. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blackburn, BB1 1BL. Tel: 01772 735 300 Fax: 01772 735 695

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB012	2.10	Irregular Lump	77.2	15.5	0.6	1523.6	0.37	0.89	0.328	Mudstone	20/03/2021
BH BB012	2.45	Irregular Lump	68.2	11.9	0.6	1033.3	0.58	0.82	0.478	Mudstone	20/03/2021
BH BB012	2.70	Irregular Lump	56.6	18.1	0.5	1304.4	0.42	0.86	0.359	Mudstone	20/03/2021
BH BB012	2.77	Irregular Lump	73.4	21.9	0.5	2046.7	0.22	0.96	0.215	Mudstone	20/03/2021
BH BB012	2.84	Irregular Lump	49.0	16.2	0.8	1010.7	0.8	0.82	0.65	Mudstone #	20/03/2021
BH BB012	3.00	Irregular Lump	53.3	15.7	0.6	1065.5	0.59	0.83	0.489	Mudstone #	20/03/2021
BH BB012	3.10	Irregular Lump	46.3	26.9	1.1	1585.8	0.67	0.9	0.601	Mudstone #	20/03/2021
BH BB012	3.21	Irregular Lump	52.6	21.2	0.5	1419.8	0.36	0.88	0.314	Mudstone	20/03/2021
BH BB012	3.25	Irregular Lump	63.9	11.6	0.7	943.8	0.72	0.8	0.579	Mudstone	20/03/2021
BH BB012	3.30	Irregular Lump	72.4	18.5	1.1	1705.4	0.63	0.92	0.579	Mudstone	20/03/2021
BH BB012	3.40	Axial	86.6	34.4	1.1	3793.0	0.29	1.1	0.321	Mudstone	20/03/2021
BH BB012	3.46	Axial	83.6	28.0	0.7	2980.4	0.22	1.04	0.229	Mudstone #	20/03/2021
BH BB012	4.27	Irregular Lump	43.8	18.8	0.9	1048.4	0.83	0.82	0.685	Mudstone	20/03/2021
BH BB012	4.35	Irregular Lump	53.4	22.8	1.4	1840.5	0.78	0.93	0.727	Mudstone #	20/03/2021

NOTES - + Tested specimen measured using calibrated vernier calliper

Certificate No :- PL4322C/7

Date of issue :- 22/04/2021

Signed :-

Client :- AMEY OW Limited

Contract Title :- A66 North Trans Pennine Scheme D Section 7

REG Contract No :- 4322C





# ALLIED EXPLORATION & GEOTECHNICS LIMITED




Head Office: Unit 22 Stella Gill Industrial Estate, Potton Field, Chesham-Street, Co. Durham, DH2 2RG. Tel: 0191 367 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blaxburn, BB1 3BL. Tel: 01772 735 300 Fax: 01772 735 995.

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB012	4.40	Irregular Lump	48.1	15.4	1.3	943.1	1.38	0.8	1.108	Mudstone #	20/03/2021
BH BB012	4.45	Irregular Lump	49.5	8.8	1.4	554.6	2.6	0.71	1.85	Mudstone	20/03/2021
BH BB012	4.50	Irregular Lump	49.7	16.5	1.1	1044.1	1.07	0.82	0.88	Mudstone	20/03/2021
BH BB012	4.60	Irregular Lump	47.1	24.2	1.0	1451.3	0.67	0.88	0.596	Mudstone #	20/03/2021
BH BB012	4.70	Irregular Lump	79.5	25.6	1.1	2591.3	0.44	1.01	0.439	Mudstone #	20/03/2021
BH BB012	4.80	Irregular Lump	64.9	24.1	1.0	1991.5	0.52	0.95	0.498	Mudstone #	20/03/2021
BH BB012	4.90	Irregular Lump	47.1	22.1	0.5	1325.3	0.4	0.87	0.343	Mudstone	20/03/2021
BH BB012	5.00	Irregular Lump	48.2	29.1	0.7	1785.9	0.39	0.93	0.365	Mudstone #	20/03/2021
BH BB012	5.10	Axial	79.4	18.1	0.5	1829.8	0.26	0.93	0.241	Mudstone #	20/03/2021
BH BB012	5.22	Irregular Lump	75.4	25.7	0.8	2467.3	0.33	1	0.324	Mudstone #	20/03/2021
BH BB012	5.40	Irregular Lump	46.7	18.7	0.7	1111.9	0.67	0.83	0.556	Mudstone	20/03/2021
BH BB012	5.47	Irregular Lump	55.1	21.9	0.7	1536.4	0.47	0.9	0.418	Mudstone #	20/03/2021
BH BB012	5.55	Irregular Lump	58.9	39.1	0.6	2932.3	0.22	1.04	0.223	Mudstone #	20/03/2021
BH BB012	5.57	Irregular Lump	60.9	27.4	0.5	2124.6	0.23	0.95	0.219	Mudstone #	20/03/2021

NOTES - + Tested specimen measured using calibrated vernier callipers # Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :- 22/04/2021	Certificate No :- PL/4322C/8	Signed :- 	
	Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322C	

A66 North Trans Pennine Scheme D Section 7



# ALLIED EXPLORATION & GEOTECHNICS LIMITED



Head Office: Unit 25 Stella Cill Industrial Estate, Fallon Fell, Chesham, Bucks, UK. Tel: 0181 387 4700 Fax: 0181 387 4710  
Regional Office: Unit 20, Business Development Centre, Extram Wharf, Blackburn, BB1 5BL. Tel: 01752 735 300 Fax: 01752 735 599

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB012	5.80	Axial	86.8	41.1	1.0	4542.3	0.22	1.14	0.252	Mudstone	27/04/2021
BH BB018	1.20	Diametral	221.6	81.2	29.4	6593.4	4.46	1.24	5.542	Limestone	17/03/2021
BH BB018	1.20	Axial	86.6	74.0	29.6	8159.4	3.63	1.3	4.736	Limestone	17/03/2021
BH BB018	1.28	Axial	86.6	50.1	21.3	5524.2	3.85	1.2	4.607	Limestone	17/03/2021
BH BB018	2.20	Diametral	157.8	82.4	33.1	6789.8	4.87	1.25	6.099	Limestone	17/03/2021
BH BB018	2.20	Axial	86.7	41.2	20.9	4548.1	4.59	1.14	5.246	Limestone	17/03/2021
BH BB018	2.25	Axial	86.7	63.8	29.8	7042.9	4.23	1.26	5.34	Limestone	17/03/2021
BH BB018	2.32	Diametral	186.6	82.7	12.8	6839.3	1.87	1.25	2.348	Limestone	17/03/2021
BH BB018	2.32	Axial	86.6	68.9	29.0	7597.1	3.81	1.28	4.896	Limestone	17/03/2021
BH BB018	2.40	Axial	86.7	31.2	18.2	3444.1	5.29	1.07	5.684	Limestone	17/03/2021
BH BB018	2.44	Axial	86.7	56.0	19.5	6181.8	3.15	1.23	3.862	Limestone	17/03/2021
BH BB018	6.40	Diametral	200.7	83.3	25.9	6938.9	3.73	1.26	4.694	Limestone	17/03/2021
BH BB018	6.50	Diametral	116.4	78.8	25.3	6209.4	4.07	1.23	4.99	Limestone	17/03/2021
BH BB018	6.50	Axial	86.8	46.7	21.6	5161.2	4.18	1.18	4.916	Limestone	17/03/2021

NOTES - +Tested specimen measured using calibrated vernier calipers #Invalid Failure (Did not pass through both points) - Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/9	Signed :- [Redacted]	Page 9 of 15
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	EG Contract No :- 4322C	

# ALLIED EXPLORATION & GEOTECHNICS LIMITED



Head Office: Unit 25 Stella Cill Industrial Estate, Pelton Fell, Chesdale-Street, Co. Durham, DH2 2BG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 599

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB018	6.55	Axial	86.8	46.0	18.1	5083.8	3.57	1.17	4.185	Limestone	17/03/2021
BH BB018	6.60	Axial	86.8	53.2	21.5	5879.5	3.66	1.21	4.434	Limestone	17/03/2021
BH BB018	6.65	Diametral	156.3	78.1	32.3	6099.6	5.3	1.22	6.476	Limestone	17/03/2021
BH BB018	6.65	Axial	86.7	55.4	28.5	6115.6	4.66	1.22	5.695	Limestone	17/03/2021
BH BB018	6.80	Diametral	165.2	81.4	31.1	6626.0	4.69	1.25	5.841	Limestone	17/03/2021
BH BB018	6.80	Axial	86.6	72.1	30.1	7949.9	3.78	1.3	4.903	Limestone	17/03/2021
BH BB018	6.95	Axial	86.7	76.0	22.5	8389.6	2.68	1.31	3.518	Limestone	17/03/2021
BH BB018	7.50	Diametral	149.1	83.7	30.2	7005.7	4.3	1.26	5.428	Limestone	17/03/2021
BH BB018	7.50	Axial	86.6	54.2	27.1	5796.2	4.54	1.22	5.524	Limestone	17/03/2021
BH BB018	7.56	Axial	86.7	84.2	29.9	9294.8	3.21	1.34	4.318	Limestone	17/03/2021
BH BB018	7.65	Diametral	128.1	76.1	39.1	5791.2	6.76	1.21	8.162	Limestone	17/03/2021
BH BB018	7.65	Axial	86.8	56.9	24.1	6288.4	3.83	1.23	4.711	Limestone	17/03/2021
BH BB018	7.71	Axial	86.7	63.8	32.2	7042.9	4.57	1.26	5.768	Limestone	17/03/2021
BH BB018	7.76	Diametral	233.4	77.1	32.7	5944.4	5.51	1.22	6.693	Limestone	17/03/2021

NOTES - +Tested specimen measured using calibrated vernier callipers #Invalid Failure (Did not pass through both points)-Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/10	Sign [Redacted]	Page 10 of 15
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	Contract No :- 4322C	



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Callindustrial Estate, Pilton Fell, Chedoke-Street, Co. Durham, DH2 2BG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 995

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB018	7.78	Axial	86.6	46.1	28.1	5083.1	5.53	1.17	6.486	Limestone	17/03/2021
BH BB018	7.83	Axial	86.6	39.3	20.5	4333.3	4.74	1.13	5.363	Limestone	17/03/2021
BH BB018	7.89	Diametral	142.6	78.0	24.9	6084.0	4.08	1.22	4.989	Limestone	17/03/2021
BH BB020	5.58	Axial	87.2	45.5	13.7	5051.7	2.72	1.17	3.183	Siltstone	20/03/2021
BH BB020	5.70	Axial	86.6	32.4	6.3	3572.5	1.76	1.08	1.909	Siltstone	20/03/2021
BH BB020	5.80	Irregular Lump	57.8	27.8	2.6	2045.9	1.27	0.96	1.216	Siltstone	20/03/2021
BH BB020	5.85	Axial	85.7	26.6	2.9	2902.5	0.99	1.03	1.02	Siltstone	20/03/2021
BH BB020	5.90	Axial	86.0	20.3	3.8	2222.8	1.72	0.97	1.674	Siltstone	20/03/2021
BH BB020	5.94	Axial	86.0	27.0	0.8	2956.5	0.28	1.04	0.292	Siltstone	20/03/2021
BH BB020	5.97	Axial	86.8	19.9	5.9	2199.3	2.66	0.97	2.587	Siltstone	20/03/2021
BH BB020	9.00	Axial	87.1	19.5	0.9	2163.5	0.44	0.97	0.423	Siltstone	20/03/2021
BH BB020	9.20	Irregular Lump	72.5	35.9	1.4	3313.9	0.43	1.07	0.458	Siltstone #	20/03/2021
BH BB020	9.40	Irregular Lump	77.8	32.3	14.2	3199.6	4.45	1.06	4.708	Siltstone	20/03/2021
BH BB020	9.50	Axial	85.6	35.1	2.0	3825.5	0.51	1.1	0.565	Siltstone	20/03/2021

NOTES - +Tested specimen measured using calibrated vernier callipers # Invalid Failure (Did not pass through both points) !-Top soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/11	Signed :- [Redacted]	Page 11 of 15
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	AEG Contract No :- 4322C	





# ALLIED EXPLORATION & GEOTECHNICS LIMITED



Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chedoke Street, Co. Durham, DH2 2PG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 505

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB020	9.55	Axial	86.3	48.3	2.9	5307.2	0.54	1.18	0.639	Siltstone #	20/03/2021
BH BB020	9.60	Axial	86.5	56.6	3.4	6233.7	0.54	1.23	0.66	Siltstone	20/03/2021
BH BB020	10.20	Irregular Lump	59.9	25.7	1.3	1960.1	0.65	0.65	0.613	Mudstone	20/03/2021
BH BB020	10.30	Irregular Lump	68.5	23.0	1.4	2006.0	0.68	0.95	0.644	Mudstone	20/03/2021
BH BB020	10.40	Irregular Lump	60.0	21.9	1.5	1673.0	0.91	0.91	0.834	Mudstone	20/03/2021
BH BB020	10.45	Irregular Lump	66.2	30.9	4.0	2604.5	1.52	1.01	1.537	Mudstone	20/03/2021
BH BB023	17.00	Diametral	220.6	76.9	37.6	5913.6	6.37	1.21	7.726	Limestone	17/03/2021
BH BB023	17.00	Axial	86.5	82.0	33.1	9031.1	3.66	1.34	4.892	Limestone	17/03/2021
BH BB023	17.08	Axial	86.5	54.8	27.9	6042.4	4.61	1.22	5.625	Limestone	17/03/2021
BH BB023	17.14	Axial	86.5	49.0	24.0	5402.9	4.43	1.19	5.274	Limestone	17/03/2021
BH BB023	17.22	Diametral	170.1	52.0	15.6	2704.0	5.77	1.02	5.875	Limestone	17/03/2021
BH BB023	17.22	Axial	58.2	39.2	21.1	2904.8	7.28	1.03	7.527	Limestone	17/03/2021
BH BB023	17.26	Axial	58.2	44.4	18.2	3290.2	5.52	1.06	5.873	Limestone	17/03/2021
BH BB023	17.40	Diametral	168.3	51.9	16.6	2693.6	6.16	1.02	6.26	Limestone	17/03/2021

NOTES - + Tested specimen measured using calibrated vernier callipers. # Invalid Failure (Did not pass through both points). I. Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/12	Signed :- [Redacted]	Page 12 of 15	
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7		AEG Contract No :- 4322C	

# ALLIED EXPLORATION & GEOTECHNICS LIMITED



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Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blackburn, BB1 5BL. - Tel: 01752 735 300 Fax: 01752 735 999

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB023	17.40	Axial	54.1	41.3	8.8	2844.8	3.08	1.03	3.172	Limestone	17/03/2021
BH BB023	17.44	Axial	54.1	40.8	17.1	2810.4	6.09	1.03	6.256	Limestone	17/03/2021
BH BB024	13.00	Diametral	201.1	80.0	17.8	6400.0	2.78	1.24	3.436	Siltstone	22/03/2021
BH BB024	13.00	Axial	86.6	61.6	10.5	6792.2	1.54	1.25	1.934	Siltstone #	22/03/2021
BH BB024	14.05	Diametral	164.1	76.4	21.6	5837.0	3.7	1.21	4.48	Siltstone	22/03/2021
BH BB024	14.05	Axial	86.7	73.1	11.6	8069.5	1.43	1.3	1.865	Siltstone #	22/03/2021
BH BB024	14.20	Diametral	160.7	81.0	22.7	6561.0	3.46	1.24	4.304	Siltstone	22/03/2021
BH BB024	14.20	Axial	86.7	64.3	30.4	7098.1	4.29	1.26	5.423	Siltstone	22/03/2021
BH BB024	14.27	Axial	86.6	79.2	26.3	8732.8	3.01	1.33	3.987	Siltstone	22/03/2021
BH BB024	14.35	Diametral	153.9	78.1	19.7	6099.6	3.22	1.22	3.939	Siltstone	22/03/2021
BH BB024	14.35	Axial	86.6	73.5	28.0	8104.3	3.46	1.3	4.502	Siltstone	22/03/2021
BH BB024	14.70	Diametral	140.0	85.5	9.2	7310.3	1.26	1.27	1.6	Siltstone	22/03/2021
BH BB024	14.70	Axial	86.7	61.8	10.2	6822.1	1.5	1.25	1.875	Siltstone	22/03/2021
BH BB024	14.77	Axial	86.7	57.9	21.3	6391.6	3.33	1.24	4.107	Siltstone	22/03/2021

NOTES - + Tested specimen measured using calibrated vernier calipers # Invalid Failure (Did not pass through both points), - Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/13	Signed :- <i>msero</i>	Name :- <b>M. SELWIK</b>	Page 13 of 15
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	AEG Contract No :- 4322C		



# ALLIED EXPLORATION & GEOTECHNICS LIMITED


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Regional Office: Unit 20, Business Development Centre, Easingwold, East Yorkshire, YO21 2JL - Tel: 01752 735 300 Fax: 01752 735 995

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB024	14.84	Diametral	126.1	79.7	28.4	6352.1	4.48	1.23	5.52	Siltstone	22/03/2021
BH BB024	15.20	Diametral	125.4	75.2	24.9	5655.0	4.41	1.2	5.295	Siltstone	22/03/2021
BH BB024	15.20	Axial	86.6	61.4	16.8	6770.1	2.48	1.25	3.099	Siltstone #	22/03/2021
BH BB024	15.33	Diametral	139.1	84.7	15.6	7174.1	2.17	1.27	2.752	Siltstone #	22/03/2021
BH BB024	15.50	Diametral	139.2	77.0	33.6	5929.0	5.67	1.21	6.89	Siltstone	22/03/2021
BH BB024	15.50	Axial	86.5	52.1	16.9	5738.0	2.95	1.21	3.554	Siltstone	22/03/2021
BH BB024	15.56	Axial	86.5	78.4	20.7	8634.6	2.4	1.32	3.172	Siltstone	22/03/2021
BH BB024	19.60	Diametral	185.9	86.4	13.4	7465.0	1.8	1.28	2.296	Siltstone	22/03/2021
BH BB024	19.60	Axial	86.6	48.3	13.9	5325.7	2.6	1.19	3.088	Siltstone	22/03/2021
BH BB024	19.70	Axial	86.6	56.7	18.9	6251.9	3.02	1.23	3.713	Siltstone	22/03/2021
BH BB024	20.00	Diametral	224.2	86.1	13.1	7413.2	1.77	1.28	2.261	Siltstone	22/03/2021
BH BB024	20.00	Axial	86.2	71.4	14.6	7836.4	1.86	1.29	2.405	Siltstone	22/03/2021
BH BB024	20.08	Axial	86.2	68.4	14.0	7507.1	1.86	1.28	2.384	Siltstone	22/03/2021
BH BB024	20.14	Axial	86.1	61.5	13.0	6742.0	1.93	1.25	2.408	Siltstone	22/03/2021

NOTES - + Tested specimen measured using calibrated vernier calipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/14	Signed :- <i>M. S. Malik</i>	Name :- M. S. Malik	Page 14 of 15
	Client :- AMEY OW Limited				





# ALLIED EXPLORATION & GEOTECHNICS LIMITED



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Regional Office: Unit 20, Business Development Centre, Earsom Wharf, Blackburn, BB1 5BL. - Tel: 01772 735 300 Fax: 01772 735 599

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH BB024	20.20	Diametral	146.6	85.9	19.3	7378.8	2.61	1.28	3.333	Siltstone	22/03/2021
BH BB024	20.20	Axial	86.6	66.7	18.7	7354.5	2.55	1.28	3.25	Siltstone	22/03/2021
BH BB024	20.28	Axial	86.6	65.1	18.9	7178.1	2.63	1.28	3.336	Siltstone	22/03/2021

NOTES - + Tested specimen measured using calibrated vernier calipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322C/15	Signed :- <i>MSO</i>	Name :- <b>M. SELWICK</b>	Page 15 of 15
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 7	AEG Contract No :- 4322C		

**Determination of Water Content and Unconfined  
Compressive Strength  
(Tested Externally)**



## LABORATORY TEST CERTIFICATE

**Certificate No :** 21/272 - 01  
**To :** Michelle Selkirk  
**Client :** Allied Exploration & Geotechnics Ltd.  
Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
County Durham  
DH2 2RG

Dear Sirs,

### LABORATORY TESTING OF ROCK

#### Introduction

We refer to samples taken from A66 North TransPennine Scheme D Section 7 and delivered to our laboratory on 08th March 2021.

#### Material & Source

Sample Reference : See Report Plate  
Sampled By : Client  
Sampling Certificate : Not Supplied  
Location : See Report Plate  
Description : Rock Cores  
Date Sampled : Not Supplied  
Date Tested : 08th March 2021 Onwards  
Source : 4322C - A66 North TransPennine Scheme D Section 7

#### Test Results;

As Detailed On Page 2

#### Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation  
This report should not be reproduced except in full without the written approval of the laboratory  
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

#### Remarks;

Approved for Issue



T McLelland (Director)

Date 11/03/2021



BOREHOLE		BH BB011	
SAMPLE		C	
DEPTH	m	7.80	
SAMPLE DIAMETER	mm	86.26	
SAMPLE HEIGHT	mm	172.61	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.2	
TEST DURATION	min.sec	6.10	
DATE OF TESTING		10/03/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	59.0	
UNCONFINED COMPRESSIVE STRENGTH	MPa	10.1	
WATER CONTENT (ISRM Suggested Methods)	%	4.1	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.48	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.38	

BOREHOLE		BH BB011	
SAMPLE		C	
DEPTH	m	10.90	
SAMPLE DIAMETER	mm	86.90	
SAMPLE HEIGHT	mm	180.93	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.6	
TEST DURATION	min.sec	6.26	
DATE OF TESTING		10/03/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	230.4	
UNCONFINED COMPRESSIVE STRENGTH	MPa	38.8	
WATER CONTENT (ISRM Suggested Methods)	%	1.9	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.59	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.54	

BOREHOLE		BH BB011	
SAMPLE		C	
DEPTH	m	13.30	
SAMPLE DIAMETER	mm	86.23	
SAMPLE HEIGHT	mm	183.82	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.9	
TEST DURATION	min.sec	10.46	
DATE OF TESTING		10/03/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	555.5	
UNCONFINED COMPRESSIVE STRENGTH	MPa	95.1	
WATER CONTENT (ISRM Suggested Methods)	%	0.6	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.68	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.66	

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

## LABORATORY TEST CERTIFICATE

**Certificate No :** 21/272 - 02  
**To :** Michelle Selkirk  
**Client :** Allied Exploration & Geotechnics Ltd.  
Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
County Durham  
DH2 2RG

Dear Sirs,

### LABORATORY TESTING OF ROCK

#### Introduction

We refer to samples taken from A66 North TransPennine Scheme D Section 7 and delivered to our laboratory on 24th March 2021.

#### Material & Source

Sample Reference : See Report Plate  
Sampled By : Client  
Sampling Certificate : Not Supplied  
Location : See Report Plate  
Description : Rock Cores  
Date Sampled : Not Supplied  
Date Tested : 24th March 2021 Onwards  
Source : 4322C - A66 North TransPennine Scheme D Section 7

#### Test Results;

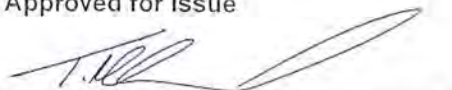
As Detailed On Page 2 to Page 5 inclusive

#### Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation  
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All remaining samples for this project will be disposed of 28 days after issue of this test certificate

#### Remarks;

Approved for Issue



T McLelland (Director)

Date 02/04/2021

BOREHOLE	SAMPLE	DEPTH (m)	WATER CONTENT (%)	BULK DENSITY (Mg/m <sup>3</sup> )	DRY DENSITY (Mg/m <sup>3</sup> )
BH BB012	C	8.10	1.0	-	-
BH BB012	C	11.67	0.6	-	-
BH BB024	C	17.60	2.6	-	-

Tested in accordance with ISRM (2007)

**SUMMARY OF WATER CONTENT  
AND DENSITY TEST RESULTS**



BOREHOLE		BH BB012	
SAMPLE		C	
DEPTH	m	8.10	
SAMPLE DIAMETER	mm	86.73	
SAMPLE HEIGHT	mm	170.22	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.7	
TEST DURATION	min.sec	12.15	
DATE OF TESTING		31/03/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	528.8	
UNCONFINED COMPRESSIVE STRENGTH	MPa	89.5	
WATER CONTENT (ISRM Suggested Methods)	%	1.2	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.63	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.60	

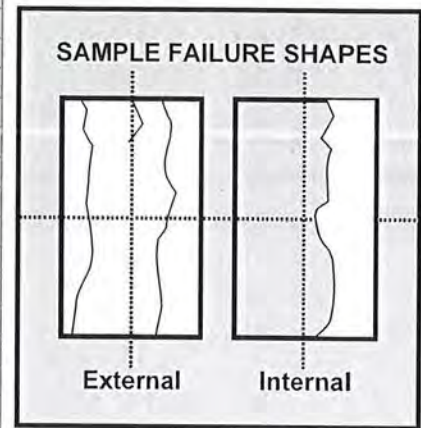
BOREHOLE		BH BB012	
SAMPLE		C	
DEPTH	m	11.67	
SAMPLE DIAMETER	mm	86.20	
SAMPLE HEIGHT	mm	170.07	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	1.0	
TEST DURATION	min.sec	14.30	
DATE OF TESTING		01/04/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	826.7	
UNCONFINED COMPRESSIVE STRENGTH	MPa	141.7	
WATER CONTENT (ISRM Suggested Methods)	%	1.2	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.70	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.67	

BOREHOLE			
SAMPLE			
DEPTH	m		
SAMPLE DIAMETER	mm		
SAMPLE HEIGHT	mm		
TEST CONDITION			
RATE OF LOADING	kN/s		
TEST DURATION	min.sec		
DATE OF TESTING			
LOAD FRAME USED			
LOAD DIRECTION WITH RESPECT TO LITHOLOGY			
FAILURE LOAD	kN		
UNCONFINED COMPRESSIVE STRENGTH	MPa		
WATER CONTENT (ISRM Suggested Methods)	%		
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		

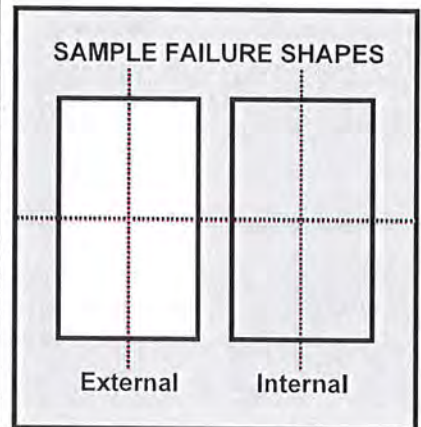
Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

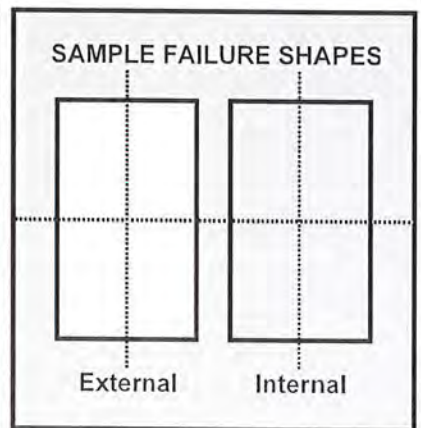
BOREHOLE		BH BB018
SAMPLE		C
DEPTH	m	1.40
SAMPLE DIAMETER	mm	86.59
SAMPLE HEIGHT	mm	169.75
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.8
TEST DURATION	min.sec	6.25
DATE OF TESTING		01/04/2021
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown
FAILURE LOAD	kN	292.2
UNCONFINED COMPRESSIVE STRENGTH	MPa	49.6
WATER CONTENT (ISRM Suggested Methods)	%	0.2
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.66
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.65



BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	



BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	



Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**



BOREHOLE		BH BB024
SAMPLE		C
DEPTH	m	13.80
SAMPLE DIAMETER	mm	86.27
SAMPLE HEIGHT	mm	170.28
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.6
TEST DURATION	min.sec	4.35
DATE OF TESTING		01/04/2021
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown
FAILURE LOAD	kN	159.5
UNCONFINED COMPRESSIVE STRENGTH	MPa	27.3
WATER CONTENT (ISRM Suggested Methods)	%	2.6
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.54
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.48

BOREHOLE		BH BB024
SAMPLE		C
DEPTH	m	17.60
SAMPLE DIAMETER	mm	85.92
SAMPLE HEIGHT	mm	168.24
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.5
TEST DURATION	min.sec	4.32
DATE OF TESTING		31/03/2021
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown
FAILURE LOAD	kN	116.7
UNCONFINED COMPRESSIVE STRENGTH	MPa	20.1
WATER CONTENT (ISRM Suggested Methods)	%	3.0
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.47
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.40

BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	

Tested in accordance with ASTM D7012 - 14

### SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH



## LABORATORY TEST CERTIFICATE

**Certificate No :** 21/272 - 03  
**To :** Michelle Selkirk  
**Client :** Allied Exploration & Geotechnics Ltd.  
Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
County Durham  
DH2 2RG

Dear Sirs,

### LABORATORY TESTING OF ROCK

#### Introduction

We refer to samples taken from A66 North TransPennine Scheme D Section 7 and delivered to our laboratory on 29th April 2021.

#### Material & Source

Sample Reference : See Report Plate  
Sampled By : Client  
Sampling Certificate : Not Supplied  
Location : See Report Plate  
Description : Rock Cores  
Date Sampled : Not Supplied  
Date Tested : 29th April 2021 Onwards  
Source : 4322C - A66 North TransPennine Scheme D Section 7

#### Test Results;

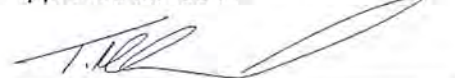
As Detailed On Page 2

#### Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation  
This report should not be reproduced except in full without the written approval of the laboratory  
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

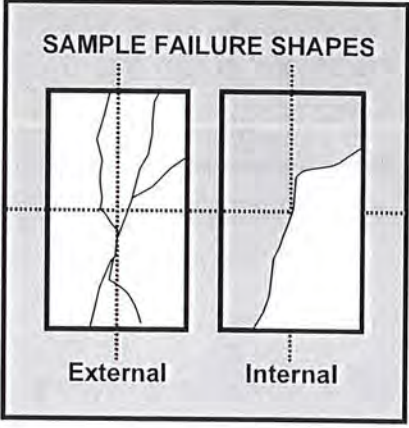
#### Remarks;

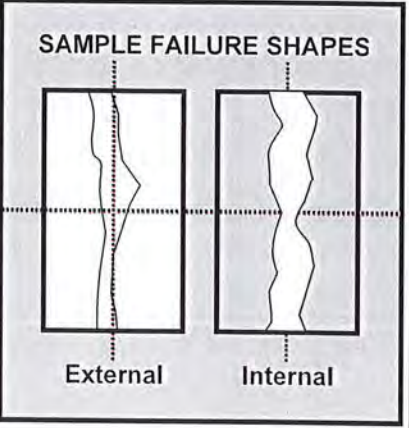
Approved for Issue

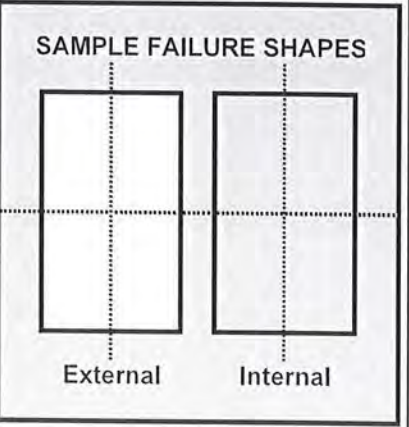


T McLelland (Director)

Date 04/05/2021

BOREHOLE		BH BB011	
SAMPLE		C	
DEPTH	m	10.20	
SAMPLE DIAMETER	mm	86.42	
SAMPLE HEIGHT	mm	179.42	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.6	
TEST DURATION	min.sec	6.27	
DATE OF TESTING		30/04/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	230.7	
UNCONFINED COMPRESSIVE STRENGTH	MPa	39.3	
WATER CONTENT (ISRM Suggested Methods)	%	3.2	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.59	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.51	

BOREHOLE		BH BB011	
SAMPLE		C	
DEPTH	m	13.10	
SAMPLE DIAMETER	mm	85.73	
SAMPLE HEIGHT	mm	172.91	
TEST CONDITION		As Received	
RATE OF LOADING	kN/s	0.8	
TEST DURATION	min.sec	12.05	
DATE OF TESTING		30/04/2021	
LOAD FRAME USED		2000kN	
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown	
FAILURE LOAD	kN	573.6	
UNCONFINED COMPRESSIVE STRENGTH	MPa	99.4	
WATER CONTENT (ISRM Suggested Methods)	%	0.4	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.70	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.69	

BOREHOLE			
SAMPLE			
DEPTH	m		
SAMPLE DIAMETER	mm		
SAMPLE HEIGHT	mm		
TEST CONDITION			
RATE OF LOADING	kN/s		
TEST DURATION	min.sec		
DATE OF TESTING			
LOAD FRAME USED			
LOAD DIRECTION WITH RESPECT TO LITHOLOGY			
FAILURE LOAD	kN		
UNCONFINED COMPRESSIVE STRENGTH	MPa		
WATER CONTENT (ISRM Suggested Methods)	%		
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>		

Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

**Specialist Chemical Testing  
(Tested Externally)**







# DETS

## Certificate of Analysis

*Certificate Number* 21-04131

*Issued:* 05-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-04131

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* One Soil sample.

*Date Received* 26-Feb-21

*Date Started* 26-Feb-21

*Date Completed* 05-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-04131

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB022	1	0.2	1808060	05/03/2021	Brown, sandy, gravelly and CLAY including numerous rootlets

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04131

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1808060
Sample ID	BH BB022
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	19/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Metals</b>				
Arsenic	DETSC 2301#	0.2	mg/kg	6.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.4
Chromium	DETSC 2301#	0.15	mg/kg	13
Chromium III	DETSC 2301*	0.15	mg/kg	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	13
Lead	DETSC 2301#	0.3	mg/kg	65
Mercury	DETSC 2325#	0.05	mg/kg	0.06
Nickel	DETSC 2301#	1	mg/kg	6.7
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5
Zinc	DETSC 2301#	1	mg/kg	79
<b>Inorganics</b>				
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	16
pH	DETSC 2008#		pH	5.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.5
Total Organic Carbon	DETSC 2002	0.1	%	3.3
Organic matter	DETSC 2002#	0.1	%	5.7
Sulphide	DETSC 2024*	10	mg/kg	< 10
Sulphate as SO <sub>4</sub> , Total	DETSC 2321#	100	mg/kg	2040
<b>Petroleum Hydrocarbons</b>				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04131

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808060
<b>Sample ID</b>	BH BB022
<b>Depth</b>	0.20
<b>Other ID</b>	1
<b>Sample Type</b>	ES
<b>Sampling Date</b>	19/02/2021
<b>Sampling Time</b>	n/s

Test	Method	LOD	Units	
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
<b>PAHs</b>				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
<b>Phenols</b>				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.7

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-04131

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1808060	BH BB022 1 0.20	SOIL	NAD	none	Darryl Fletcher

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 21-04131

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1808060	BH BB022 0.20 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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.

End of Report



# DETS

## Certificate of Analysis

**Certificate Number** 21-03909

**Issued:** 31-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-03909

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 9 Soil samples, 4 Leachate samples.

**Date Received** 24-Feb-21

**Date Started** 24-Feb-21

**Date Completed** 31-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approve



Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03909

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
BH BB006	1	0.2	1806699	19/03/2021	Dark brown gravelly, sandy CLAY including odd rootlets
BH BB006	9	1.7	1806700	19/03/2021	Dark brown gravelly, sandy CLAY including odd rootlets
TP BB005	3	0.3	1806701	19/03/2021	Dark brown slightly gravelly, sandy CLAY including odd rootlets
TP BB005	7	1.2	1806702	19/03/2021	Dark brown sandy CLAY
TP BB014	3	0.4	1806703	19/03/2021	Dark brown sandy CLAY
TP BB014	6	1.2	1806704	19/03/2021	Dark brown gravelly, sandy CLAY including odd rootlets
WS BB002	1	0.2	1806705	19/03/2021	Dark brown slightly gravelly, sandy CLAY including numerous rootlets
WS BB002	4	1	1806706	19/03/2021	Dark brown gravelly, sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806699	1806700	1806701	1806702	1806703
Sample ID	BH BB006	BH BB006	TP BB005	TP BB005	TP BB014
Depth	0.20	1.70	0.30	1.20	0.40
Other ID	1	9	3	7	3
Sample Type	ES	ES	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	19/02/2021	18/02/2021	18/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Metals</b>								
Arsenic	DETSC 2301#	0.2	mg/kg	6.0	4.8	6.9	5.1	7.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.2	0.3	0.4	0.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.4	0.3	0.4
Chromium	DETSC 2301#	0.15	mg/kg	13	13	13	9.8	17
Chromium III	DETSC 2301*	0.15	mg/kg	13	13	13	9.8	17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	27	18	74	18	14
Lead	DETSC 2301#	0.3	mg/kg	95	230	49	48	25
Mercury	DETSC 2325#	0.05	mg/kg	0.13	< 0.05	0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	9.4	12	20	14	15
Selenium	DETSC 2301#	0.5	mg/kg	0.5	< 0.5	< 0.5	0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	94	61	190	58	63
<b>Inorganics</b>								
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	12	5.7	5.9	4.1	5.9
pH	DETSC 2008#		pH	5.8	6.8	7.7	6.4	6.3
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.5	0.1	< 0.1	0.2	0.2
Total Organic Carbon	DETSC 2002	0.1	%	3.8	1.3	1.4	1.0	1.2
Organic matter	DETSC 2002#	0.1	%	6.6	2.2	2.4	1.7	2.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l					
Sulphide	DETSC 2024*	10	mg/kg	12	< 10	< 10	< 10	< 10
Sulphur as S, Total	DETSC 2320	0.01	%					
Sulphate as SO4, Total	DETSC 2321#	0.01	%					
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	1160	422	436	566	637

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806699	1806700	1806701	1806702	1806703
Sample ID	BH BB006	BH BB006	TP BB005	TP BB005	TP BB014
Depth	0.20	1.70	0.30	1.20	0.40
Other ID	1	9	3	7	3
Sample Type	ES	ES	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	19/02/2021	18/02/2021	18/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Petroleum Hydrocarbons</b>								
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 C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	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	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	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



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806699	1806700	1806701	1806702	1806703
Sample ID	BH BB006	BH BB006	TP BB005	TP BB005	TP BB014
Depth	0.20	1.70	0.30	1.20	0.40
Other ID	1	9	3	7	3
Sample Type	ES	ES	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	19/02/2021	18/02/2021	18/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>PAHs</b>								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.15	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.04	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.44	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.39	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.17	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.19	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.18	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.11	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	1.8	< 0.10	< 0.10	< 0.10
<b>Phenols</b>								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.5	< 0.3	< 0.3	< 0.3	< 0.3

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section

Lab No	1806704	1806705	1806706	1817266
Sample ID	TP BB014	WS BB002	WS BB002	BH BB006
Depth	1.20	0.20	1.00	1.70
Other ID	6	1	4	9
Sample Type	ES	ES	ES	ES
Sampling Date	18/02/2021	22/02/2021	22/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	7.5	6.9	6.8	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.8	0.4	
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.4	0.4	
Chromium	DETSC 2301#	0.15	mg/kg	14	17	9.0	
Chromium III	DETSC 2301*	0.15	mg/kg	14	17	9.0	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	24	35	33	
Lead	DETSC 2301#	0.3	mg/kg	22	44	52	
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.06	
Nickel	DETSC 2301#	1	mg/kg	26	18	21	
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	
Zinc	DETSC 2301#	1	mg/kg	72	110	72	
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	3.8	8.7	5.0	
pH	DETSC 2008#		pH	7.5	6.4	7.7	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	0.3	< 0.1	
Total Organic Carbon	DETSC 2002	0.1	%	2.3	3.0	1.1	
Organic matter	DETSC 2002#	0.1	%	4.0	5.2	1.9	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l				19
Sulphide	DETSC 2024*	10	mg/kg	< 10	16	< 10	
Sulphur as S, Total	DETSC 2320	0.01	%				0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%				0.03
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	202	753	344	

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section

Lab No	1806704	1806705	1806706	1817266
Sample ID	TP BB014	WS BB002	WS BB002	BH BB006
Depth	1.20	0.20	1.00	1.70
Other ID	6	1	4	9
Sample Type	ES	ES	ES	ES
Sampling Date	18/02/2021	22/02/2021	22/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section

Lab No	1806704	1806705	1806706	1817266
Sample ID	TP BB014	WS BB002	WS BB002	BH BB006
Depth	1.20	0.20	1.00	1.70
Other ID	6	1	4	9
Sample Type	ES	ES	ES	ES
Sampling Date	18/02/2021	22/02/2021	22/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.05	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.22	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.28	
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.04	0.07	3.1	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.61	
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.11	0.14	6.8	
Pyrene	DETSC 3303#	0.03	mg/kg	0.09	0.11	5.8	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04	0.05	2.7	
Chrysene	DETSC 3303	0.03	mg/kg	0.05	0.06	2.4	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	0.06	2.5	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.99	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	1.9	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.79	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.22	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	1.0	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.38	0.49	29	
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	

## WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB005 3 0.30

Sample Numbers 1806701 1806707 1806708

Date Analysed 03/03/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	5.4
DETSC 2003# Loss On Ignition	%	5.9
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	3.8
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.32	0.22	< 0.002	< 0.01
DETSC 2306 Barium as Ba	4.4	1.8	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	0.044	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.1	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	0.98	0.81	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	0.015	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	1.7	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	0.54	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.47	0.34	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	0.2	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.92	0.32	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	6.4	11	0.013	0.106
DETSC 2055 Chloride as Cl	1000	720	< 20	< 100
DETSC 2055* Fluoride as F	140	< 100	0.28	0.12
DETSC 2055 Sulphate as SO4	1200	1100	< 20	< 100
DETSC 2009* Total Dissolved Solids	18000	9100	36	98.4
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	8.3	8.3
DETSC 2009 Conductivity uS/cm	25.3	13.1
* Temperature*	21.0	21.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.120

### Stage 1

Volume of Leachant L2*	0.221
Volume of Eluate VE1*	0.1

### Stage 2

Volume of Leachant L8*	0.961
Volume of Eluate VE2*	0.93

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB014 6 1.20

Sample Numbers 1806704 1806709 1806710

Date Analysed 03/03/2021

Test Results On Waste					WAC Limit Values		
Determinand and Method Reference	Units	Result			Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.0			3	5	6
DETSC 2003# Loss On Ignition	%	3.8			n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04			6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01			1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10			500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6			100	n/a	n/a
DETSC2008# pH	pH Units				n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg				n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg				n/a	TBE	TBE

Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		Limit values for LS10 Leachate		
	2:1	8:1	LS2	LS10	Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	< 0.16	0.19	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	0.74	1	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.99	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	< 0.40	< 0.40	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	7.6	5.8	0.015	0.061	4	50	200
DETSC 2055 Chloride as Cl	940	840	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	1100	940	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	7500	6900	15	70	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50	500	800	1000

Additional Information		
DETSC 2008 pH	8.2	8.1
DETSC 2009 Conductivity uS/cm	10.8	9.8
* Temperature*	22.0	22.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.120
Stage 1	
Volume of Leachant L2*	0.22
Volume of Eluate VE1*	0.2
Stage 2	
Volume of Leachant L8*	0.961
Volume of Eluate VE2*	0.93

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03909

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1806699	BH BB006 1 0.20	SOIL	NAD	none	D Wilkinson
1806701	TP BB005 3 0.30	SOIL	NAD	none	D Wilkinson
1806703	TP BB014 3 0.40	SOIL	NAD	none	D Wilkinson
1806705	WS BB002 1 0.20	SOIL	NAD	none	D Wilkinson
1806706	WS BB002 4 1.00	SOIL	NAD	none	D Wilkinson

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 21-03909  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1806699	BH BB006 0.20 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806700	BH BB006 1.70 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806701	TP BB005 0.30 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806702	TP BB005 1.20 SOIL	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806703	TP BB014 0.40 SOIL	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806704	TP BB014 1.20 SOIL	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806705	WS BB002 0.20 SOIL	22/02/21	GJ 60ml x2, PT 1L x2, PT 500ml x2		
1806706	WS BB002 1.00 SOIL	22/02/21	GJ 60ml x2, PT 1L x2, PT 500ml x2		
1806707	TP BB005 0.30 LEACHATE	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806708	TP BB005 0.30 LEACHATE	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806709	TP BB014 1.20 LEACHATE	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806710	TP BB014 1.20 LEACHATE	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1817266	BH BB006 1.70 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03800

*Issued:* 02-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03800

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 4 Soil samples, 4 Leachate samples.

*Date Received* 23-Feb-21

*Date Started* 23-Feb-21

*Date Completed* 02-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03800

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
BH BB004	0	0.5	1806095	02/03/2021	Brown gravelly, sandy CLAY
BH BB004	10A	2.4	1806096	02/03/2021	Dark grey gravelly, sandy CLAY
BH BB005	1	0.2	1806097	02/03/2021	Dark brown gravelly, sandy CLAY including odd rootlets
BH BB005	12A	3.5	1806098	02/03/2021	Dark brown very gravelly SAND



## Summary of Chemical Analysis Soil Samples

Our Ref 21-03800

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806095	1806096	1806097	1806098
Sample ID	BH BB004	BH BB004	BH BB005	BH BB005
Depth	0.50	2.40	0.20	3.50
Other ID	0	10A	1	12A
Sample Type	ES	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	18/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	3.6	4.2	5.8	5.6
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	0.4	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.2	0.2	0.4
Chromium	DETSC 2301#	0.15	mg/kg	7.4	11	10	4.4
Chromium III	DETSC 2301*	0.15	mg/kg	7.4	11	10	4.4
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	13	18	21	9.9
Lead	DETSC 2301#	0.3	mg/kg	15	15	41	8.3
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	13	18	12	13
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	1.0	< 0.5
Zinc	DETSC 2301#	1	mg/kg	82	93	71	42
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	2.7	3.0	8.2	2.7
pH	DETSC 2008#		pH	7.9	8.1	7.0	7.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.8	1.3	2.9	0.3
Organic matter	DETSC 2002#	0.1	%	1.4	2.2	5.0	0.5
Sulphide	DETSC 2024*	10	mg/kg	< 10	36	< 10	32
Sulphate as SO <sub>4</sub> , Total	DETSC 2321#	100	mg/kg	539	421	734	365
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 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
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10

## Summary of Chemical Analysis Soil Samples

Our Ref 21-03800

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806095	1806096	1806097	1806098
Sample ID	BH BB004	BH BB004	BH BB005	BH BB005
Depth	0.50	2.40	0.20	3.50
Other ID	0	10A	1	12A
Sample Type	ES	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	18/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

## WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03800

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB004 10A 2.40

Sample Numbers 1806096 1806099 1806100

Date Analysed 02/03/2021

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.4	3	5	6
DETSC 2003# Loss On Ignition	%	3.0	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		Limit values for LS10 Leachate		
	2:1	8:1	LS2	LS10	Inert Waste	SNRHW	Hazardous Waste
	DETSC 2306 Arsenic as As	< 0.16	0.24	< 0.002	< 0.01	0.5	2
DETSC 2306 Barium as Ba	1.8	2.1	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.5	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.66	0.81	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	2.5	2.9	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.17	0.11	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	1.3	< 1.3	0.003	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	1900	1300	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	2400	1700	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	24000	21000	48	215	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50	500	800	1000

### Additional Information

DETSC 2008 pH	5.9	6.0
DETSC 2009 Conductivity uS/cm	34.8	30.4
* Temperature*	19.0	19.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.119

### Stage 1

Volume of Leachant L2*	0.217
Volume of Eluate VE1*	0.2

### Stage 2

Volume of Leachant L8*	0.953
Volume of Eluate VE2*	0.9

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.



## WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03800

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB005 12A 3.50

Sample Numbers 1806098 1806101 1806102

Date Analysed 02/03/2021

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETS02084# Total Organic Carbon	%	0.9	3	5	6
DETS02003# Loss On Ignition	%	2.7	n/a	n/a	10
DETS03321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETS03401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETS03311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETS03301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETS02008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		Limit values for LS10 Leachate		
	2:1	8:1	LS2	LS10	Inert Waste	SNRHW	Hazardous Waste
	DETS02306 Arsenic as As	0.29	< 0.16	< 0.002	< 0.01	0.5	2
DETS02306 Barium as Ba	8.1	1.4	< 0.02	< 0.1	20	100	300
DETS02306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETS02306 Chromium as Cr	0.92	< 0.25	< 0.02	< 0.1	0.5	10	70
DETS02306 Copper as Cu	0.9	0.61	< 0.004	< 0.02	2	50	100
DETS02306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETS02306 Molybdenum as Mo	6.4	1.4	< 0.02	< 0.1	0.5	10	30
DETS02306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1	0.4	10	40
DETS02306 Lead as Pb	0.19	0.82	< 0.01	< 0.05	0.5	10	50
DETS02306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETS02306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETS02306 Zinc as Zn	< 1.3	5	< 0.002	0.042	4	50	200
DETS02055 Chloride as Cl	2200	1100	< 20	< 100	800	15,000	25,000
DETS02055* Fluoride as F	100	< 100	0.2	0.16	10	150	500
DETS02055 Sulphate as SO4	3100	1200	< 20	< 100	1000	20,000	50,000
DETS02009* Total Dissolved Solids	48000	12000	96	178.2	4000	60,000	100,000
DETS02130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETS02085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50	500	800	1000

### Additional Information

DETS02008 pH	5.9	6.2
DETS02009 Conductivity uS/cm	69.1	17.7
* Temperature*	19.0	19.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.124

### Stage 1

Volume of Leachant L2*	0.231
Volume of Eluate VE1*	0.2

### Stage 2

Volume of Leachant L8*	0.99
Volume of Eluate VE2*	0.94

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

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## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03800

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1806095	BH BB004 0 0.50	SOIL	NAD	none	Keith Wilson
1806097	BH BB005 1 0.20	SOIL	NAD	none	Keith Wilson

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 21-03800  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1806095	BH BB004 0.50 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806096	BH BB004 2.40 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806097	BH BB005 0.20 SOIL	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806098	BH BB005 3.50 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806099	BH BB004 2.40 LEACHATE	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806100	BH BB004 2.40 LEACHATE	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806101	BH BB005 3.50 LEACHATE	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806102	BH BB005 3.50 LEACHATE	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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.

End of Report



# DETS

## Certificate of Analysis

**Certificate Number** 21-03540

**Issued:** 03-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-03540

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 3 Soil samples.

**Date Received** 19-Feb-21

**Date Started** 19-Feb-21

**Date Completed** 03-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Appro**



Adam Fenwick  
Contracts Manager



2139



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03540

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
BH BB023	1	0.2	1804481	26/02/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB023	4	1	1804482	26/02/2021	Brown gravelly, sandy CLAY including some rootlets
BH BB026	1	0.2	1804483	26/02/2021	Dark brown gravelly, sandy CLAY including some rootlets

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03540

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1804481	1804482	1804483
Sample ID	BH BB023	BH BB023	BH BB026
Depth	0.20	1.00	0.20
Other ID	1	4	1
Sample Type	ES	ES	ES
Sampling Date	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	4.8	6.2	4.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.2	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.2	0.3
Chromium	DETSC 2301#	0.15	mg/kg	7.0	14	9.7
Chromium III	DETSC 2301*	0.15	mg/kg	7.0	14	9.7
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	12	13	18
Lead	DETSC 2301#	0.3	mg/kg	33	24	55
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.06
Nickel	DETSC 2301#	1	mg/kg	4.8	19	6.0
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.5
Zinc	DETSC 2301#	1	mg/kg	46	52	77
<b>Inorganics</b>						
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	11		14
pH	DETSC 2008#		pH	6.9		6.5
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.3		0.5
Total Organic Carbon	DETSC 2002	0.1	%	4.1		4.4
Organic matter	DETSC 2002#	0.1	%	7.1		7.7
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	21		
Sulphide	DETSC 2024*	10	mg/kg	48		< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	922		1700

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03540

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1804481	1804482	1804483
Sample ID	BH BB023	BH BB023	BH BB026
Depth	0.20	1.00	0.20
Other ID	1	4	1
Sample Type	ES	ES	ES
Sampling Date	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4		< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4		< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03540

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1804481	1804482	1804483
Sample ID	BH BB023	BH BB023	BH BB026
Depth	0.20	1.00	0.20
Other ID	1	4	1
Sample Type	ES	ES	ES
Sampling Date	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10		< 0.10
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.5		0.9

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03540

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1804481	BH BB023 1 0.20	SOIL	NAD	none	Keith Wilson
1804483	BH BB026 1 0.20	SOIL	NAD	none	Keith Wilson

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 21-03540

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1804481	BH BB023 0.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804482	BH BB023 1.00 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804483	BH BB026 0.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



## Certificate of Analysis

**Certificate Number** 21-03342

**Issued:** 03-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-03342

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 1 Soil sample, 2 Leachate samples.

**Date Received** 17-Feb-21

**Date Started** 17-Feb-21

**Date Completed** 03-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved**



Adam Fenwick  
Contracts Manager



2139



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03342

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB016	6	1	1803332	24/02/2021	Dark brown slightly gravelly, sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03342

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1803332
Sample ID	BH BB016
Depth	1.00
Other ID	6
Sample Type	ES
Sampling Date	16/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Metals</b>				
Arsenic	DETSC 2301#	0.2	mg/kg	13
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.3
Chromium	DETSC 2301#	0.15	mg/kg	8.2
Chromium III	DETSC 2301*	0.15	mg/kg	8.2
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	31
Lead	DETSC 2301#	0.3	mg/kg	62
Mercury	DETSC 2325#	0.05	mg/kg	0.07
Nickel	DETSC 2301#	1	mg/kg	23
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5
Zinc	DETSC 2301#	1	mg/kg	130
<b>Inorganics</b>				
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	5.2
pH	DETSC 2008#		pH	6.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.6
Organic matter	DETSC 2002#	0.1	%	2.8
Sulphide	DETSC 2024*	10	mg/kg	< 10
Sulphate as SO <sub>4</sub> , Total	DETSC 2321#	100	mg/kg	11300

## Summary of Chemical Analysis Soil Samples

Our Ref 21-03342

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1803332
Sample ID	BH BB016
Depth	1.00
Other ID	6
Sample Type	ES
Sampling Date	16/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Petroleum Hydrocarbons</b>				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03342

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1803332
Sample ID	BH BB016
Depth	1.00
Other ID	6
Sample Type	ES
Sampling Date	16/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>PAHs</b>				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
<b>Phenols</b>				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

## WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03342

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB016 6 1.00

Sample Numbers 1803332 1803333 1803334

Date Analysed 01/03/2021

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	2.0	3	5	6
DETSC 2003# Loss On Ignition	%	5.2	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	97.0	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		Limit values for LS10 Leachate		
	2:1	8:1	LS2	LS10	Inert Waste	SNRHW	Hazardous Waste
	DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01	0.5	2
DETSC 2306 Barium as Ba	12	1.8	0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2.7	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.59	< 0.40	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	120	11	0.24	0.297	4	50	200
DETSC 2055 Chloride as Cl	1200	1400	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	1200	950	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	6500	8400	13	80.7	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50	500	800	1000

### Additional Information

DETSC 2008 pH	6.8	6.3
DETSC 2009 Conductivity uS/cm	9.3	12.0
* Temperature*	18.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.116

### Stage 1

Volume of Leachant L2*	0.209
Volume of Eluate VE1*	0.2

### Stage 2

Volume of Leachant L8*	0.931
Volume of Eluate VE2*	0.94

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

v2.06 \* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

## Information in Support of the Analytical Results

Our Ref 21-03342

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1803332	BH BB016 1.00 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1803333	BH BB016 1.00 LEACHATE	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1803334	BH BB016 1.00 LEACHATE	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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 SO <sub>4</sub>	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 SO <sub>4</sub>	%	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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03341-1

*Issued:* 01-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03341-1

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 3 Soil samples.

*Date Received* 17-Feb-21

*Date Started* 17-Feb-21

*Date Completed* 01-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

**Notes** This report supersedes 21-03341, extra testing.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03341-1

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB014	1	0.1	1803329	24/02/2021	Brown sandy CLAY including numerous rootlets
BH BB018	1	0.7	1803330	24/02/2021	Brown sandy, gravelly CLAY
BH BB020	1	0.2	1803331	24/02/2021	Brown sandy, gravelly CLAY

## Summary of Chemical Analysis Soil Samples

Our Ref 21-03341-1

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1803329	1803330	1803331
Sample ID	BH BB014	BH BB018	BH BB020
Depth	0.10	0.70	0.20
Other ID	1	1	1
Sample Type	ES	ES	ES
Sampling Date	12/02/2021	12/02/2021	12/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	4.4	6.1	4.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.0	0.3	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	54	20	18
Chromium III	DETSC 2301*	0.15	mg/kg	54	20	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	26	27	10
Lead	DETSC 2301#	0.3	mg/kg	56	21	22
Mercury	DETSC 2325#	0.05	mg/kg	0.06	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	9.3	28	8.9
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	83	88	52
<b>Inorganics</b>						
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	26	3.6	5.3
pH	DETSC 2008#		pH	6.6	8.4	6.5
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.9	< 0.1	0.4
Total Organic Carbon	DETSC 2002	0.1	%	10	1.2	1.5
Organic matter	DETSC 2002#	0.1	%	18	2.1	2.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		260	
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	2060	906	525
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10

## Summary of Chemical Analysis Soil Samples

Our Ref 21-03341-1

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1803329	1803330	1803331
Sample ID	BH BB014	BH BB018	BH BB020
Depth	0.10	0.70	0.20
Other ID	1	1	1
Sample Type	ES	ES	ES
Sampling Date	12/02/2021	12/02/2021	12/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.07	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.16	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.13	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.07	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.54	< 0.10	< 0.10
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	1.1	< 0.3	< 0.3



## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03341-1

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1803329	BH BB014 1 0.10	SOIL	NAD	none	D Wilkinson
1803330	BH BB018 1 0.70	SOIL	NAD	none	D Wilkinson
1803331	BH BB020 1 0.20	SOIL	NAD	none	D Wilkinson

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 21-03341-1

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1803329	BH BB014 0.10 SOIL	12/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1803330	BH BB018 0.70 SOIL	12/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1803331	BH BB020 0.20 SOIL	12/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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.

End of Report



## Certificate of Analysis

*Certificate Number* 21-03213

*Issued:* 22-Feb-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03213

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 1 Soil sample, 2 Leachate samples.

*Date Received* 16-Feb-21

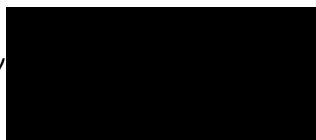
*Date Started* 16-Feb-21

*Date Completed* 22-Feb-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03213

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB017	1	0.2	1802375	22/02/2021	Dark brown gravelly, sandy CLAY including some rootlets



# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-03213

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1802375
Sample ID	BH BB017
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	09/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Metals</b>				
Arsenic	DETSC 2301#	0.2	mg/kg	6.4
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.4
Chromium	DETSC 2301#	0.15	mg/kg	13
Chromium III	DETSC 2301*	0.15	mg/kg	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	21
Lead	DETSC 2301#	0.3	mg/kg	48
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05
Nickel	DETSC 2301#	1	mg/kg	14
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5
Zinc	DETSC 2301#	1	mg/kg	89
<b>Inorganics</b>				
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	6.8
pH	DETSC 2008#		pH	5.6
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2
Total Organic Carbon	DETSC 2002	0.1	%	2.0
Organic matter	DETSC 2002#	0.1	%	3.4
Sulphide	DETSC 2024*	10	mg/kg	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	802
<b>Petroleum Hydrocarbons</b>				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-03213

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1802375
Sample ID	BH BB017
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	09/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
<b>PAHs</b>				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
<b>Phenols</b>				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03213

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BBO17 1 0.20

Sample Numbers 1802375 1802376 1802377

Date Analysed 22/02/2021

Test Results On Waste					WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste		
DETSC 2084# Total Organic Carbon	%	2.2	3	5	6		
DETSC 2003# Loss On Ignition	%	6.8	n/a	n/a	10		
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a		
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a		
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a		
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a		
DETSC2008# pH	pH Units		n/a	>6	n/a		
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE		
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE		
Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	2.2	0.5	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2.1	0.57	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.66	< 0.40	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	1.3	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4.2	1.9	0.008	0.022	4	50	200
DETSC 2055 Chloride as Cl	1900	1700	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	2400	1400	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	17000	9700	34	106.4	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50	500	800	1000
TBE - To Be Evaluated SNRHW - Stable Non-Reactive Hazardous Waste							
Additional Information							
DETSC 2008 pH	6.6	6.6					
DETSC 2009 Conductivity uS/cm	24.3	13.9					
* Temperature*	18.0	18.0					
Mass of Sample Kg*	0.140						
Mass of dry Sample Kg*	0.109						
Stage 1							
Volume of Leachant L2*	0.186						
Volume of Eluate VE1*	0.14						
Stage 2							
Volume of Leachant L8*	0.871						
Volume of Eluate VE2*	0.81						

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.



## Summary of Asbestos Analysis Soil Samples

*Our Ref* 21-03213

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1802375	BH BB017 1 0.20	SOIL	NAD	none	Keith Wilson
<p>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.</p>					

## Information in Support of the Analytical Results

Our Ref 21-03213

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
1802375	BH BB017 0.20 SOIL	09/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1802376	BH BB017 0.20 LEACHATE	09/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1802377	BH BB017 0.20 LEACHATE	09/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03154

*Issued:* 24-Feb-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03154

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 2 Soil samples.

*Date Received* 15-Feb-21

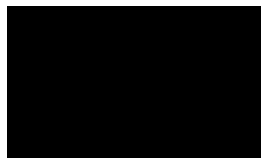
*Date Started* 15-Feb-21

*Date Completed* 24-Feb-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved*



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03154

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP BB012	2	0.25	1801844	19/02/2021	Brown sandy, gravelly CLAY including odd rootlets
TP BB013	3	0.3	1801845	19/02/2021	Brown sandy, gravelly CLAY including odd rootlets



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03154

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1801844	1801845
<b>Sample ID</b>	TP BB012	TP BB013
<b>Depth</b>	0.25	0.30
<b>Other ID</b>	2	3
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	09/02/2021	09/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Metals</b>					
Arsenic	DETSC 2301#	0.2	mg/kg	6.4	5.0
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3
Chromium	DETSC 2301#	0.15	mg/kg	13	11
Chromium III	DETSC 2301*	0.15	mg/kg	13	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	11	16
Lead	DETSC 2301#	0.3	mg/kg	44	57
Mercury	DETSC 2325#	0.05	mg/kg	0.15	0.12
Nickel	DETSC 2301#	1	mg/kg	7.1	7.1
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	51	50
<b>Inorganics</b>					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	9.0	10
pH	DETSC 2008#		pH	6.6	6.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.2
Total Organic Carbon	DETSC 2002	0.1	%	2.3	2.3
Organic matter	DETSC 2002#	0.1	%	3.9	4.0
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	760	848

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03154

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1801844	1801845
<b>Sample ID</b>	TP BB012	TP BB013
<b>Depth</b>	0.25	0.30
<b>Other ID</b>	2	3
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	09/02/2021	09/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Petroleum Hydrocarbons</b>					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03154

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1801844	1801845
<b>Sample ID</b>	TP BB012	TP BB013
<b>Depth</b>	0.25	0.30
<b>Other ID</b>	2	3
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	09/02/2021	09/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>PAHs</b>					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10
<b>Phenols</b>					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3



## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03154

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1801844	TP BB012 2 0.25	SOIL	NAD	none	Keith Wilson
1801845	TP BB013 3 0.30	SOIL	NAD	none	Keith Wilson

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 21-03154  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1801844	TP BB012 0.25 SOIL	09/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1801845	TP BB013 0.30 SOIL	09/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



## Certificate of Analysis

**Certificate Number** 21-03153

**Issued:** 19-Feb-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-03153

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** One Soil sample.

**Date Received** 15-Feb-21

**Date Started** 15-Feb-21

**Date Completed** 19-Feb-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved By**



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03153

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB021	1	0.2	1801843	19/02/2021	Brown, sandy and CLAY and odd rootlets



# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-03153

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1801843
Sample ID	BH BB021
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	11/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Metals</b>				
Arsenic	DETSC 2301#	0.2	mg/kg	8.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.8
Chromium	DETSC 2301#	0.15	mg/kg	20
Chromium III	DETSC 2301*	0.15	mg/kg	20
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	22
Lead	DETSC 2301#	0.3	mg/kg	46
Mercury	DETSC 2325#	0.05	mg/kg	0.11
Nickel	DETSC 2301#	1	mg/kg	17
Selenium	DETSC 2301#	0.5	mg/kg	0.8
Zinc	DETSC 2301#	1	mg/kg	98
<b>Inorganics</b>				
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	14
pH	DETSC 2008#		pH	5.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.3
Total Organic Carbon	DETSC 2002	0.1	%	3.5
Organic matter	DETSC 2002#	0.1	%	6.0
Sulphide	DETSC 2024*	10	mg/kg	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	1280
<b>Petroleum Hydrocarbons</b>				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01

## Summary of Chemical Analysis Soil Samples

Our Ref 21-03153

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1801843
Sample ID	BH BB021
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	11/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
<b>PAHs</b>				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
<b>Phenols</b>				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

## Summary of Asbestos Analysis Soil Samples

*Our Ref* 21-03153

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1801843	BH BB021 1 0.20	SOIL	NAD	none	Rebecca Burgess

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 21-03153

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
1801843	BH BB021 0.20 SOIL	11/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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.

End of Report





## Certificate of Analysis

*Certificate Number* 21-03041

*Issued:* 19-Feb-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03041

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* One Soil sample.

*Date Received* 12-Feb-21

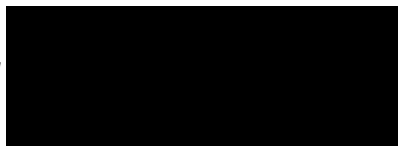
*Date Started* 12-Feb-21

*Date Completed* 19-Feb-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved*



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03041

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB019	1	0.2	1801129	19/02/2021	Dark brown gravelly, sandy CLAY

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-03041

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1801129
Sample ID	BH BB019
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	10/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Metals</b>				
Arsenic	DETSC 2301#	0.2	mg/kg	6.0
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.3
Chromium	DETSC 2301#	0.15	mg/kg	15
Chromium III	DETSC 2301*	0.15	mg/kg	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	23
Lead	DETSC 2301#	0.3	mg/kg	35
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05
Nickel	DETSC 2301#	1	mg/kg	19
Selenium	DETSC 2301#	0.5	mg/kg	0.7
Zinc	DETSC 2301#	1	mg/kg	73
<b>Inorganics</b>				
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	6.8
pH	DETSC 2008#		pH	5.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2
Total Organic Carbon	DETSC 2002	0.1	%	1.3
Organic matter	DETSC 2002#	0.1	%	2.2
Sulphide	DETSC 2024*	10	mg/kg	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	675
<b>Petroleum Hydrocarbons</b>				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01



## Summary of Chemical Analysis Soil Samples

Our Ref 21-03041

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1801129
Sample ID	BH BB019
Depth	0.20
Other ID	1
Sample Type	ES
Sampling Date	10/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
<b>PAHs</b>				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
<b>Phenols</b>				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

## Summary of Asbestos Analysis Soil Samples

*Our Ref* 21-03041

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1801129	BH BB019 1 0.20	SOIL	NAD	none	D Wilkinson

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 21-03041

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
1801129	BH BB019 0.20 SOIL	10/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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 SO <sub>4</sub>	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 SO <sub>4</sub>	%	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.

End of Report



# DETS

## Certificate of Analysis

**Certificate Number** 21-02882

**Issued:** 18-May-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-02882

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 4 Soil samples, 6 Leachate samples.

**Date Received** 11-Feb-21

**Date Started** 11-Feb-21

**Date Completed** 18-May-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved By**



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-02882

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP BB008	2	0.3	1800166	18/02/2021	Dark brown very sandy CLAY including some rootlets
TP BB009	2	0.3	1800167	18/02/2021	Dark brown gravelly, sandy CLAY
TP BB009	5	1	1800168	18/02/2021	Brown sandy CLAY
HDP BB001	1	0.2	1800169	18/02/2021	Dark brown very sandy CLAY including some rootlets

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02882

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800166	1800167	1800168	1800169
Sample ID	TP BB008	TP BB009	TP BB009	HDP BB001
Depth	0.30	0.30	1.00	0.20
Other ID	2	2	5	1
Sample Type	ES	ES	ES	ES
Sampling Date	05/02/2021	05/02/2021	05/02/2021	05/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	5.6	5.7	14	6.8
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.4	0.3	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.5	0.3
Chromium	DETSC 2301#	0.15	mg/kg	14	14	13	15
Chromium III	DETSC 2301*	0.15	mg/kg	14	14	13	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	23	23	41	30
Lead	DETSC 2301#	0.3	mg/kg	44	44	35	71
Mercury	DETSC 2325#	0.05	mg/kg	0.05	< 0.05	< 0.05	0.09
Nickel	DETSC 2301#	1	mg/kg	13	11	80	13
Selenium	DETSC 2301#	0.5	mg/kg	1.0	0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	95	65	170	69
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	3.8	4.2	2.9	8.5
pH	DETSC 2008#		pH	5.5	5.9	5.4	7.3
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.3	0.2	< 0.1	0.2
Total Organic Carbon	DETSC 2002	0.1	%	1.3	0.5	0.7	3.3
Organic matter	DETSC 2002#	0.1	%	2.2	0.8	1.2	5.7
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	12
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	342	408	< 100	642

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02882

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800166	1800167	1800168	1800169
Sample ID	TP BB008	TP BB009	TP BB009	HDP BB001
Depth	0.30	0.30	1.00	0.20
Other ID	2	2	5	1
Sample Type	ES	ES	ES	ES
Sampling Date	05/02/2021	05/02/2021	05/02/2021	05/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 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
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02882

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800166	1800167	1800168	1800169
Sample ID	TP BB008	TP BB009	TP BB009	HDP BB001
Depth	0.30	0.30	1.00	0.20
Other ID	2	2	5	1
Sample Type	ES	ES	ES	ES
Sampling Date	05/02/2021	05/02/2021	05/02/2021	05/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.05
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.04
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02882

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB008 2 0.30

Sample Numbers 1800166 1800170 1800171

Date Analysed 18/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.5
DETSC 2003# Loss On Ignition	%	3.8
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	0.17	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.6	1.1	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.69	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.4	0.66	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.092	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	4	4	0.008	0.04
DETSC 2055 Chloride as Cl	4400	2000	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	3800	2200	< 20	< 100
DETSC 2009* Total Dissolved Solids	19000	11000	38	122.6
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	3500	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	8.2	6.1
DETSC 2009 Conductivity uS/cm	26.9	15.9
* Temperature*	18.0	16.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.113

### Stage 1

Volume of Leachant L2*	0.199
Volume of Eluate VE1*	0.178

### Stage 2

Volume of Leachant L8*	0.903
Volume of Eluate VE2*	0.843

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02882

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB009 2 0.30

Sample Numbers 1800167 1800172 1800173

Date Analysed 18/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.8
DETSC 2003# Loss On Ignition	%	4.2
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.18	0.19	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.46	1.1	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.9	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1	0.65	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3.1	2.7	0.006	0.028
DETSC 2055 Chloride as Cl	3600	2200	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	3000	2000	< 20	< 100
DETSC 2009* Total Dissolved Solids	15000	16000	30	158.4
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	2700	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information		
DETSC 2008 pH	8.2	5.9
DETSC 2009 Conductivity uS/cm	21.6	23.2
* Temperature*	18.0	16.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.105

Stage 1	
Volume of Leachant L2*	0.175
Volume of Eluate VE1*	0.164

Stage 2	
Volume of Leachant L8*	0.839
Volume of Eluate VE2*	0.789

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02882

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id HDP BB001 1 0.20

Sample Numbers 1800169 1800174 1800175

Date Analysed 18/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	5.1
DETSC 2003# Loss On Ignition	%	8.5
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	2.7
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	0.36	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.53	1.4	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.1	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.4	1	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.14	0.13	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3.9	3.2	0.008	0.033
DETSC 2055 Chloride as Cl	3600	2300	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	2900	2200	< 20	< 100
DETSC 2009* Total Dissolved Solids	17000	14000	34	144.4
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	8.0	5.8
DETSC 2009 Conductivity uS/cm	24.1	20.5
* Temperature*	18.0	16.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.104

### Stage 1

Volume of Leachant L2*	0.172
Volume of Eluate VE1*	0.152

### Stage 2

Volume of Leachant L8*	0.832
Volume of Eluate VE2*	0.772

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-02882

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1800166	TP BB008 2 0.30	SOIL	NAD	none	D Wilkinson
1800167	TP BB009 2 0.30	SOIL	NAD	none	D Wilkinson
1800169	HDP BB001 1 0.20	SOIL	NAD	none	D Wilkinson

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 21-02882

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1800166	TP BB008 0.30 SOIL	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800167	TP BB009 0.30 SOIL	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800168	TP BB009 1.00 SOIL	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800169	HDP BB001 0.20 SOIL	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800170	TP BB008 0.30 LEACHATE	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800171	TP BB008 0.30 LEACHATE	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800172	TP BB009 0.30 LEACHATE	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800173	TP BB009 0.30 LEACHATE	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800174	HDP BB001 0.20 LEACHATE	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800175	HDP BB001 0.20 LEACHATE	05/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-02875

*Issued:* 15-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-02875

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 19 Soil samples, 12 Leachate samples.

*Date Received* 11-Feb-21

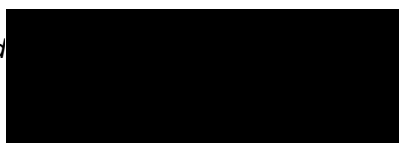
*Date Started* 11-Feb-21

*Date Completed* 15-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-02875

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH BB007	1	0.2	1800068	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB007	4	1.2	1800069	03/03/2021	Brown gravelly, sandy CLAY
BH BB008	1	0.2	1800070	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB008	3	0.6	1800071	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB009	1	0.2	1800072	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB009	4	1	1800073	03/03/2021	Brown gravelly, very sandy CLAY
BH BB010	3	0.2	1800074	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB010	6	0.4	1800075	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB011	1	0.2	1800076	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB012	3	0.2	1800077	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB013	3	0.2	1800078	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
BH BB013	8	1	1800079	03/03/2021	Brown gravelly, very sandy CLAY
BH BB015	3	0.2	1800080	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
TP BB011	3	0.3	1800081	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
TP BB011	6	1.2	1800082	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
WS BB001	2	0.2	1800083	03/03/2021	Dark brown gravelly, sandy CLAY including some rootlets
WS BB001	5	0.8	1800084	03/03/2021	Dark brown gravelly, sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800068	1800069	1800070	1800071	1800072	1800073
Sample ID	BH BB007	BH BB007	BH BB008	BH BB008	BH BB009	BH BB009
Depth	0.20	1.20	0.20	0.60	0.20	1.00
Other ID	1	4	1	3	1	4
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
<b>Metals</b>									
Arsenic	DETSC 2301#	0.2	mg/kg	8.3	6.7	6.2	6.3	6.7	7.7
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.8	0.3	1.3	0.7	1.0	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.3	0.5	0.4	0.4	0.2
Chromium	DETSC 2301#	0.15	mg/kg	16	13	16	15	16	15
Chromium III	DETSC 2301*	0.15	mg/kg	16	13	16	15	16	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	41	21	39	36	34	23
Lead	DETSC 2301#	0.3	mg/kg	110	28	120	89	120	35
Mercury	DETSC 2325#	0.05	mg/kg	0.13	0.08	0.20	0.16	0.24	< 0.05
Nickel	DETSC 2301#	1	mg/kg	13	19	11	13	11	17
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.6	0.8	< 0.5	0.6
Zinc	DETSC 2301#	1	mg/kg	90	63	110	88	97	73
<b>Inorganics</b>									
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	12	3.0	21	7.0	15	3.5
pH	DETSC 2008#		pH	6.1	5.8	5.5	5.8	5.9	6.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.4	0.1	0.6	0.3	0.4	0.1
Total Organic Carbon	DETSC 2002	0.1	%	5.4	0.3	8.0	2.8	5.9	1.1
Organic matter	DETSC 2002#	0.1	%	9.4	0.6	14	4.9	10	1.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l						
Sulphide	DETSC 2024*	10	mg/kg	12	< 10	20	< 10	16	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%						
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	1050	175	2150	648	1290	136
<b>Petroleum Hydrocarbons</b>									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 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	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800068	1800069	1800070	1800071	1800072	1800073
Sample ID	BH BB007	BH BB007	BH BB008	BH BB008	BH BB009	BH BB009
Depth	0.20	1.20	0.20	0.60	0.20	1.00
Other ID	1	4	1	3	1	4
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 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	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 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	< 0.01
<b>PAHs</b>									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
<b>Phenols</b>									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.5	< 0.3	1.0	< 0.3	0.7	0.3



# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800074	1800075	1800076	1800077	1800078	1800079
Sample ID	BH BB010	BH BB010	BH BB011	BH BB012	BH BB013	BH BB013
Depth	0.20	0.40	0.20	0.20	0.20	1.00
Other ID	3	6	1	3	3	8
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
<b>Metals</b>									
Arsenic	DETSC 2301#	0.2	mg/kg	7.8	5.4	8.1	6.7	5.6	4.9
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.7	1.3	0.6	0.6	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.4	0.4	0.5	0.3	0.3
Chromium	DETSC 2301#	0.15	mg/kg	12	7.2	12	16	12	16
Chromium III	DETSC 2301*	0.15	mg/kg	12	7.2	12	16	12	16
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	19	15	23	29	20	19
Lead	DETSC 2301#	0.3	mg/kg	38	14	40	57	76	21
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.05	0.32	0.09	< 0.05
Nickel	DETSC 2301#	1	mg/kg	14	11	14	23	8.2	23
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.0	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	87	56	89	100	66	65
<b>Inorganics</b>									
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	6.7	4.2	19	8.1	9.3	2.4
pH	DETSC 2008#		pH	7.4	8.1	6.5	7.1	6.2	6.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.1	< 0.1	0.4	0.1	0.4	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	2.8	1.6	5.0	2.6	4.1	0.7
Organic matter	DETSC 2002#	0.1	%	4.9	2.8	8.7	4.5	7.1	1.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	13					
Sulphide	DETSC 2024*	10	mg/kg	< 10	210	28	20	< 10	12
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.10					
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	962	1050	1430	591	909	< 100
<b>Petroleum Hydrocarbons</b>									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	1.8	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	9.5	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	21	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	8.9	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 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	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800074	1800075	1800076	1800077	1800078	1800079
Sample ID	BH BB010	BH BB010	BH BB011	BH BB012	BH BB013	BH BB013
Depth	0.20	0.40	0.20	0.20	0.20	1.00
Other ID	3	6	1	3	3	8
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 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	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 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	< 0.01
<b>PAHs</b>									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	0.10	0.04	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	0.20	0.07	0.04	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	0.16	0.05	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.10	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.67	0.16	< 0.10	< 0.10
<b>Phenols</b>									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	1.8	0.5	< 0.3	< 0.3

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800080	1800081	1800082	1800083	1800084	1801858
Sample ID	BH BB015	TP BB011	TP BB011	WS BB001	WS BB001	BH BB012
Depth	0.20	0.30	1.20	0.20	0.80	0.40
Other ID	3	3	6	2	5	5
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Metals</b>								
Arsenic	DETSC 2301#	0.2	mg/kg	5.7	6.0	5.1	4.4	5.8
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	< 0.2	< 0.2	1.0	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.3	0.3	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	14	16	15	17	16
Chromium III	DETSC 2301*	0.15	mg/kg	14	16	15	17	16
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	16	24	24	14	12
Lead	DETSC 2301#	0.3	mg/kg	41	26	24	41	21
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	9.0	22	21	7.8	16
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	48	76	110	120	85
<b>Inorganics</b>								
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.4	3.5	2.3	8.4	3.1
pH	DETSC 2008#		pH	5.9	7.6	7.1	6.2	6.7
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	< 0.1	< 0.1	0.3	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.8	0.8	0.6	3.1	0.8
Organic matter	DETSC 2002#	0.1	%	3.1	1.3	1.0	5.3	1.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l					15
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%					0.04
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	596	298	237	908	130
<b>Petroleum Hydrocarbons</b>								
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 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	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 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	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 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	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	



## Summary of Chemical Analysis Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1800080	1800081	1800082	1800083	1800084	1801858
Sample ID	BH BB015	TP BB011	TP BB011	WS BB001	WS BB001	BH BB012
Depth	0.20	0.30	1.20	0.20	0.80	0.40
Other ID	3	3	6	2	5	5
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Aromatic C35-C44	DETS 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4		
Aromatic C10-C44	DETS 3072*	10	mg/kg	< 10	< 10	< 10	< 10		
Ali/Aro C10-C44	DETS 3072*	10	mg/kg	< 10	< 10	< 10	< 10		
Benzene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01		
Ethylbenzene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01		
Toluene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01		
Xylene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01		
<b>PAHs</b>									
Naphthalene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Acenaphthylene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Acenaphthene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Fluorene	DETS 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Phenanthrene	DETS 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03	< 0.03		
Anthracene	DETS 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Fluoranthene	DETS 3303#	0.03	mg/kg	< 0.03	0.07	< 0.03	< 0.03		
Pyrene	DETS 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03	< 0.03		
Benzo(a)anthracene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Chrysene	DETS 3303	0.03	mg/kg	< 0.03	0.03	< 0.03	< 0.03		
Benzo(b)fluoranthene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Benzo(k)fluoranthene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Benzo(a)pyrene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Indeno(1,2,3-c,d)pyrene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Dibenzo(a,h)anthracene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
Benzo(g,h,i)perylene	DETS 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03		
PAH - USEPA 16, Total	DETS 3303	0.1	mg/kg	< 0.10	0.20	< 0.10	< 0.10		
<b>Phenols</b>									
Phenol - Monohydric	DETS 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1801859
Sample ID	BH BB011
Depth	0.60
Other ID	3
Sample Type	ES
Sampling Date	08/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Metals</b>				
Arsenic	DETSC 2301#	0.2	mg/kg	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	
Cadmium	DETSC 2301#	0.1	mg/kg	
Chromium	DETSC 2301#	0.15	mg/kg	
Chromium III	DETSC 2301*	0.15	mg/kg	
Chromium, Hexavalent	DETSC 2204*	1	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	
<b>Inorganics</b>				
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	
pH	DETSC 2008#		pH	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	
Total Organic Carbon	DETSC 2002	0.1	%	
Organic matter	DETSC 2002#	0.1	%	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	27
Sulphide	DETSC 2024*	10	mg/kg	
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.04
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	
<b>Petroleum Hydrocarbons</b>				
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 C35-C44	DETSC 3072*	3.4	mg/kg	
Aliphatic C10-C44	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	

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1801859
Sample ID	BH BB011
Depth	0.60
Other ID	3
Sample Type	ES
Sampling Date	08/02/2021
Sampling Time	n/s

Test	Method	LOD	Units
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg
Aromatic C10-C44	DETSC 3072*	10	mg/kg
Ali/Aro C10-C44	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
<b>PAHs</b>			
Naphthalene	DETSC 3303#	0.03	mg/kg
Acenaphthylene	DETSC 3303#	0.03	mg/kg
Acenaphthene	DETSC 3303#	0.03	mg/kg
Fluorene	DETSC 3303	0.03	mg/kg
Phenanthrene	DETSC 3303#	0.03	mg/kg
Anthracene	DETSC 3303	0.03	mg/kg
Fluoranthene	DETSC 3303#	0.03	mg/kg
Pyrene	DETSC 3303#	0.03	mg/kg
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg
Chrysene	DETSC 3303	0.03	mg/kg
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg
<b>Phenols</b>			
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB007 4 1.20

Sample Numbers 1800069 1800085 1800086

Date Analysed 24/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.1
DETSC 2003# Loss On Ignition	%	3.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	1.7	0.31	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.2	0.39	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.1	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	3	1.6	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.092	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.55	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	11	2	0.022	0.034
DETSC 2055 Chloride as Cl	2200	24000	< 20	206.6
DETSC 2055* Fluoride as F	< 100	110	< 0.02	0.93
DETSC 2055 Sulphate as SO4	1500	21000	< 20	180.2
DETSC 2009* Total Dissolved Solids	11000	160000	22	1371.9
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	3000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	7.7	10.1
DETSC 2009 Conductivity uS/cm	15.9	225.0
* Temperature*	18.0	16.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.109

### Stage 1

Volume of Leachant L2*	0.187
Volume of Eluate VE1*	0.167

### Stage 2

Volume of Leachant L8*	0.873
Volume of Eluate VE2*	0.812

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB008 1 0.20

Sample Numbers 1800070 1800087 1800088

Date Analysed 24/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	11.0
DETSC 2003# Loss On Ignition	%	21.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.28	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	1.1	< 0.26	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.4	0.49	< 0.02	< 0.1
DETSC 2306 Copper as Cu	2.2	0.66	0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	2	1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.1	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3.9	< 1.3	0.008	< 0.01
DETSC 2055 Chloride as Cl	2600	44000	< 20	396.5
DETSC 2055* Fluoride as F	< 100	180	< 0.02	1.61
DETSC 2055 Sulphate as SO4	2000	21000	< 20	190.1
DETSC 2009* Total Dissolved Solids	12000	210000	24	1892.2
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	3500	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	7.4	10.3
DETSC 2009 Conductivity uS/cm	17.8	304.0
* Temperature*	17.0	16.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.077

### Stage 1

Volume of Leachant L2*	0.091
Volume of Eluate VE1*	0.081

### Stage 2

Volume of Leachant L8*	0.617
Volume of Eluate VE2*	0.577

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

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# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB009 4 1.00

Sample Numbers 1800073 1800089 1800090

Date Analysed 24/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.4
DETSC 2003# Loss On Ignition	%	3.5
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.62	< 0.26	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.3	0.35	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	2.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	2.6	< 1.3	0.005	< 0.01
DETSC 2055 Chloride as Cl	2700	25000	< 20	215.8
DETSC 2055* Fluoride as F	< 100	130	< 0.02	1.1
DETSC 2055 Sulphate as SO4	1900	12000	< 20	104.5
DETSC 2009* Total Dissolved Solids	12000	130000	24	1119.1
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	2300	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	7.2	9.8
DETSC 2009 Conductivity uS/cm	17.6	188.0
* Temperature*	17.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.110

### Stage 1

Volume of Leachant L2*	0.189
Volume of Eluate VE1*	0.168

### Stage 2

Volume of Leachant L8*	0.877
Volume of Eluate VE2*	0.836

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB013 8 1.00

Sample Numbers 1800079 1800091 1800092

Date Analysed 24/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	0.9
DETSC 2003# Loss On Ignition	%	2.4
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.5	< 0.26	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.65	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	0.75	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	1.9	2.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.1	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3.1	1.6	0.006	0.018
DETSC 2055 Chloride as Cl	2200	57000	< 20	480.8
DETSC 2055* Fluoride as F	< 100	150	< 0.02	1.26
DETSC 2055 Sulphate as SO4	1900	7800	< 20	< 100
DETSC 2009* Total Dissolved Solids	11000	180000	22	1524.8
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	2600	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	7.1	10.0
DETSC 2009 Conductivity uS/cm	16.3	252.0
* Temperature*	18.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.117

### Stage 1

Volume of Leachant L2*	0.212
Volume of Eluate VE1*	0.191

### Stage 2

Volume of Leachant L8*	0.938
Volume of Eluate VE2*	0.888

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB015 3 0.20

Sample Numbers 1800080 1800093 1800094

Date Analysed 24/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.8
DETSC 2003# Loss On Ignition	%	4.4
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.17	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.78	< 0.26	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.3	0.3	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.8	0.47	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	3.9	2.6	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.29	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	2.3	< 1.3	0.005	< 0.01
DETSC 2055 Chloride as Cl	2800	54000	< 20	462.4
DETSC 2055* Fluoride as F	< 100	160	< 0.02	1.36
DETSC 2055 Sulphate as SO4	2300	7100	< 20	< 100
DETSC 2009* Total Dissolved Solids	14000	140000	28	1208.9
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	3000	3200	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information		
DETSC 2008 pH	6.8	9.5
DETSC 2009 Conductivity uS/cm	20.6	195.0
* Temperature*	18.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.108

Stage 1	
Volume of Leachant L2*	0.184
Volume of Eluate VE1*	0.164

Stage 2	
Volume of Leachant L8*	0.865
Volume of Eluate VE2*	0.815

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB011 3 0.30

Sample Numbers 1800081 1800095 1800096

Date Analysed 24/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.7
DETSC 2003# Loss On Ignition	%	3.5
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.84	< 0.26	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.74	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.2	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	3.2	1.5	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.17	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	3.3	< 1.3	0.007	< 0.01
DETSC 2055 Chloride as Cl	2200	2200	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	1600	1200	< 20	< 100
DETSC 2009* Total Dissolved Solids	12000	13000	24	128.3
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.7	7.9
DETSC 2009 Conductivity uS/cm	17.2	19.0
* Temperature*	18.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.121

### Stage 1

Volume of Leachant L2*	0.223
Volume of Eluate VE1*	0.202

### Stage 2

Volume of Leachant L8*	0.967
Volume of Eluate VE2*	0.907

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



## Summary of Asbestos Analysis

### Soil Samples

Our Ref 21-02875

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1800068	BH BB007 1 0.20	SOIL	NAD	none	D Wilkinson
1800070	BH BB008 1 0.20	SOIL	NAD	none	D Wilkinson
1800072	BH BB009 1 0.20	SOIL	NAD	none	D Wilkinson
1800074	BH BB010 3 0.20	SOIL	NAD	none	D Wilkinson
1800075	BH BB010 6 0.40	SOIL	NAD	none	D Wilkinson
1800076	BH BB011 1 0.20	SOIL	NAD	none	D Wilkinson
1800077	BH BB012 3 0.20	SOIL	NAD	none	D Wilkinson
1800078	BH BB013 3 0.20	SOIL	NAD	none	D Wilkinson
1800080	BH BB015 3 0.20	SOIL	NAD	none	D Wilkinson
1800081	TP BB011 3 0.30	SOIL	NAD	none	D Wilkinson
1800083	WS BB001 2 0.20	SOIL	NAD	none	D Wilkinson

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 21-02875

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1800068	BH BB007 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800069	BH BB007 1.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800070	BH BB008 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800071	BH BB008 0.60 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800072	BH BB009 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800073	BH BB009 1.00 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800074	BH BB010 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800075	BH BB010 0.40 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800076	BH BB011 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800077	BH BB012 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800078	BH BB013 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800079	BH BB013 1.00 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800080	BH BB015 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800081	TP BB011 0.30 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800082	TP BB011 1.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800083	WS BB001 0.20 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800084	WS BB001 0.80 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800085	BH BB007 1.20 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800086	BH BB007 1.20 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800087	BH BB008 0.20 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800088	BH BB008 0.20 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800089	BH BB009 1.00 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800090	BH BB009 1.00 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800091	BH BB013 1.00 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800092	BH BB013 1.00 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800093	BH BB015 0.20 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800094	BH BB015 0.20 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800095	TP BB011 0.30 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1800096	TP BB011 0.30 LEACHATE	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1801858	BH BB012 0.40 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1801859	BH BB011 0.60 SOIL	08/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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.

## Information in Support of the Analytical Results

*Our Ref* 21-02875

*Client Ref* 4322C

*Contract* A66 North Trans Pennine Scheme D Section 7

### 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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-02729

*Issued:* 23-Feb-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-02729

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 8 Soil samples, 6 Leachate samples.

*Date Received* 09-Feb-21

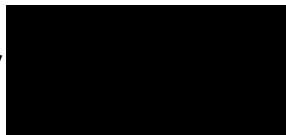
*Date Started* 09-Feb-21

*Date Completed* 23-Feb-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-02729

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP BB004	3	0.3	1799190	16/02/2021	Brown gravelly, sandy CLAY
TP BB004	10	2.5	1799191	16/02/2021	Dark grey sandy CLAY
TP BB006	3	0.2	1799192	16/02/2021	Dark brown gravelly, sandy CLAY
TP BB006	6	1	1799193	16/02/2021	Dark brown gravelly, sandy CLAY
TP BB007	3	0.4	1799194	16/02/2021	Brown gravelly, sandy CLAY
TP BB007	5	1	1799195	16/02/2021	Brown gravelly, sandy CLAY
BH BB003	2	0.2	1799196	16/02/2021	Dark brown gravelly, very sandy CLAY
BH BB003	4	0.8	1799197	16/02/2021	Dark brown gravelly, very sandy CLAY

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799190	1799191	1799192	1799193
Sample ID	TP BB004	TP BB004	TP BB006	TP BB006
Depth	0.30	2.50	0.20	1.00
Other ID	3	10	3	6
Sample Type	ES	ES	ES	ES
Sampling Date	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	240	9.9	10	130
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.3	0.2	0.3
Chromium	DETSC 2301#	0.15	mg/kg	18	13	10	9.9
Chromium III	DETSC 2301*	0.15	mg/kg	18	13	10	9.9
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	22	28	18
Lead	DETSC 2301#	0.3	mg/kg	20	51	24	17
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	0.06
Nickel	DETSC 2301#	1	mg/kg	18	21	20	19
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	47	61	94	61
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.0	4.8	3.8	3.7
pH	DETSC 2008#		pH	7.4	8.1	8.1	8.3
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.8	1.7	0.6	0.8
Organic matter	DETSC 2002#	0.1	%	1.5	2.9	1.1	1.4
Sulphide	DETSC 2024*	10	mg/kg	< 10	56	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	221	454	112	141

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799190	1799191	1799192	1799193
Sample ID	TP BB004	TP BB004	TP BB006	TP BB006
Depth	0.30	2.50	0.20	1.00
Other ID	3	10	3	6
Sample Type	ES	ES	ES	ES
Sampling Date	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 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
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799190	1799191	1799192	1799193
Sample ID	TP BB004	TP BB004	TP BB006	TP BB006
Depth	0.30	2.50	0.20	1.00
Other ID	3	10	3	6
Sample Type	ES	ES	ES	ES
Sampling Date	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.11	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.20	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.16	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.05	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.65	< 0.10
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799194	1799195	1799196	1799197
Sample ID	TP BB007	TP BB007	BH BB003	BH BB003
Depth	0.40	1.00	0.20	0.80
Other ID	3	5	2	4
Sample Type	ES	ES	ES	ES
Sampling Date	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	160	100	85	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	< 0.2	0.7	
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.3	0.6	
Chromium	DETSC 2301#	0.15	mg/kg	11	15	17	
Chromium III	DETSC 2301*	0.15	mg/kg	11	15	17	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	10	17	45	
Lead	DETSC 2301#	0.3	mg/kg	16	24	110	
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.08	
Nickel	DETSC 2301#	1	mg/kg	10	36	23	
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	
Zinc	DETSC 2301#	1	mg/kg	35	72	390	
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	3.1	7.1	9.9	5.8
pH	DETSC 2008#		pH	7.5	7.8	7.7	
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.2	
Total Organic Carbon	DETSC 2002	0.1	%	0.6	0.7	2.8	
Organic matter	DETSC 2002#	0.1	%	1.0	1.2	4.9	
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	104	177	764	

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799194	1799195	1799196	1799197
Sample ID	TP BB007	TP BB007	BH BB003	BH BB003
Depth	0.40	1.00	0.20	0.80
Other ID	3	5	2	4
Sample Type	ES	ES	ES	ES
Sampling Date	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	



## Summary of Chemical Analysis Soil Samples

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799194	1799195	1799196	1799197
Sample ID	TP BB007	TP BB007	BH BB003	BH BB003
Depth	0.40	1.00	0.20	0.80
Other ID	3	5	2	4
Sample Type	ES	ES	ES	ES
Sampling Date	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.12	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.23	
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.19	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.07	
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.08	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.07	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.75	
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	

# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB004 3 0.30

Sample Numbers 1799190 1799198 1799199

Date Analysed 16/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	0.8
DETSC 2003# Loss On Ignition	%	4.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	7.4
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.7	0.5	< 0.002	< 0.01
DETSC 2306 Barium as Ba	1.5	1.9	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	2.3	0.31	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1	0.73	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	1.8	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.31	0.17	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	1.2	0.58	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	4.3	4.1	0.009	0.041
DETSC 2055 Chloride as Cl	2600	1600	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	2400	1600	< 20	< 100
DETSC 2009* Total Dissolved Solids	11000	9700	22	98.7
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	5900	4300	11.8	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.7	6.3
DETSC 2009 Conductivity uS/cm	15.7	13.9
* Temperature*	17.0	17.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.114

Stage 1	
Volume of Leachant L2*	0.203
Volume of Eluate VE1*	0.15

Stage 2	
Volume of Leachant L8*	0.914
Volume of Eluate VE2*	0.88

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB006 6 1.00

Sample Numbers 1799193 1799200 1799201

Date Analysed 16/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.0
DETSC 2003# Loss On Ignition	%	3.7
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	8.3
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.48	0.44	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.63	0.93	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.1	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	0.74	0.52	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.33	0.28	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	6.1	3.6	0.012	0.04
DETSC 2055 Chloride as Cl	2600	1600	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	2300	1700	< 20	< 100
DETSC 2009* Total Dissolved Solids	12000	9300	24	97.6
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	4800	3600	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.5	6.4
DETSC 2009 Conductivity uS/cm	16.5	13.3
* Temperature*	18.0	18.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.118

### Stage 1

Volume of Leachant L2*	0.215
Volume of Eluate VE1*	0.2

### Stage 2

Volume of Leachant L8*	0.947
Volume of Eluate VE2*	0.911

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02729

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Numbers 1799197 1799202 1799203

Sample Id BH BB003 4 0.80

Date Analysed 16/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	3.4
DETSC 2003# Loss On Ignition	%	5.8
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	2.4
DETSC 2008# pH	pH Units	9.2
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.55	0.57	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.93	1.2	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.92	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.1	1.4	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.17	0.28	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	4.1	2.3	0.008	0.025
DETSC 2055 Chloride as Cl	2600	2300	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	2600	2200	< 20	< 100
DETSC 2009* Total Dissolved Solids	16000	17000	32	168.7
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	4800	4800	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

Additional Information		
DETSC 2008 pH	6.3	6.2
DETSC 2009 Conductivity uS/cm	22.7	24.7
* Temperature*	18.0	18.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.118

Stage 1	
Volume of Leachant L2*	0.214
Volume of Eluate VE1*	0.15

Stage 2	
Volume of Leachant L8*	0.944
Volume of Eluate VE2*	0.9

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-02729

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1799190	TP BB004 3 0.30	SOIL	NAD	none	D Wilkinson
1799192	TP BB006 3 0.20	SOIL	NAD	none	D Wilkinson
1799194	TP BB007 3 0.40	SOIL	NAD	none	D Wilkinson
1799196	BH BB003 2 0.20	SOIL	NAD	none	D Wilkinson

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 21-02729  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1799190	TP BB004 0.30 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799191	TP BB004 2.50 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799192	TP BB006 0.20 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799193	TP BB006 1.00 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799194	TP BB007 0.40 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799195	TP BB007 1.00 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799196	BH BB003 0.20 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799197	BH BB003 0.80 SOIL	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799198	TP BB004 0.30 LEACHATE	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799199	TP BB004 0.30 LEACHATE	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799200	TP BB006 1.00 LEACHATE	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799201	TP BB006 1.00 LEACHATE	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799202	BH BB003 0.80 LEACHATE	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799203	BH BB003 0.80 LEACHATE	03/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-02703

*Issued:* 23-Feb-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-02703

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 3 Soil samples.

*Date Received* 09-Feb-21

*Date Started* 09-Feb-21

*Date Completed* 23-Feb-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



2139



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-02703

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP BB003	2	0.1	1799075	16/02/2021	Brown, gravelly, sandy CLAY
TP BB010	2	0.2	1799076	16/02/2021	Brown, gravelly, sandy CLAY
TP BB010	5	1	1799077	16/02/2021	Brown, gravelly, sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02703

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799075	1799076	1799077
Sample ID	TP BB003	TP BB010	TP BB010
Depth	0.10	0.20	1.00
Other ID	2	2	5
Sample Type	ES	ES	ES
Sampling Date	04/02/2021	04/02/2021	04/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	7.6	6.9	260
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.7	0.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	13	11	12
Chromium III	DETSC 2301*	0.15	mg/kg	13	11	12
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	26	4.4	9.0
Lead	DETSC 2301#	0.3	mg/kg	72	13	17
Mercury	DETSC 2325#	0.05	mg/kg	0.06	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	14	5.8	14
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	76	34	46
<b>Inorganics</b>						
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	11	4.6	3.0
pH	DETSC 2008#		pH	7.0	6.0	6.8
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.1	0.1
Total Organic Carbon	DETSC 2002	0.1	%	4.1	0.8	0.6
Organic matter	DETSC 2002#	0.1	%	7.2	1.4	1.1
Sulphide	DETSC 2024*	10	mg/kg	16	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	698	301	103

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02703

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799075	1799076	1799077
Sample ID	TP BB003	TP BB010	TP BB010
Depth	0.10	0.20	1.00
Other ID	2	2	5
Sample Type	ES	ES	ES
Sampling Date	04/02/2021	04/02/2021	04/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02703

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1799075	1799076	1799077
Sample ID	TP BB003	TP BB010	TP BB010
Depth	0.10	0.20	1.00
Other ID	2	2	5
Sample Type	ES	ES	ES
Sampling Date	04/02/2021	04/02/2021	04/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

## Summary of Asbestos Analysis

### Soil Samples

Our Ref 21-02703

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1799075	TP BB003 2 0.10	SOIL	NAD	none	Keith Wilson
1799076	TP BB010 2 0.20	SOIL	NAD	none	Keith Wilson

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 21-02703

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1799075	TP BB003 0.10 SOIL	04/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799076	TP BB010 0.20 SOIL	04/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1799077	TP BB010 1.00 SOIL	04/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-02324

*Issued:* 18-May-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-02324

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 5 Soil samples, 6 Leachate samples.

*Date Received* 04-Feb-21

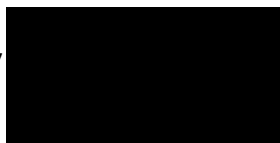
*Date Started* 04-Feb-21

*Date Completed* 18-May-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-02324

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP BB001	2	0.2	1796902	15/02/2021	Dark brown gravelly, very sandy CLAY including some rootlets
TP BB001	8	2	1796903	15/02/2021	Brown gravelly, sandy CLAY
BH BB002	2	0.3	1796904	15/02/2021	Brown very gravelly, sandy CLAY
BH BB002	5	1	1796905	15/02/2021	Dark brown very gravelly, sandy CLAY
BH BB002	10A	3	1796906	15/02/2021	Dark brown very gravelly, sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02324

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1796902	1796903	1796904	1796905	1796906
Sample ID	TP BB001	TP BB001	BH BB002	BH BB002	BH BB002
Depth	0.20	2.00	0.30	1.00	3.00
Other ID	2	8	2	5	10A
Sample Type	ES	ES	ES	ES	ES
Sampling Date	01/02/2021	01/02/2021	01/02/2021	01/02/2021	01/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Metals</b>								
Arsenic	DETSC 2301#	0.2	mg/kg	6.5	8.4	1.2	3.3	4.1
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.8	< 0.2	< 0.2	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.3	0.7	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	13	12	2.1	6.1	9.4
Chromium III	DETSC 2301*	0.15	mg/kg	13	12	2.1	6.1	9.4
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	38	22	6.6	18	16
Lead	DETSC 2301#	0.3	mg/kg	130	22	12	30	18
Mercury	DETSC 2325#	0.05	mg/kg	0.13	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	9.4	28	4.3	12	16
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	89	69	64	66	51
<b>Inorganics</b>								
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	15	3.8	3.7	2.4	4.3
pH	DETSC 2008#		pH	5.9	7.4	8.1	8.4	8.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.9	0.1	0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	5.6	0.7	0.5	0.7	0.5
Organic matter	DETSC 2002#	0.1	%	9.7	1.3	0.9	1.2	0.9
Sulphide	DETSC 2024*	10	mg/kg	200	< 10	< 10	< 10	24
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	2070	488	466	507	210

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-02324

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1796902	1796903	1796904	1796905	1796906
Sample ID	TP BB001	TP BB001	BH BB002	BH BB002	BH BB002
Depth	0.20	2.00	0.30	1.00	3.00
Other ID	2	8	2	5	10A
Sample Type	ES	ES	ES	ES	ES
Sampling Date	01/02/2021	01/02/2021	01/02/2021	01/02/2021	01/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Petroleum Hydrocarbons</b>								
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 C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	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	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	24	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	45	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	67	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	67	< 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



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-02324

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1796902	1796903	1796904	1796905	1796906
Sample ID	TP BB001	TP BB001	BH BB002	BH BB002	BH BB002
Depth	0.20	2.00	0.30	1.00	3.00
Other ID	2	8	2	5	10A
Sample Type	ES	ES	ES	ES	ES
Sampling Date	01/02/2021	01/02/2021	01/02/2021	01/02/2021	01/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>PAHs</b>								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.07	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.04	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.10	< 0.10
<b>Phenols</b>								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.6	< 0.3	< 0.3	< 0.3	< 0.3

## WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02324

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB001 2 0.20

Sample Numbers 1796902 1796907 1796908

Date Analysed 15/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	8.0
DETSC 2003# Loss On Ignition	%	15.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	5.9
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.5	0.44	< 0.002	< 0.01
DETSC 2306 Barium as Ba	1.5	0.65	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.7	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	3.3	1.9	0.007	0.021
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.32	0.22	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	7.8	4	0.016	0.046
DETSC 2055 Chloride as Cl	3100	2400	< 20	< 100
DETSC 2055* Fluoride as F	160	< 100	0.32	0.24
DETSC 2055 Sulphate as SO4	2900	2100	< 20	< 100
DETSC 2009* Total Dissolved Solids	22000	12000	44	135
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	7.1	7.0
DETSC 2009 Conductivity uS/cm	30.8	16.7
* Temperature*	19.0	19.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.093

### Stage 1

Volume of Leachant L2*	0.14
Volume of Eluate VE1*	0.14

### Stage 2

Volume of Leachant L8*	0.747
Volume of Eluate VE2*	0.7

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02324

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id TP BB001 8 2.00

Sample Numbers 1796903 1796909 1796910

Date Analysed 15/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	0.6
DETSC 2003# Loss On Ignition	%	3.8
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	7.4
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.41	0.45	< 0.002	< 0.01
DETSC 2306 Barium as Ba	0.62	0.72	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.4	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	0.68	0.47	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	0.13	0.13	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	2.6	2	0.005	0.021
DETSC 2055 Chloride as Cl	3200	1500	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	2700	1400	< 20	< 100
DETSC 2009* Total Dissolved Solids	16000	8800	32	99.3
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.9	6.8
DETSC 2009 Conductivity uS/cm	22.3	12.5
* Temperature*	19.0	19.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.114

Stage 1	
Volume of Leachant L2*	0.203
Volume of Eluate VE1*	0.18

Stage 2	
Volume of Leachant L8*	0.914
Volume of Eluate VE2*	0.88

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-02324

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Sample Id BH BB002 5 1.00

Sample Numbers 1796905 1796911 1796912

Date Analysed 15/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.0
DETSC 2003# Loss On Ignition	%	2.4
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC 2008# pH	pH Units	8.4
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	0.38	0.35	< 0.002	< 0.01
DETSC 2306 Barium as Ba	3.6	4.1	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	0.51	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	0.87	0.97	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.32	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	4.2	2.8	0.008	0.03
DETSC 2055 Chloride as Cl	2700	1400	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	5200	2600	< 20	< 100
DETSC 2009* Total Dissolved Solids	32000	30000	64	303.4
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.3	6.3
DETSC 2009 Conductivity uS/cm	45.8	43.5
* Temperature*	19.0	19.0

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.124

### Stage 1

Volume of Leachant L2*	0.241
Volume of Eluate VE1*	0.21

### Stage 2

Volume of Leachant L8*	0.989
Volume of Eluate VE2*	0.94

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-02324

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1796904	BH BB002 2 0.30	SOIL	NAD	none	Rebecca Burgess
1796905	BH BB002 5 1.00	SOIL	NAD	none	Rebecca Burgess

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 21-02324  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1796902	TP BB001 0.20 SOIL	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796903	TP BB001 2.00 SOIL	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796904	BH BB002 0.30 SOIL	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796905	BH BB002 1.00 SOIL	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796906	BH BB002 3.00 SOIL	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796907	TP BB001 0.20 LEACHATE	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796908	TP BB001 0.20 LEACHATE	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796909	TP BB001 2.00 LEACHATE	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796910	TP BB001 2.00 LEACHATE	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796911	BH BB002 1.00 LEACHATE	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1796912	BH BB002 1.00 LEACHATE	01/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



## Certificate of Analysis

*Certificate Number* 21-06838

*Issued:* 09-Apr-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-06838

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 4 Water samples.

*Date Received* 31-Mar-21

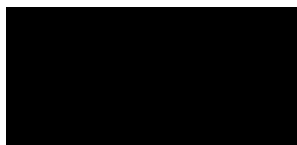
*Date Started* 31-Mar-21

*Date Completed* 09-Apr-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Water Samples

Our Ref 21-06838

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1825745	1825746	1825747	1825748
Sample ID	BH BB007	BH BB013	SW BB001	SW BB002
Depth	4.45-12.00	2.85-4.00	0.00	0.00
Other ID	100	100	100	100
Sample Type	EW	EW	EW	EW
Sampling Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic, Dissolved	DETSC 2306	0.001	mg/l	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium, Dissolved	DETSC 2306	0.0001	mg/l	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Calcium, Dissolved	DETSC 2306	0.09	mg/l	81	75	8.6	9.9
Chromium III, Dissolved	DETSC 2306*	0.001	mg/l	< 0.001	< 0.001	< 0.001	< 0.001
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007	< 0.007	< 0.007	< 0.007
Copper, Dissolved	DETSC 2306	0.0004	mg/l	0.0024	0.0022	0.0009	0.0010
Iron, Dissolved	DETSC 2306	0.0055	mg/l	0.79	0.11	0.55	0.52
Lead, Dissolved	DETSC 2306	0.0001	mg/l	0.0010	0.0004	0.0010	0.0010
Mercury, Dissolved	DETSC 2306	0.0001	mg/l	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel, Dissolved	DETSC 2306	0.0005	mg/l	0.0018	0.0042	0.0010	0.0010
Potassium, Dissolved	DETSC 2306	0.08	mg/l	6.0	4.2	0.54	0.61
Selenium, Dissolved	DETSC 2306	0.0003	mg/l	0.0005	0.0010	0.0003	0.0004
Sodium, Dissolved	DETSC 2306	0.07	mg/l	9.3	39	4.8	5.0
Zinc, Dissolved	DETSC 2306	0.0013	mg/l	0.012	0.0061	0.0057	0.0057
<b>Inorganics</b>							
pH	DETSC 2008		pH	7.5	7.4	7.4	7.0
Alkalinity as CaCO <sub>3</sub> (Automated)	DETSC 2030	10	mg/l	210	170	21	24
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	17	6.0	16	23
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	20	400	32	31
Cyanide, Free	DETSC 2130	0.02	mg/l	< 0.02	< 0.02	< 0.02	< 0.02
Dissolved Organic Carbon	DETSC 2085	2	mg/l	85	12	8.5	10
Total Hardness as CaCO <sub>3</sub>	DETSC 2303	0.1	mg/l	236	246	25.0	28.7
Suspended Solids	DETSC 2034	5	mg/l	190	24000	< 5.0	< 5.0
Un-Ionised Ammonia	*	0.02	mg/l	< 0.02	< 0.02	< 0.02	< 0.02
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.069	< 0.015	< 0.015	< 0.015
Chloride	DETSC 2055	0.1	mg/l	19	37	11	11
Nitrate as NO <sub>3</sub>	DETSC 2055	0.1	mg/l	0.29	0.15	0.81	1.2
Nitrite as NO <sub>2</sub>	DETSC 2055	0.1	mg/l	0.18	0.58	< 0.10	< 0.10
Sulphate as SO <sub>4</sub>	DETSC 2055	0.1	mg/l	13	62	3.7	3.0
Sulphide	DETSC 2208	0.01	mg/l	0.02	0.01	0.02	0.02

## Summary of Chemical Analysis

### Water Samples

Our Ref 21-06838

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1825745	1825746	1825747	1825748
Sample ID	BH BB007	BH BB013	SW BB001	SW BB002
Depth	4.45-12.00	2.85-4.00	0.00	0.00
Other ID	100	100	100	100
Sample Type	EW	EW	EW	EW
Sampling Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	3.2	< 0.1	3.8	3.9
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Ali/Aro C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
<b>PAHs</b>							
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01	0.01	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	0.01	0.02	< 0.01	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01

## Summary of Chemical Analysis Water Samples

Our Ref 21-06838

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1825745	1825746	1825747	1825748
Sample ID	BH BB007	BH BB013	SW BB001	SW BB002
Depth	4.45-12.00	2.85-4.00	0.00	0.00
Other ID	100	100	100	100
Sample Type	EW	EW	EW	EW
Sampling Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130	0.1	mg/l	< 0.1	< 0.1	< 0.1	< 0.1



## Information in Support of the Analytical Results

Our Ref 21-06838  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1825745	BH BB007 WATER	30/03/21	GB 1L x2, GV x2, PB 1L x2		
1825746	BH BB013 WATER	30/03/21	GB 1L x2, GV x2, PB 1L x2		
1825747	SW BB001 WATER	30/03/21	GB 1L x2, GV x2, PB 1L x2		
1825748	SW BB002 WATER	30/03/21	GB 1L x2, GV x2, PB 1L x2		

Key: G-Glass P-Plastic B-Bottle V-Vial

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.

### 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

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-05627

*Issued:* 23-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-05627

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Penine Scheme D Section 7

*Description* 2 Soil samples.

*Date Received* 08-Mar-21

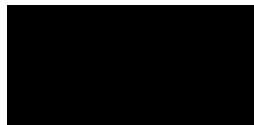
*Date Started* 17-Mar-21

*Date Completed* 23-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved B*



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05627

Client Ref 4322C

Contract Title A66 North Trans Penine Scheme D Section 7

<b>Lab No</b>	1818285	1818286
<b>Sample ID</b>	BH BB010	BH BB018
<b>Depth</b>	3.50	5.10
<b>Other ID</b>	14	9
<b>Sample Type</b>	C	C
<b>Sampling Date</b>	16/02/2021	19/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Inorganics</b>					
pH	DETSC 2008#		pH	8.3	9.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	37	22
Sulphur as S, Total	DETSC 2320	0.01	%	0.85	0.03
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	128	383



## Information in Support of the Analytical Results

Our Ref 21-05627  
 Client Ref 4322C  
 Contract A66 North Trans Penine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1818285	BH BB010 3.50 SOIL	16/02/21	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
1818286	BH BB018 5.10 SOIL	19/02/21	PT 500ml	Total Sulphur ICP (7 days), pH + Conductivity (7 days)	

Key: P-Plastic 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

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-05428

*Issued:* 19-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-05428

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* One Soil sample.

*Date Received* 11-Feb-21

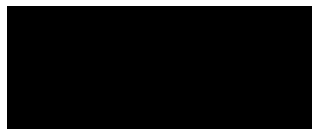
*Date Started* 15-Mar-21

*Date Completed* 19-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approve*



Adam Fenwick  
Contracts Manager



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## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05428

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1817279
<b>Sample ID</b>	BH BB009
<b>Depth</b>	1.00
<b>Other ID</b>	4
<b>Sample Type</b>	ES
<b>Sampling Date</b>	08/02/2021
<b>Sampling Time</b>	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphate Aqueous Extract as SO <sub>4</sub>	DETSC 2076#	10	mg/l	13
Sulphur as S, Total	DETSC 2320	0.01	%	0.01
Sulphate as SO <sub>4</sub> , Total	DETSC 2321#	0.01	%	0.04



## Information in Support of the Analytical Results

Our Ref 21-05428  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817279	BH BB009 1.00 SOIL	08/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-05426

*Issued:* 19-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-05426

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* One Soil sample.

*Date Received* 23-Feb-21

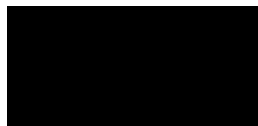
*Date Started* 15-Mar-21

*Date Completed* 19-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



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# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-05426

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1817275
Sample ID	BH BB004
Depth	2.40
Other ID	10A
Sample Type	ES
Sampling Date	19/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	84
Sulphur as S, Total	DETSC 2320	0.01	%	0.49
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.06



## Information in Support of the Analytical Results

Our Ref 21-05426  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817275	BH BB004 2.40 SOIL	19/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

End of Report



## Certificate of Analysis

**Certificate Number** 21-05421

**Issued:** 19-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-05421

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** One Soil sample.

**Date Received** 24-Feb-21

**Date Started** 15-Mar-21

**Date Completed** 19-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approve**



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05421

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1817266
Sample ID	BH BB006
Depth	1.70
Other ID	9
Sample Type	ES
Sampling Date	19/02/2021
Sampling Time	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	19
Sulphur as S, Total	DETSC 2320	0.01	%	0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03



## Information in Support of the Analytical Results

Our Ref 21-05421  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817266	BH BB006 1.70 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

End of Report



## Certificate of Analysis

**Certificate Number** 21-05404

**Issued:** 19-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-05404

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** One Soil sample.

**Date Received** 17-Feb-21

**Date Started** 15-Mar-21

**Date Completed** 19-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved**



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05404

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1817205
<b>Sample ID</b>	BH BB018
<b>Depth</b>	0.70
<b>Other ID</b>	1
<b>Sample Type</b>	ES
<b>Sampling Date</b>	12/02/2021
<b>Sampling Time</b>	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphur as S, Total	DETSC 2320	0.01	%	1.1



## Information in Support of the Analytical Results

Our Ref 21-05404  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817205	BH BB018 0.70 SOIL	12/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-05403

*Issued:* 23-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-05403

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* One Soil sample.

*Date Received* 19-Feb-21

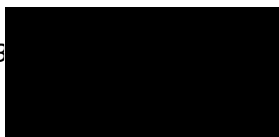
*Date Started* 15-Mar-21

*Date Completed* 23-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



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## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05403

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1817204
<b>.Sample ID</b>	BH BB023
<b>Depth</b>	0.20
<b>Other ID</b>	1
<b>Sample Type</b>	ES
<b>Sampling Date</b>	15/02/2021
<b>Sampling Time</b>	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphur as S, Total	DETSC 2320	0.01	%	0.05
Sulphate as SO <sub>4</sub> , Total	DETSC 2321#	0.01	%	0.09



## Information in Support of the Analytical Results

Our Ref 21-05403

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817204	BH BB023 0.20 SOIL	15/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

End of Report



# DETS

## Certificate of Analysis

**Certificate Number** 21-05402

**Issued:** 19-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-05402

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** One Soil sample.

**Date Received** 01-Mar-21


**Date Started** 15-Mar-21

**Date Completed** 19-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approve**



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05402

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1817203
<b>Sample ID</b>	BH B0024
<b>Depth</b>	0.20
<b>Other ID</b>	1
<b>Sample Type</b>	ES
<b>Sampling Date</b>	23/02/2021
<b>Sampling Time</b>	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphur as S, Total %	DETSC 2320	0.01	%	0.06



## Information in Support of the Analytical Results

Our Ref 21-05402  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817203	BH B0024 0.20 SOIL	23/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

End of Report



## Certificate of Analysis

**Certificate Number** 21-05401

**Issued:** 19-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-05401

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 3 Soil samples.

**Date Received** 11-Feb-21

**Date Started** 15-Mar-21

**Date Completed** 19-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved**



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis Soil Samples

Our Ref 21-05401

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1817200	1817201	1817202
Sample ID	BH BB010	BH BB012	BH BB011
Depth	0.20	0.40	0.60
Other ID	3	5	3
Sample Type	ES	ES	ES
Sampling Date	08/02/2021	08/02/2021	08/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Inorganics</b>						
pH	DETSC 2008#		pH		8.0	8.1
Sulphur as S, Total	DETSC 2320	0.01	%	0.06	0.20	0.07



## Information in Support of the Analytical Results

Our Ref 21-05401

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
1817200	BH BB010 0.20 SOIL	08/02/21	GJ 250ml (250ml)		
1817201	BH BB012 0.40 SOIL	08/02/21	GJ 250ml (250ml)		
1817202	BH BB011 0.60 SOIL	08/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

End of Report



# DETS

## Certificate of Analysis

**Certificate Number** 21-04245

**Issued:** 08-Mar-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-04245

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 2 Soil samples.

**Date Received** 01-Mar-21

**Date Started** 01-Mar-21

**Date Completed** 08-Mar-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved**



Adam Fenwick  
Contracts Manager



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## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-04245

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
BH BB025	1	0.2	1808924	05/03/2021	Dark brown sandy CLAY including numerous rootlets
BH B0024	1	0.2	1808925	05/03/2021	Dark brown sandy CLAY including numerous rootlets



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04245

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808924	1808925
<b>Sample ID</b>	BH BB025	BH B0024
<b>Depth</b>	0.20	0.20
<b>Other ID</b>	1	1
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	22/02/2021	23/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Metals</b>					
Arsenic	DETSC 2301#	0.2	mg/kg	4.0	4.8
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.6
Chromium	DETSC 2301#	0.15	mg/kg	9.7	9.1
Chromium III	DETSC 2301*	0.15	mg/kg	9.7	9.1
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	14	17
Lead	DETSC 2301#	0.3	mg/kg	28	41
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.07
Nickel	DETSC 2301#	1	mg/kg	7.9	9.0
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	53	91
<b>Inorganics</b>					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	27	22
pH	DETSC 2008#		pH	6.3	5.8
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.4	0.5
Total Organic Carbon	DETSC 2002	0.1	%	4.3	4.0
Organic matter	DETSC 2002#	0.1	%	7.5	7.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		35
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	1490	1130

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04245

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808924	1808925
<b>Sample ID</b>	BH BB025	BH B0024
<b>Depth</b>	0.20	0.20
<b>Other ID</b>	1	1
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	22/02/2021	23/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Petroleum Hydrocarbons</b>					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04245

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808924	1808925
<b>Sample ID</b>	BH BB025	BH B0024
<b>Depth</b>	0.20	0.20
<b>Other ID</b>	1	1
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	22/02/2021	23/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>PAHs</b>					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.03	0.04
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	0.09
Pyrene	DETSC 3303#	0.03	mg/kg	0.04	0.07
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04	0.05
Chrysene	DETSC 3303	0.03	mg/kg	0.03	0.05
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	0.06
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.03	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.03	0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	0.31
<b>Phenols</b>					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.9	0.8



## Summary of Asbestos Analysis

### Soil Samples

Our Ref 21-04245

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1808924	BH BB025 1 0.20	SOIL	NAD	none	Keith Wilson
1808925	BH B0024 1 0.20	SOIL	NAD	none	Keith Wilson

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 21-04245  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1808924	BH BB025 0.20 SOIL	22/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1808925	BH B0024 0.20 SOIL	23/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

**Certificate Number** 21-04233

**Issued:** 18-May-21

**Client** Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

**Our Reference** 21-04233

**Client Reference** 4322C

**Order No** (not supplied)

**Contract Title** A66 North Trans Pennine Scheme D Section 7

**Description** 2 Soil samples.

**Date Received** 25-Feb-21

**Date Started** 01-Mar-21

**Date Completed** 18-May-21

**Test Procedures** Identified by prefix DETSn (details on request).

**Notes** Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved By**



Adam Fenwick  
Contracts Manager



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## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-04233

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP BB002	3	0.4	1808883	04/03/2021	Brown gravelly, sandy CLAY including some rootlets
TP BB002	8	2	1808884	04/03/2021	Brown gravelly, sandy CLAY including some rootlets



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04233

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808883	1808884
<b>Sample ID</b>	TP BB002	TP BB002
<b>Depth</b>	0.40	2.00
<b>Other ID</b>	3	8
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	23/02/2021	23/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Metals</b>					
Arsenic	DETSC 2301#	0.2	mg/kg	9.6	12
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	18	19
Chromium III	DETSC 2301*	0.15	mg/kg	18	19
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	29
Lead	DETSC 2301#	0.3	mg/kg	36	25
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.08
Nickel	DETSC 2301#	1	mg/kg	13	13
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	78	71
<b>Inorganics</b>					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.8	4.3
pH	DETSC 2008#		pH	7.7	7.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.7	0.7
Organic matter	DETSC 2002#	0.1	%	1.2	1.3
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	325	273

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04233

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808883	1808884
<b>Sample ID</b>	TP BB002	TP BB002
<b>Depth</b>	0.40	2.00
<b>Other ID</b>	3	8
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	23/02/2021	23/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Petroleum Hydrocarbons</b>					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04233

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1808883	1808884
<b>Sample ID</b>	TP BB002	TP BB002
<b>Depth</b>	0.40	2.00
<b>Other ID</b>	3	8
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	23/02/2021	23/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>PAHs</b>					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10
<b>Phenols</b>					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3



## Information in Support of the Analytical Results

Our Ref 21-04233

Client Ref 4322C

Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1808883	TP BB002 0.40 SOIL	23/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1808884	TP BB002 2.00 SOIL	23/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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 SO <sub>4</sub>	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 SO <sub>4</sub>	%	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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# Quality Control

## *Quality Systems*

Derwentside Environmental Testing Services (DETS) employs numerous measures to ensure high levels of confidence in the results produced. Our laboratory has been accredited by the United Kingdom Accreditation Service (UKAS) since its inception and operates in full compliance with the internationally recognised standard ISO 17025:2017 and the Environment Agency's MCERTS (Monitoring & Certification Scheme) standard for soils and waters, which provides greater assurance to all parties of the reliability of data from chemical analysis.

To obtain a copy of our full UKAS schedule visit the UKAS website at [\[REDACTED\]](#) and search for our laboratory number 2139, or scan the QR code.



## *Proficiency Testing Schemes*

DETS participates in six external proficiency testing schemes in order to monitor and ensure the continuing quality of analysis. These schemes cover soil, water and fuel analysis and the schemes are:



**Contest**

**Aquacheck**



## *Internal Quality Control*

DETS runs a strict internal quality control system. A minimum of 5% of all samples that undergo analysis in our laboratories are quality control samples. This way we can ensure a high level of confidence in all of the analytical data produced. In addition, MCERTS accredited tests must meet strict, ongoing limits for precision and bias, to maintain their accreditation status.

The types of internal Analytical Quality Control (AQC) samples undertaken by DETS include Blanks, Internal QC, Calibration Checks, Surrogates and Internal Standards.

In addition to internal AQC, DETS also checks aspects of instrument performance. These checks are in general method specific. Examples are, but not limited to, retention time, peak area, signal to noise, SPE column, peak shape and peak tailing check standards.

# Quality Control

## *Methods*

DETS currently have over 140 documented methods for analytical analysis. The analytical methods are always available to employees for reference purposes. All the methods follow a documented procedure for content and headings, including health and safety, interferences, reagents and standards preparation, quality control, method procedure, analysis of results, acceptability criteria and disposal of waste.

## *Procedures*

DETS currently have over 170 documented Standard Operating Procedures (SOPs), covering every section of the business.

The Key Quality procedures include:

- DETSC.SOP 1002 - Contract Review
- DETSC.SOP 1003 - Deviating Samples
- DETSC.SOP 1010 - Checking a Report
- DETSC.SOP 1206 - Supplier/Subcontractor Approval and Review
- DETSC.SOP 1401 - FERA Plant Health License
- DETSC.SOP 3001 - Analysis of AQC Samples
- DETSC.SOP 3004 - QC Chart Review
- DETSC.SOP 3005 - AQC Failure Reporting
- DETSC.SOP 3010 - Control of Nonconforming Testing
- DETSC.SOP 3102 - Complaint Handling
- DETSC.SOP 3103 - Corrective & Preventive Action
- DETSC.SOP 3201 - Uncertainty of Measurement
- DETSC.SOP 3204 - Validation, Evaluation and Revalidation of Methods
- DETSC.SOP 3401 - Documentation of Methods
- DETSC.SOP 3402 - Document Control - Issuing and Removal of Controlled Documents
- DETSC.SOP 3404 - Internal Audit Procedure
- DETSC.SOP 3407 - Training
- DETSC.SOP 3408 - Control of Records & Data
- DETSC.SOP 3411 - Archiving of Documents and Records
- DETSC.SOP 3412 - Competency
- DETSC.SOP 3501 - Handling PT Schemes
- DETSC.SOP 4203 - Handling Scheduled Samples
- DETSC.SOP 4204 - Handling Unscheduled Samples
- DETSC.SOP 4205 - Sending Subcontracted Samples

DETS also have documented procedures for equipment calibration and scheduled checks, including procedures for balances, hotblock digesters, furnaces, shakers, ovens, fridges, incubators, sonic baths, thermometers, timers, auto-dispensers and syringes.

# Quality Control

## *Training*

All new employees at DETS undergo a formal induction on the first day, covering an introduction to the Company, followed by an overview of the Quality Systems, the Environmental Systems and the Health and Safety Systems, Human Resources Systems, Information Technology Systems and finally an overview of the Laboratory Operations.

All new employees at DETS also undertake a Week 1 Induction schedule covering AQC Analysis and Failure Reporting and Basic Laboratory Skills.

All training on analytical methods follows a documented process requiring the employee to read and observe the method being conducted. The employee must then conduct the method under supervision on at least three occasions to the required standard before both the trainer, trainee and section manager sign the training record. Before the trainee can perform the method unsupervised, a method training verification (MTV) audit must be undertaken by a senior member of staff to verify the trainee is undertaking analysis to the required standard.

## *Competency*

All employees will have their competency to undertake analytical methods assessed every year. Competency is usually assessed by PT Scheme Testing Results, Method Audits, MTV Audits or UKAS Audits.

If no record of competency is present within a 12-month period, the employee will have to undergo a MTV audit before undertaking any further analytical method analysis.



# DETS INFO 008 – Sample Holding Time Information

## Soil

Analyte	Container type	Minimum sample required	Reference	Maximum holding time from sampling	
				pre drying/extraction <sup>1</sup>	post drying/extraction <sup>2</sup>
Acid Herbicides	Glass	20g	EPA SW-846 Chapter 4	14 days	40 days
Aliphatic/Aromatic	Glass	20g	EPA Victoria	14 days	-
Ammonium	Glass or plastic	20g	E DIN 19746	3 days	30 days
Anions	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
Boron	Glass or plastic	50g	BS ISO18512:2007	6 months	30 years
BTEX	60ml glass jar	Full container	EPA SW-846 Chapter 4	14 days	-
Carbonate	Glass or plastic	20g	Lab Validation	4 weeks	1 year
Chloride	Glass or plastic	20g	BS ISO18512:2007	1 month	3 years
Conductivity	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Cyanide	Glass or plastic	20g	EPA SW-846 Chapter 3	14 days	-
Heavy metals	Glass or plastic	10g	BS ISO18512:2007	6 months	30 years
Hexavalent chromium	Glass or plastic	20g	BS ISO18512:2007	30 days	-
Loss on ignition	Glass or plastic	10g	EPA SW-846 Chapter 3	28 days	-
Mercury	Glass or plastic	10g	EPA SW-846 Chapter 3	28 days	-
OCP	Glass	20g	BS ISO18512:2007	1 month	-
Oil & grease	Glass	20g	EPA SW-846 Chapter 3	28 days	-
Organic matter/TOC	Glass or plastic	20g	EPA SW-846 Chapter 3	28 days	-
PAH	Glass	20g	EPA Victoria	14 days	-
PCB	Glass	20g	BS ISO18512:2007	1 month	-
pH	Glass or plastic	20g	BS ISO18512:2007	1 week	3 years
Phenols	Glass	20g	EPA Victoria	14 days	-
PRO	60ml glass jar	Full container	EPA SW-846 Chapter 4	14 days	-
Sulphate	Glass or plastic	50g	BS ISO18512:2007	1 month	3 years
Sulphide	Glass or plastic	20g	EPA SW-846 Chapter 3	7 days	-
SVOC	Glass	20g	EPA SW-846 Chapter 4	14 days	40 days
TEM/CEM	Glass	20g	EPA Victoria	14 days	-
Total sulphur	Glass or plastic	20g	EPA Victoria	7 days	-
TPH (C10-C40)	Glass	20g	EPA Victoria	14 days	-
VOC	60ml glass jar	Full container	EPA SW-846 Chapter 4	7 days	-
Whole Oil Interpretation	60ml glass jar	Full container	-	-	-

<sup>1</sup> From sampling to extraction

<sup>2</sup> Once extracted

# DETS INFO 008 – Sample Holding Time Information

## Water

Analyte	Container type	Minimum sample required	Reference	Maximum holding time from sampling	
				Preservative required	Holding Time
Acid Herbicides	Glass	500	EPA SW-846 Chapter 4	none	7 days
Alkalinity	Glass or plastic	100	ISO 5667 3:2018	none	2 weeks
Aluminium (Reactive)	Glass or plastic	50	DETS Stability Study	none	2 days
Ammonium	Glass or plastic	20	ISO 5667 3:2018	Sulphuric acid	3 weeks
BOD	Glass or plastic	500	DETS Stability Study	none	2 days
Boron	Plastic	20	ISO 5667 3:2018	HNO3	6 months
Bromide	Glass or plastic	20	ISO 5667 3:2018	none	1 month
BTEX	Glass vial	Full container	EPA SW-846 Chapter 4	none	7 days
Chloride / Fluoride	Glass or plastic	20	ISO 5667 3:2018	none	1 month
COD	Glass or plastic	20	ISO 5667 3:2018	Sulphuric acid	6 months
Conductivity	Glass or plastic	100	ISO 5667 3:2018	none	1 day
Cyanide	Glass or Plastic	50	EPA SW-846 Chapter 3	NaOH	14 days
Hexavalent chromium	Glass or plastic	20	ISO 5667 3:2018	none	4 days
Metals (including Hardness)	Glass or plastic	20	EPA SW-846 Chapter 3	HNO3	6 months
Mercury	Glass or plastic	20	ISO 5667 3:2018	HNO3	6 months
Nitrate	Glass or plastic	20	EPA SW-846 Chapter 3	none	28 days
Nitrite	Glass or plastic	20	DETS Stability Study	none	5 days
OCP	Glass	500	ISO 5667 3:2018	Dark Glass	7 days
Oil & grease	Glass	500 (Separate bottle)	ISO 5667 3:2018	HCl / HNO3 / H2SO4	1 month
PAH	Glass	500	ISO 5667 3:2018	none	4 days
pH	Glass or plastic	50	ISO 5667 3:2018	none	1 day
PCB	Glass	500	EPA Victoria	none	7 days
Phenols	Glass	500	ISO 5667 3:2018	H3PO4 / H2SO4	21 days
Phosphate	Glass or plastic	20	DETS Stability Study	none	5 days
Phosphorus	Glass or plastic	20	EPA Victoria	HNO3	28 days
PRO	Glass vial	Full container	ISO 5667 3:2018	HCl / HNO3 / H2SO4	7 days
Sulphate	Glass or plastic	20	ISO 5667 3:2018	none	1 month
Sulphide	Plastic	50	ISO 5667 3:2018	Zinc acetate / Na2CO3	7 days
Suspended solids	Glass or plastic	100	ISO 5667 3:2018	none	2 days
SVOC	Glass	500	EPA SW-846 Chapter 4	none	7 days
TDS / Total Solids	Glass or plastic	500	ISO 5667 3:2018	none	7 days
Thiocyanate	Glass or plastic	50	DETS Stability Study	none	3 days
TOC/DOC	Glass or plastic	20	EPA SW-846 Chapter 3	H2SO4	28 days
TON	Glass or plastic	20	DETS Stability Study	none	5 days
TPH/EPH	Glass	500 (Separate bottle)	ISO 5667 3:2018	none (HCl / HNO3)	4 days (1 Month)
VOC	Glass vial	Full container	ISO 5667 3:2018	HCl / HNO3 / H2SO4	7 days
Whole Oil Interpretation	60ml glass jar	Full container	-	-	-

# DETS INFO 008 – Sample Holding Time Information

## **Fuel**

Due to the nature of fuel samples, no sample holding time is appropriate.

## **Asbestos**

Due to the nature of asbestos samples, no sample holding time is appropriate.

## **Whole Oil Interpretation**

Due to the nature of whole oil interpretation, no sample holding time is appropriate.

## **Unaccredited Methods**

As unaccredited methods may not have undertaken a full validation programme, no sample holding time study has been undertaken. A study will be conducted (if required) during the process of accreditation of the method.

## **Sample Transport Environment**

$5 \pm 3^{\circ}\text{C}$

## **Sample Storage environment**

$3 \pm 2^{\circ}\text{C}$



## DETS INFO 001 - Analytical Method Summary

Method Number	Title	Description	Reference	LOD	Accreditation Status
DETSC 1001	Sample Pre-Treatment and Preparation of Solids	Solid samples are classified and identified. Samples requiring analysis for unstable or volatile determinands are analysed as received. Samples requiring analysis for stable and non-volatile determinands are dried at <30°C or 50°C, depending on requirements, for a minimum of 16hrs (overnight). Dried samples are crushed in a jaw crusher, if necessary, and then ground using a mechanical mixer mill and sieved through a 250µm sieve to ensure they are homogenous.	BS1377:1990 – Soils for Civil Engineering Purposes  The preparation and pre-treatment of potentially contaminated soils prior to chemical analysis – MEWAM – 2006 – Environment Agency	n/a	Not Accredited
DETSC 1002	Description of Soil Sample Type	This method outlines the procedure used to describe soil samples with respect to basic type, predominant colour and inclusions. The procedure is carried out during the sample preparation stage.	BS 5930:Section 6:1999	n/a	Not Accredited
DETSC 1003	Stone and Glass / Metal / Plastic Content of Soil	This method outlines the procedure used to determine the Stone and Glass/Metal/Plastic content of soil samples. The procedure is carried out during the sample preparation stage.	BS 3882:2007 BS 1377:1990	0.10%	Not Accredited
DETSC 1004	Natural Moisture Content / Loss on Drying of Soil	Loss on drying is determined by loss of mass on drying in an oven set at 28°C. Moisture content is determined by loss of mass on drying in an oven set at 105°C. The procedure is carried out during the sample preparation stage.	Practical Environmental Analysis. Radojevic & Bashkin. RSC 1999  BS 1377: Part 2:1990  DETS drying time study	0.10%	Not Accredited
DETSC 1005	Soil Crushing	Dried samples are crushed in a jaw crusher, if necessary, and then ground using a mechanical mixer mill to ≤250µm to ensure they are homogenous.	In-house Method	n/a	Not Accredited
DETSC 1006	Soil Weighing	Soil samples are weighed to predefined tolerances into batches in preparation for extraction and analysis by documented methods.	In-house Method	n/a	Not Accredited
DETSC 1007	Batch Scanning	Batches of soil prepared as per DETSC 1006 – Soil Weighing are scanned to create LIMS worksheets for individual method extraction and analysis. Addition of extraction reagents followed by shaking or standing overnight of certain methods is also conducted.	In-house Method	n/a	Not Accredited
DETSC 1008	Handling Liquid Samples	Liquid samples are filtered and/or fixed before analysis by documented methods.	In-house Method	n/a	Not Accredited
DETSC 1009	Leachate Preparation (NRA Method and BS EN 12457 Parts 1-3)	Leachates are prepared as per the NRA (1994) method and as per BS EN 12457 Parts 1 - 3 one and two stage leachate preparation.	Leaching Test Method for the Assessment of Contaminated Land, Interim Guidance, NRA(1994)  BS EN 12457 Part 1,2 & 3	n/a	Not Accredited
DETSC 1010	Leaching Characteristics of Moulded and Monolithic Building or Waste Materials	A block of the material to be analysed is placed into an appropriate container ensuring that there is a gap of at least 2cm around the test piece on all sides (including the base). The container is then filled with deionised water and covered. At set time periods, the water is drained from the container which is then re-filled. The water drained out of the container is retained and analysed for the components of interest.	EA NEN 7375:2004 – Leaching Characteristics of Moulded or Monolithic Building and Waste Materials	n/a	Not Accredited
DETSC 1101	Asbestos - Bulk Analysis	Samples are examined visually for the presence of asbestos containing materials or asbestos fibres. Suspect fibres are removed from the sample and examined using polarised light microscopy to determine whether they are asbestos fibres. If no asbestos fibres are identified by the method after an adequate length of examination time, and after at least two small pinch samples have been examined, then the sample may be reported as 'NAD' (no asbestos detected).	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005  McCrone W.C., Asbestos Identification (Second Edition), The McCrone Research Institute, 1987  LAB 30, Application of ISO/IEC17025 for Asbestos Sampling and Testing, UKAS, Edition 3, January 2015	n/a	UKAS

DETS C 1102	Quantification of asbestos in soils, loose aggregates and ballast	The method of quantification is divided into three procedures: Gravimetric analysis, detailed gravimetric analysis and PCOM analysis. The analysis may be affected by the client's requirements as determined by contract review, and by the nature of the asbestos found in the sample, e.g. whether ACMs are present, and whether fibre bundles large enough to pick out using tweezers are have been found in the sample.	HSG 248 Asbestos: The Analysis Guide for Sampling, Analysis and Clearance Procedures. 2005 McCrone W.C., Asbestos Identification (Second Edition), The McCrone Rese HSG264 Asbestos: The survey guide. HSE Books, 2010 Davies, L. S.T., Wetherill, G. Z., McIntosh, C., McGonagle, C., Addison, J. 1996. Development and validation of an analytical method to determine the amount of asbestos in soils and loose aggregates. HSE Contract Research Report NO. 83/1996. HSE Books	Gravimetric Analysis: 0.01% for 1kg sample Detailed Gravimetric Analysis: 0.001% for 50g sample PCOM Analysis: 0.001%	UKAS
DETS C 1103	Asbestos Water Absorption Test	This test involves a sample of the asbestos product being dried and weighed before being immersed in water for a period of time. The sample is then removed from the water and re-weighed. If the amount of water absorbed is <30% by weight, then the sample should be reported as 'Not Licensed'. If ≥30% water is absorbed then the sample should be reported as being 'Licensed', i.e. an asbestos material for which a licence is required to work on.	Work with Materials Containing Asbestos: Approved Code of Practice and Guidance. HSE Books, 2006.	n/a	UKAS
DETS C 1104 (DRAFT)	Respirable Fibres in Soil and Dust	The analysis can follow-on from a quantitative analysis, or be scheduled as a test on its own, according to client requirements. A known mass of between 8g and 12g is removed and mixed with 1000ml of water. The mixture is stirred for 1 hour using a magnetic stirrer. A portion of the mixture is filtered through a 10 micron pore size filter, to collect a filtrate containing a sample of the respirable dust. The mass of respirable (PM10) dust per ml of the filtrate is calculated, and this value is used to decide how much of the filtrate is to be used for the rest of the analysis. Then, a known quantity of the filtrate is filtered through a cellulose-ester filter papers with a pore size of 0.8-1.2 microns. The filter is then placed onto a microscope slide, allowed to air dry, and then cleared and fixed using the acetone/triacetin method described in HSG 248. The filter is then evaluated using PCOM. From the number of respirable fibres observed on the slide the number of respirable fibres per mg of dust is calculated.	Asbestos: The analyst's guide for sampling, analysis and clearance procedures. HSG248, HSE Books, 2005 Asbestos: The survey guide. HSG264, HSE Books, 2012.	n/a	Not Accredited
DETS C 2002	Organic matter content of soil	The procedure is based upon Walkley and Black's method. Organic matter in soil is oxidised with potassium dichromate in the presence of concentrated sulphuric acid. The excess dichromate is titrated with ferrous sulphate using diphenylamine as an external indicator. The organic matter content is calculated from the amount of dichromate used during the oxidation process based on an empirical relationship.	BS1377 : Part 3 : 1990 Method 3 BS1377 : Part 1 : 1990 BS 3882:2007	0.10%	MCERTS(Soils)
DETS C 2003	Loss On Ignition	Soil is ignited at 440C and the amount of sample lost on ignition is determined gravimetrically. Other specified temperatures may be used but are not accredited.	BS1377 : Part 3 : 1990 Method 4 BS1377 : Part 1 : 1990	0.01%	MCERTS(Soils)
DETS C 2004	Sulphate and Total Sulphur Content of Soil, Aggregate and Water	The sulphate in the soil is dissolved in dilute hydrochloric acid, or in an aqueous extract having a water:soil ratio of 2:1 and the insoluble residue is removed by filtration. Waters are also filtered prior to analysis. The sulphate in the filtrate is precipitated as barium sulphate which is then filtered, ignited and weighed. Aggregate analysis is not comparable to BS EN 1744.	BS1377 : Part 3 : 1990 Method 5 BS1377 : Part 1 : 1990 BRE SD1: 2005 Concrete in Aggressive Ground	Acid Soluble: 0.01% Water Soluble: 100mg/l Waters: 10mg/l	MCERTS(Soils) Not Accredited (Aggregates)
DETS C 2005	Carbonate content of soil by Rapid Titration	The carbonate present in the soil reacts with a known excess of hydrochloric acid liberating carbon dioxide. The acid remaining after the reaction is determined by titration against sodium hydroxide. The result is calculated in terms of the equivalent proportion of carbon dioxide.	BS 1377: Part 1: 1990 BS 1377: Part 3: 1990: Method 5	1%	UKAS
DETS C 2006	Water Soluble Chloride Content of Soil & Chloride Content of Water	Chloride in the soil is extracted in deionised water and the insoluble material is removed by filtration. Water samples are filtered prior to analysis. The chloride in solution is analysed by titration using Mohr's method titration with standard silver nitrate solution using potassium chromate as an indicator.	BS1377 : Part 3 : 1990 Method 7.2 BS1377: Part 1: 1990	Soil: 0.01% Water: 10mg/l	UKAS
DETS C 2007	Acid Soluble Chloride Content of Soil and Concrete	The chloride in the sample is dissolved in nitric acid and the insoluble material is removed by filtration. The dissolved chloride is analysed by Volhard's method. The chloride in solution is precipitated with a known excess of standard silver nitrate. The excess silver nitrate is titrated against standard ammonium thiocyanate using ferric alum as an indicator. The colour change is white to red.	BS1377 : Part 3 : 1990 Method 7.3 BS1377: Part 1: 1990 BS 1881-124:1988	0.01%	UKAS

DETSC 2008	pH Value of Soil and Water	The pH value of a soil suspension in water or a groundwater sample is determined electrometrically using a glass electrode.	BS1377: Part 3: 1990 – Soils for Civil Engineering Purposes – Chemical and Electrochemical Methods	n/a	MCERTS (Soils) UKAS (Waters)
DETSC 2009	Electrical Conductivity of Soil & Water	The electrical conductance of a soil suspension in water or of a water sample is determined by voltammetry using a conductivity meter. In some cases, the soil may need to be extracted with an aqueous solution of an inorganic salt e.g. the conductivity of topsoil is determined by preparing a suspension of the soil in saturated calcium sulphate.	Standard Methods for the Examination of water and Wastewater Part 2510B 21st Edition 2005 APHA, AWWA, WEF BS3882:2007 Specification for Topsoil	1uS/cm	UKAS
DETSC 2010	Chloramine in Water Samples	Free available residual chlorine reacts with diethyl-p-phenylenediamine (DPD) to produce a pink/red coloured complex. The addition of a small amount of potassium iodide causes mono-chloramine to produce the same pink/red colour with the same reagent. Further addition of an excess of iodide causes di-chloramine and any nitrogen tri-chloride to react and produce a colour. The pink/red coloured complex is titrated with ferrous ammonium sulphate to a clear endpoint.	In-house Method	100µg/l	Not Accredited
DETSC 2011	Acid Alkali Reserve	An initial pH value is obtained for the sample. The sample is then titrated with either hydrochloric acid or sodium hydroxide to a pH of 7.00. From this result, the acid/alkali reserve value can be calculated.	In-house Method	TBC	Not Accredited
DETSC 2012	Biofilm Potential of Sewage and Sludges	Sodium hypochlorite solution is added to the sample in small increments. The sample temperature is monitored during the additions until no further changes in temperature occur due to all of the bacteria in the sample having been effectively neutralised.	In-house Method	TBC	Not Accredited
DETSC 2013	Gravimetric Carbonate Content of Soils	A dried and finely crushed portion of the sample is ashed in a muffle furnace at 440°C for 4 hours to burn off any organic materials in the sample. The crucible containing the sample is then allowed to cool and is re-weighed and then returned to the furnace at a temperature of 950°C which will break down any carbonates present and release them as carbon dioxide gas. The carbonate content of the sample is then determined by calculation.	The British Calcium Carbonates Federation – Calcium Carbonate – Occurrence and uses	0.10%	Not Accredited
DETSC 2014	Total and Available Lime Content	Samples for Total Lime are extracted with hot hydrochloric acid and analysed for calcium by ICP-OES. Samples for available lime content are extracted with hot water using granulated sugar as a catalyst and analysed by titration with standardised hydrochloric acid.	BS 4551: Part 2: 1998 – Methods of testing mortars, screed and plasters. Chemical analysis and aggregate grading	TBC	Not Accredited
DETSC 2015	Initial Consumption of Lime	The pH of a saturated calcium hydroxide solution is measured at ambient temperature. Several portions of the sample to be analysed are weighed out and differing amounts of lime are added to each one. The samples are mixed with water and then shaken. After shaking the pH of each portion is determined and a graph plotted of pH against percentage of lime. From this graph, the initial consumption of lime is determined (this is the lime percentage at which the sample pH is the same as that of the saturated calcium hydroxide solution).	BS 1924: Part 2: 1990 – Stabilized materials for civil engineering purposes. Methods of test for cement-stabilized and lime-stabilized materials	TBC	Not Accredited
DETSC 2016	Redox Potential of Soil and Water	Redox potential is measured using a probe with two electrodes, one of platinum and the other of silver chloride between which the potential of the solution being tested is measured in millivolts. The probe is placed into the sample and a direct reading in millivolts is given on the meter attached to the redox probe. Soils are analysed by preparation of a 2:1 water to soil sludge.	Encyclopaedia of Soils in the Environment 2005 – Redox Potential	n/a	Not Accredited
DETSC 2017	Salinity of Soils and Waters by Calculation	The conductivity of the sample is measured in µS/cm and from this result the salinity is calculated.	Method 2520B - Standard Methods for the Examination of Water and Wastewater - 21st Edition – 2005	n/a	Not Accredited
DETSC 2018	Specific Gravity of Sludge	The 'as received' sample is transferred to a dry, tared measuring cylinder and the volume recorded. The cylinder and its contents are then weighed, and the specific gravity of the sample is calculated.	In-house Method	n/a	Not Accredited



DETSC 2019	Loose Packed Dry Soil Density	Dried, ground soil is transferred to a dry, tared measuring cylinder and the volume recorded. The cylinder and its contents are then weighed and the density of the soil calculated.	BS3882:2007 Specification for Topsoil	n/a	Not Accredited
DETSC 2024	Sulphide in Soil and Water by Iodometry	Hydrogen sulphide is liberated by acidification of the sample with hydrochloric acid in a steam distillation unit. The hydrogen sulphide produced is carried over with the steam and is absorbed in alkaline zinc acetate. The zinc sulphide produced reacts with iodine formed when iodate-iodide is acidified and the excess iodine titrated with standard thiosulphate.	In House Method based on: Environment Agency - The determination of easily liberated sulphide in soils and similar matrices (2010) - Blue Book 228 Method D - The determination of easily liberated sulphide in as received or air-dried samples following acid steam distillation with iodometric titration  The determination of sulphide in waters and associated materials (2007) Draft Method D - The determination of easily liberated sulphide in as received or air-dried samples following phosphoric acid steam distillation with iodometric titration.	Soils: 10mg/kg  Waters: 250ug/l	Not Accredited
DETSC 2025	Volatile Fatty Acids in Waters and Sludges	Volatile fatty acids are esterified with acidic ethylene glycol. The resultant esters are reacted with hydroxylamine to form hydroxamic acids. Addition of iron (II) chloride causes formation of purple coloured ferric hydroxamates which are determined spectrophotometrically at 500nm.	Determination of Volatile Fatty Acids in Environmental Aqueous Samples - Polish Journal of Environmental Studies Volume 17, No. 3 (2008), 351-356.  Volatile Fatty Acids Production By Anaerobic Fermentation Of Urban Organic Wastes - C. Sans, J. Mata-Alvarez, Department of Chemical Engineering, University of Barcelona  Determination of Volatile Fatty Acids in Sewage Sludge - Methods for the Examination of Waters and Associated Materials Book 21 ISBN 011-751462-4	20mg/l	Not Accredited
DETSC 2026	AOC, pH and Alkalinity of Solid Soaps and Detergents	A representative portion of the sample is weighed out and dissolved in water. The pH is measured on the liquid produced using a calibrated pH meter. The same solution is then titrated with standard sulphuric acid using methyl orange as an indicator and from this result the alkalinity is calculated. The active oxygen content is measured by digesting the sample with sulphuric acid and then titrating with potassium permanganate solution.	ISO 4321:1977 - Washing Powders - Determination of AOC - Titrimetric Method	TBC	Not Accredited
DETSC 2030	Alkalinity in Water	The alkalinity of a sample of water or leachate is determined by potentiometric or indicator end point titration with a strong acid from sample pH to pH 8.3 (where applicable) and then to pH 4.5. From the titres obtained the total alkalinity and concentrations and types of alkalinity present can be calculated.	SCA Method ISBN 0 11 751601 5 The Determination of Alkalinity and Acidity in Water 1981  Instruction Manual for Skalar SP50 Robotic Analyser	20mg/l as CaCO <sub>3</sub>	UKAS
DETSC 2031	5 Day Biochemical Oxygen Demand	The sample, either diluted or undiluted, is placed in a BOD bottle and the initial dissolved oxygen content of the sample is measured using a dissolved oxygen meter. The bottle is placed in an incubator at 20°C in the dark for 5 days. After this time the bottle is removed and the residual dissolved oxygen content of the sample is measured. The BOD of the sample is calculated from the reduction in the concentration of dissolved oxygen over 5 days.	SCA Method ISBN 0 117522120  5 Day Biochemical Oxygen Demand (BOD5) Second Edition 1988	1 mg/l	UKAS
DETSC 2032	Chemical Oxygen Demand	Oxidisable substances react with sulphuric acid - potassium dichromate solution in the presence of silver sulphate as a catalyst. Chloride is masked by mercury sulphate. The reduction in the yellow colouration of Cr <sup>6+</sup> is evaluated using a spectrophotometer for the low range tubes (LCK 314) whilst the green colouration of Cr <sup>3+</sup> is evaluated for the medium and high range tubes (LCK 014 and LCK 114).	Environment Agency The determination of chemical oxygen demand in waters and effluents (2007) Methods for the Examination of Waters and Associated Materials	10 mg/l	UKAS MCERTS - Trade Effluent ONLY
DETSC 2033	Total and Dissolved Organic Carbon in Water	The term TOC (Total Organic Carbon) is used to describe the total content of organically bound carbon in dissolved and undissolved compounds. The TOC content is expressed in mg/l. If DOC (Dissolved Organic Carbon) is required, samples are filtered through a 0.45µm filter paper prior to analysis. Inorganic carbon is expelled by acidification of the sample. TOC is then determined by digestion of the sample with sulphuric acid and peroxodisulphate. Carbon containing compounds are transformed into carbon dioxide. The carbon dioxide evolves and reacts with an indicator solution. The colour change is measured using a spectrophotometer.	Hach-Lange Technical Instructions: LCK 385, LCK 386	2 mg/l	UKAS
DETSC 2034	Suspended and Settleable Solids in Water	Suspended matter is removed from a measured volume of sample by filtration under reduced pressure through a pre-treated, pre-weighed glass fibre filter paper. The paper is washed with deionised water to remove dissolved salts and the total suspended matter is determined gravimetrically after drying at 105 ±5°C. Settleable solids are determined by subtracting the solids left in suspension after settlement for 1 hour (or other agreed time) from the total suspended matter in the sample.	SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980	5 mg/l	Suspended Solids: UKAS Settleable Solids: Not Accredited

DETS C 2035	<b>Total Solids, Total Dissolved Solids and Total Volatile Solids in Water</b>	<p>For total dissolved solids determination: Water samples are pre-filtered to remove any suspended solids and evaporated in an oven at 180°C. The amount of residual dissolved solids is determined gravimetrically. An estimate of the total dissolved solids can be obtained by measuring the conductivity of the sample and performing an empirical calculation from the conductivity obtained.</p> <p>For total solids and total volatile solids: The sample is shaken to ensure homogeneity of any suspended matter. The sample is then evaporated and the result is determined gravimetrically as for total dissolved solids. If total volatile solids is required on the sample, the container used for the total solids determination is retained and heated in a muffle furnace to 440°C and a further gravimetric determination is made.</p>	<p>SCA Method ISBN 011 751957 X Suspended, Settleable and Total Dissolved Solids in Waters and Effluents 1980.</p> <p>BS1377: Part 3 : 1990 Section 8</p>	5 mg/l	<p><b>Total Dissolved Solids:</b> UKAS</p> <p><b>Total Solids &amp; Total Volatile Solids:</b> Not Accredited</p>
DETS C 2036	<b>Combustibility of Solids</b>	A representative sample of 10 to 20g of the material to be tested is placed on a gauze mat and heated using a blowtorch. The sample is observed during and after heating and a determination of the behaviour of the sample during the test is made using a standard set of definitions.	EN ISO 1182:2010 Reaction to Fire Tests for Products – Non-Combustibility Test	n/a	Not Accredited
DETS C 2037	<b>Turbidity in Waters</b>	Samples are measured on a turbidity meter. The instrument measures turbidity in the sample by passing light at a wavelength of 860nm through a glass vial containing the liquid to be analysed. Light scattered by the sample is detected at an angle of 90° by a photo-diode and a result is displayed on the instrument screen, with results being based on a set of calibration standards for which the instrument stores a calibration graph.	Standard Methods for the Examination of Water and Wastewater 21st Edition	1.00 NTU	Not Accredited
DETS C 2038	<b>Total and Free Chlorine in Water</b>	The sample is reacted with diethyl-p-phenylenediamine (DPD) in an ethylene diamine tetra-acetic acid (EDTA) buffer for free chlorine. For total chlorine analysis, potassium iodide is added as well to break down any chloramine compounds in the sample so that the chlorine is released to react with the DPD. Samples for both tests are then analysed colourimetrically at a wavelength of 510nm using a small bench top photometer.	Methods for the Examination of Waters and Associated Materials - Chemical disinfecting agents in waters and effluents (2008)	0.1mg/l	Not Accredited
DETS C 2039	<b>Cation Exchange Capacity of Soil</b>	The sample is saturated with Ba <sup>2+</sup> ions by mixing with a barium chloride solution. The barium is then exchanged with Mg <sup>2+</sup> by reaction with magnesium sulphate forming a precipitate of barium sulphate. The quantity of Mg <sup>2+</sup> ions adsorbed (i.e. the CEC value) is determined by loss from magnesium sulphate solution added. This is determined by titration with an ethylene diamine tetra-acetic acid solution using eriochrome black as an indicator.	CEC & Kd Determination in Landfill Performance Evaluation - A review of methodologies and preparation of standard materials for laboratory analysis. BaCl <sub>2</sub> /triethanolamine method. PR: P1/254/01	1 meq/100g	Not Accredited
DETS C 2040	<b>Sediment Oxygen Demand</b>	The sample to be analysed is placed into a BOD bottle and covered with water saturated with oxygen, which also contains nutrients to promote bacterial growth. The oxygen level in the supernatant liquid is monitored for up to three hours. From the decrease in oxygen content of the supernatant liquid, the SOD rate can be determined.	<p>Nutrient Release and Sediment Oxygen Demand in a Eutrophic Land-Locked Embayment in Hong Kong – Environment International Journal Volume 26 (2001)</p> <p>Sediment Oxygen Demand and Biochemical Oxygen Demand: Patterns of Oxygen Depletion in Tidal Creek Sites - Program in Marine Science, University of North Carolina at Wilmington (2003)</p>	n/a	Not Accredited
DETS C 2047	<b>Formaldehyde in Water</b>	Formaldehyde in soil is extracted in water, with a water to soil ratio of 10:1. The insoluble residue is removed by filtration prior to analysis. Waters are filtered prior to analysis to remove any particulates in suspension. Formaldehyde in the extract or water sample reacts with chromotropic acid-sulphuric acid solution to form a purple coloured complex. The absorbance of the coloured solution is read at 580nm using a suitable visible spectrophotometer.	Formaldehyde by visible absorption spectrophotometry – Method 3500, Issue 2 – NIOSH Manual of Analytical Methods, Fourth edition, August 1994	<p><b>Soil:</b> 0.2mg/kg</p> <p><b>Water:</b> 20µg/l</p>	Not Accredited
DETS C 2048	<b>Dissolved Oxygen Content of Water</b>	The dissolved oxygen content of the sample is measured using a dissolved oxygen meter either electrochemically or by fluorescence, or by the titrimetric method developed by Winkler.	<p>SCA Method ISBN 0.11 751442X.</p> <p>Dissolved Oxygen in Natural and Waste Waters 1979</p>	0.1 mg/l	Not Accredited
DETS C 2055	<b>Anions in Water and Aqueous Soil Extracts by Ion Chromatography</b>	Liquid samples and aqueous soil extracts are filtered through a 0.22µm syringe filter prior to analysis. The filtered samples are injected into an Ion Chromatograph. The anions of interest are separated on the basis of their affinity for the active sites of the column packing material. The separated anions are converted into their highly conductive acid forms and measured by conductivity. The anions are identified on the basis of retention time as compared to standards and quantisation is by measurement of peak area.	Standard Methods for the Examination of Water and Wastewater Section 4110 21st Edition 2005 APHA, AWWA, WEF	<p><b>Soil:</b> 1.0 mg/kg</p> <p><b>Water:</b> 0.1 mg/L</p>	UKAS (except Br)
DETS C 2065	<b>Cement Content of Concrete and Mortar</b>	The concrete or mortar sample is dried and finely crushed, then digested with hydrochloric acid and filtered to remove the remaining solids, collecting the filtrate for further analysis. The remaining solids are then re-digested using an alkaline solution of sodium carbonate and ammonium chloride and re-filtered. The resulting filtrate is combined with that produced during the first stage of the extraction which is then analysed for calcium and silicon contents by ICP-OES. The remaining solids are ashed at 800°C to determine the insoluble residue content of the sample. A loss on ignition of the original sample is also performed. From these results a series of calculations can be made to determine the soluble silica, calcium oxide and cement content of the sample.	BS1881:Part124:1988 Methods for analysis of hardened concrete	n/a	Not Accredited
DETS C 2066	<b>Gypsum Content of Soil by Acetone Precipitation</b>	The sample is mixed with water and filtered. The filtrate is then mixed with acetone to precipitate out the gypsum. The precipitate is separated out using a centrifuge then re-dissolved in water. The conductivity of the resulting solution is measured from which the gypsum content is calculated.	ASTM C 471M-01 Standard Test Methods for Chemical Analysis of Gypsum and Gypsum Products	TBC	Not Accredited
DETS C 2067	<b>Rapid Chemical Test for Detecting High Alumina Cement Concrete</b>	This is an empirical test to determine the presence or absence of high alumina cement in the sample, it does not provide a quantitative result. The sample is reacted with Oxine reagent in acidic solution. If high alumina cement is present, a yellow precipitate is formed.	BRE Centre for Concrete Construction Special Digest 3 – HAC Concrete in the UK: Assessment, Durability Management, Maintenance and Refurbishment	n/a	Not Accredited

DETSO 2073	Acid Neutralisation Capacity of Soils and Other Solids	ANC is a measure of the buffering capacity of soils and other waste materials. The analysis measures the amount of acid required to bring the sample to a fixed pH. The initial pH of the sample extract must be measured before analysis begins. Analysis is performed by the addition of acid in conjunction with pH measurement by pH meter until the specified pH has been reached as indicated by the meter. The result is expressed in mol/kg (dry wt).	Annex B (Preliminary determination of the acid/base consumption) – CEN/TC 292 – WI 292046 – Characterization of waste – Leaching behaviour tests – Acid and Base neutralization capacity test	1.0 mol/kg	Not Accredited
DETSO 2076	Sulphate and Magnesium Content of 2:1 Aqueous Extract of Soil by ICP-OES	The sulphate and magnesium in the soil are extracted in an aqueous extract having water: soil ratio of 2:1 and the insoluble material is removed by filtration. The concentrations of sulphate and magnesium in the filtrate are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelengths used for identification and quantification are 181.972nm for sulphate and 285.213nm for magnesium.	BS1377 : Part 3: 1990 Method 5 BS1377 : Part 1: 1990 TRL 447 Sulphate Specification for Structural Backfills 2005. BRE SD1:2005 Concrete in Aggressive Ground 2005	10mg/L	<b>Sulphate:</b> MCERTS(Soils) <b>Magnesium:</b> Not Accredited
DETSO 2084	Total Organic Carbon by PrimacATC Analyser	Soil samples are treated with phosphoric acid to expel any inorganic carbonates. The samples are then heated at high temperature in a continuous flow of air so that any organic carbon is oxidised to carbon dioxide. The gas is then allowed to cool and analysed by an infra-red detector.	PrimacATC Analyser – User Manual, Skalar	0.47%	MCERTS(Soils)
DETSO 2085	Total and Dissolved Organic Carbon in Water	<b>Direct TOC Analysis</b> - The sample is acidified, stirred and purged to remove the IC before the sample is injected and handled as in the TC Analysis. The sample is filtered before acidification for DOC. <b>TC Analysis</b> - The sample is injected by an automated septum less rotary port into a high temperature reactor. In the reactor, at a temperature of 750 - 950°C all organic and inorganic carbon is oxidized to the gaseous carbon dioxide (CO <sub>2</sub> ). The catalyst that is present in the reactor catalysis the oxidation to completion. A flow of air transports these oxidation products to the detectors. The oxygen required for reaction is taken from the airflow. The products are led into the non-dispersive infrared detector where the carbon dioxide is determined. The carbon dioxide is measured at a wavelength of 4.2 μm by NDIR detection.	Standard Methods for the Examination of Water and Wastewater Section 5310 B 21st Edition 2005 APHA, AWWA, WEF. HMSO Methods for the Examination of Waters and Associated Materials – The Instrumental Determination of Total Organic Carbon and Related Determinands 1995	lmg/l as C	UKAS
DETSO 2119	Exchangeable Ammonia in Soil	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	MAFF/ADAS Reference Book 427 – the Analysis of Agricultural Materials – Method 53, Ammonium, Nitrate and Nitrite-Nitrogen, Potassium Chloride Extractable	0.5mg/kg	MCERTS(Soils)
DETSO 2120	Ammonia in Water by Spectrophotometry	An intense blue-green complex, related to indophenol blue, is formed by the reaction of ammonia with hypochlorite and sodium salicylate, with sodium nitroprusside acting as a catalyst. The complex is measured at 655nm and is related to the ammonia concentration by means of a calibration curve. Sodium citrate is added to overcome interfering ions.	Environment Agency Ammonia in Waters 1981 ISBN 0117516139. Methods for the Examination of Waters and Associated Materials	20μg/l	UKAS
DETSO 2121	Total Kjeldahl Nitrogen Content of Soils and Waters	The sample is digested with sulphuric acid and a mixture of catalysts to convert organic nitrogen to ammonia. The sample is then distilled under alkaline conditions, and the distilled ammonia is absorbed in sulphuric acid. The ammonia content of the distillate is then determined colorimetrically either using the UV/vis spectrophotometer or the Konelab 60i. Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm	The Analysis of Agricultural Materials – MAFF/ADAS Reference Book 427 – HMSO. BS 3882: 2007 Specification for topsoil. Standard Methods for the Examination of Water and Wastewater Part 4500-N, 21st Edition 2005 APHA, WWA, WEF	<b>Soil:</b> 0.01% <b>Water:</b> 2mg/l	Not Accredited
DETSO 2122	UV Light Transmittance in Waters	The absorbance of a water sample is measured at a wavelength of 254nm in a 10mm glass or quartz cell using deionised water as a blank. The percentage UV transmission of the sample is then calculated from the absorbance result.	Ultraviolet Light Factsheet - Treatment of Residential Drinking Water Using UV – Water Quality Association	n/a	Not Accredited
DETSO 2123	Water Soluble Boron in Soil & Boron in Water	Boron in soil is extracted in boiling saline water. Waters are filtered prior to analysis to remove any particulates in suspension. The water soluble boron in the extract or filtrate reacts with azomethine-H to produce a yellow coloured complex. The resulting colour absorbance is measured at 420nm using a suitable visible spectrophotometer.	SecondSite Property (now National Grid Property Holdings) - Guidance for assessing and managing potential contamination on former gasworks and associated sites (Part 1) (Version 3) Method 17.12 The analysis of Agricultural materials MAFF/ADAS – reference book 427 HMSO	<b>Soil:</b> 0.2mg/kg <b>Water:</b> 100ug/L	MCERTS(Soils)
DETSO 2124	Reactive Aluminium in Waters and Leachates	Aluminium reacts with Catechol violet in a suitably buffered solution (pH 6.1) to form an aluminium–catechol violet complex which can be measured photometrically at 575nm.	KonelabAquaChemLabmedics Method No. ALU001. Standard Methods for the Examination of Water and Wastewater. Part 3111 B – 21stEdition, 2005 APHA, AWWA, WEFT	3μg/l	Not Accredited



DETS 2125	Colour in Water	A filtered (true colour) or unfiltered (apparent colour) sample is analysed on a UV / Visible Spectrometer at 455nm and the result compared against a PtCo Calibration.	HACH - Water Analysis Handbook – Method 8025 Color, True and Apparent. APHA – Standard Methods for the Examination of Water & Wastewater 2005 - 2120 COLOR	1mg/l	Not Accredited
DETS 2126	Methylene Blue Active Substances	Methylene Blue is much more readily soluble in water than in chloroform, however in the presence of anionic surfactants an ion-pair is formed which is readily extracted into chloroform. The sample is mixed with chloroform and methylene blue solution in a separating funnel. The resultant colour change in the chloroform layer is measured on a spectrophotometer at a wavelength of 654nm.	Koga, Yamamichi, Nomoto et al. Analytical Sciences 15, 563-568 (1999)	0.01mg/l	Not Accredited
DETS 2127	Acidity, Dissolved CO2 and Aggressive CO2 in Water	Samples requiring acidity or aggressive CO2 are first digested by heating the sample with sulphuric acid and hydrogen peroxide. Samples for acidity analysis are then titrated with sodium hydroxide to pH 8.3 for total acidity or to pH 3.7 for mineral acidity. For aggressive and dissolved CO2 samples are titrated with sodium hydroxide to pH 8.3. The aggressive or dissolved CO2 in the sample is then calculated from the titration result.	USEPA – Method 305.1 Acidity HMSO – The Determination of Alkalinity and Acidity in Water 1981	10mg/l	Not Accredited
DETS 2130	Cyanides & Monohydric Phenols by Skalar	Water samples are filtered through a 0.45µm syringe filter and solid samples are extracted with 1M caustic soda prior to analysis on the automated flow analyser. The method determines total cyanide, easily liberated cyanide, complex cyanide, thiocyanate and monohydric phenols.	Skalar methods: I295-001 w/r+P7, I295-002 w/r+P7, 293-902 w/r+P7, 497-001	<b>Soils mg/kg:</b> Total & Free CN=0.1, Thio=0.6, Phenol=0.3 <b>Waters µg/L:</b> Total CN=40, Free CN=20, Thio=20, Phenol=100	<b>Soils:</b> MCERTS <b>Waters:</b> UKAS
DETS 2131	Low Level Cyanides & Monohydric Phenols by SKALAR	Water samples are filtered through a 0.45µm syringe filter prior to analysis on the automated flow analyser. The method determines total cyanide, easily liberated cyanide, complex cyanide, thiocyanate and monohydric phenols.	Skalar methods: I295-003w/r - Free Cyanide, I295-004w/r - Total Cyanide, 497-001 - Phenol	Total CN=0.1µg/l Free CN=0.1µg/l Phenol=1.5µg/l	UKAS
DETS 2140	Sugar in Mixing Water for Cement	Waters are filtered prior to analysis to remove any particulates in suspension. The sugar in the filtrate reacts with phenol and sulphuric acid to produce a yellow-orange coloured complex. The resulting colour absorbance is measured at 490nm using a suitable visible spectrophotometer.	Colorimetric Method for Determination of Sugars and Related Substances. MICHEL DUBOIS, K. A. GILLES, J. K. HAMILTON, P. A. REBERS, and FRED SMITH - Division of Biochemistry, University of Minnesota, St. Paul, Minnesota.	10mg/l	Not Accredited
DETS 2141	Acid Base Accounting & Neutralisation Potential of Soils	Carbonate content and Sulphur content are first determined on the sample using the current DETS methods (DETS 2005 and DETS 5017 respectively). Hydrochloric acid is then added to the sample, the amount being based on the initial carbonate content of the sample. After 22 hours the pH of the sample is checked. If pH is above 2.5 a further addition of acid is made to bring the pH down to around 2.0. Sample is then left to stand for a further 2 hours. Excess acid is then titrated with sodium hydroxide solution, and from this result the neutralisation potential of the sample is calculated. The acid potential of the sample is calculated from the sulphur content of the sample. Further calculations can then be performed using these results to give the neutralisation potential ratio and net neutralisation potential.	BSIPD CEN/TR 16363:2012 Characterisation of Waste – Kinetic testing for assessing acid generation potential of sulphidic waste from extractive industries. BS EN 15875:2011 Characterisation of Waste – Static test for determination of acid potential and neutralisation potential of sulphidic waste.	None available	Not Accredited
DETS 2142	Acid Soluble Fluoride in Soils and Sludges	Samples are tested on an 'as received' basis, without drying and crushing, as fluoride is very volatile and may be lost during normal sample preparation procedures. Samples are treated with sulphuric acid and a mixture of sodium citrate and potassium chloride buffer solutions. The fluoride ions released are then measured potentiometrically using a fluoride ion selective electrode.	Fluoride in Waters, Effluents, Sludges, Plants and Soils 1982 (HMSO Publication ISBN 0117516627	1mg/kg	Not Accredited
DETS 2143	Partition Coefficient of Soil (Kd Value)	The sample to be tested is first equilibrated with water (or any other solvent of interest) by mixing for a set time period (usually 72 hours). A spiking solution containing the compound or element of interest is then added to give a known concentration in the sample and then mixed for a further 48 hours. Analysis is then performed on the spiked samples by a standard method for the compound of interest. An un-spiked portion of the sample is extracted and analysed at the same time and the Kd value is calculated from the results obtained.	Environment Agency Science Report SC020039/4 – Development of the partition coefficient (Kd) test method for use in environmental risk assessments	TBC	Not Accredited
DETS 2144	Baumann-Gully Acidity in Soils	The dried and crushed sample is treated with sodium acetate to produce acetic acid. The acid produced is titrated with standard sodium hydroxide solution to give an indication of the acidity potential of the sample.	BS EN 16502: 2014 – Test method for the determination of the degree of soil acidity according to Baumann-Gully	TBC	Not Accredited

DETSO 2201	Nitrite in Waters and Leachates by Colourimetric Analysis	Nitrite is determined colorimetrically using the Konelab60i autoanalyser. The nitrite colour reaction occurs at pH 2.0 to 2.5 by coupling diazotized Sulphanilamide with N-1-naphthyl-ethylenediamine. The absorbance of this compound is measured spectrophotometrically at 540nm.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B – 21st Edition 2005 APHA, AWWA, WEF.  Aquakem Method Nitrite in Waters Iss No 2.  Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981.  EPA Method 354.1 Nitrite, spectrophotometric (Approved at 40 CFR Part 136, not approved at Part 141)	0.04mg/l (as N)	UKAS
DETSO 2202	Total Oxidised Nitrogen in Waters and Leachates by Colourimetric Analysis	Nitrate is reduced to nitrite by hydrazine under alkaline conditions. The total nitrite ions are then reacted with sulphanilamide and N-1-naphthylethylenediamine dihydrochloride under acidic conditions to form a reddish purple azo-dye. The absorbance of this compound is measured spectrophotometrically at 540 nm using the Konelab 60i autoanalyser.	Standard Methods for the Examination of Water and Wastewater Part 4500-NO2 B and Part 4500-NO3 H – 21st Edition 2005 APHA, AWWA, WEF.  Aquakem Method Total Oxidised Nitrogen.  Methods for the Examination of Water and Associated Materials Oxidised Nitrogen in Waters 1981.  EPA Method 353.1 Nitrate, Nitrite Colorimetric Automated Hydrazine Reduction (Approved at 40 CFR Part 136, Not approved at Part 141)	0.7mg/l (as N)	UKAS
DETSO 2203	Hexavalent Chromium in Waters and Leachates by Colourimetric Analysis	Hexavalent Chromium is determined colorimetrically using the Konelab 60i autoanalyser. Hexavalent chromium reacts with diphenylcarbazide in acid solution and produces a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm.	Standard Methods for the Examination of Water and Wastewater Part 3500-Cr – 21st Edition 2005 APHA, AWWA, WEF.  USEPA 7196-A.  Aquakem Method. Hexavalent Chromium	10µg/l	UKAS
DETSO 2204	Hexavalent Chromium in Soil by Colourimetric Analysis	Hexavalent Chromium is determined colorimetrically using the Konelab 60i or Smartchem 600 autoanalyser. Hexavalent chromium reacts with diphenylcarbazide in acid solution producing a red-violet colour. The absorbance of this compound is measured spectrophotometrically at 540nm	Aquakem Method. Hexavalent Chromium	1mg/kg	Not Accredited
DETSO 2205	Reactive & Total Phosphorus in Waters and Leachates by Colourimetric Analysis	Phosphate is determined colorimetrically using the Konelab 60i or Smartchem 600 autoanalyser. The orthophosphate ion reacts with ammonium molybdate and antimony potassium tartrate under acidic conditions to form a 12-molybdophosphoric acid complex. The complex is then reduced with ascorbic acid to form a blue heteropoly compound.  The absorbance of this compound is measured spectrophotometrically at wavelength 880nm.  The Konelab 60i analyses a series of manually prepared standards. An intermediate calibrator is diluted by the Smartchem 600 autoanalyser, to produce a series of standards. These standards are used to produce a calibration graph. Filtered samples are analysed and the phosphate content determined by comparison of the sample absorbance with the calibration graph.  Samples for total phosphate analysis are digested by boiling with sulphuric acid and ammonium metavanadate, then analysed as above.	Standard Methods for the Examination of Water and Wastewater Part 4500-P E– 21st Edition 2005 APHA, AWWA, WEF.  Aquakem Method. Phosphate in Waters Issue 2	0.01mg/l	Reactive Phosphorus: UKAS Total Phosphorus: Not Accredited
DETSO 2207	Ammonia in Waters and Leachates by Colourimetric Analysis	NOTE THAT AMMONIA ANALYSIS IS PERFORMED IN TWO STAGES USING A HIGH-RANGE METHOD AND A LOW-RANGE METHOD. ALL SAMPLES ARE ANALYSED BY THE HIGH-LEVEL AMMONIA METHOD FIRST. SAMPLES THAT GIVE AN AMMONIA RESULT BELOW 2.5mg/l WILL AUTOMATICALLY BE ANALYSED BY THE INSTRUMENT USING THE LOW-LEVEL AMMONIA METHOD.  Ammonia reacts with hypochlorite ions generated by the alkaline hydrolysis of sodium dichloroisocyanurate to form monochloramine. Monochloramine reacts with salicylate ions in the presence of sodium nitroprusside at around pH 12.6 to form a blue compound. The absorbance of this compound is measured spectrophotometrically at wavelength 660nm and is related to the ammonia concentration by means of a calibration curve.  The Konelab 60i analyses a series of manually prepared standards for low-range ammonia analysis and prepares a series of calibration standards from a single stock solution for high-range analysis. The Smartchem 600 single stock solutions to prepare standards for both analysis ranges. These standards are used to produce a calibration graph. The ammonia content in the analysed samples is determined by comparison of the sample absorbance with the calibration graph.	Methods for the Examination of Waters and Associated Materials Ammonia in Waters 1981 ISBN 0117516139.  Aquakem Method. Ammonia in Waters Issue 2	0.015mg/l	UKAS
DETSO 2208	Sulphide in Waters and Leachates by Colourimetric Analysis	Sulphide is determined colorimetrically using the Konelab60i autoanalyser. Potassium Dichromate converts N-N-Diethyl-p-phenylenediamine to the free radical which reacts rapidly with sulphide to produce the coloured 'DPD Blue' or 'Ethylene Blue'. The absorbance can then be measured at wavelength 660nm.	The determination of sulphide in waters and associated materials (2007) - SCA - Draft (March 2007).  Aquakem Method. Sulphide SP001 Issue 2.  Standard Methods for the Examination of Water and Wastewater, 21st Edition 2005, Part 4500. ISBN0-87553-223-3	10µg/l	UKAS

DETSO 2210	<b>Ferrous Iron in Waters and Leachates by Colourimetric Analysis</b>	Three molecules of phenanthroline chelate with each atom of ferrous iron to form an orange/red complex. The intensity of the coloured solution is stable between pH3 to pH9. Rapid colour development occurs between pH2.9 and pH3.5 in the presence of excess phenanthroline. The resulting colour absorbance is measured at 510nm	Aquakem Method Ferrous Iron FIR001 Issue 2	0.1mg/l	Not Accredited
DETSO 2211	<b>Silicate in Waters and Leachates by Colourimetric Analysis</b>	Reactive forms of silicon in acid solution, below pH2, react with ammonium molybdate ions to form a yellow silicomolybdate. Ascorbic acid reduces the yellow silicomolybdate to produce a blue silicomolybdate complex. Oxalic acid is added to destroy any molybdophosphoric acid formed.	ASTM D7126 - 10 Standard Test Method for On-Line Colorimetric Measurement of Silica.  Aquakem Method Silica SIL Issue 2	0.25mg/l	Not Accredited
DETSO 2212	<b>Chloride Content of Waters and Leachates by Colourimetric Analysis</b>	Chloride reacts with mercury (II) thiocyanate to form a soluble non-ionic compound. The thiocyanate ions released react in acid solution with iron (III) nitrate to form a red/brown iron (III) thiocyanate complex. The resulting intensity of the stable colour produced is measured spectrophotometrically at a wavelength of 480nm and is related to the chloride concentration by means of a calibration curve.	EPA Method 325.1 Chloride Colorimetric, Automated Ferricyanide, Automated Analyzer I	10mg/l	Not Accredited
DETSO 2301	<b>Metals in Soil by ICP-OES</b> As, Ba, Be, Cd, Cr, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, Zn	Metals in soils and associated materials are extracted by boiling in a mixture of hydrochloric and nitric acids. The metal concentrations in the sample extract are determined by inductively coupled plasma optical emission spectroscopy (ICP-OES).	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005, AWWA, WEF	<b>mg/kg:</b> As, Be Cu =0.2, Ba=1.5, Cd=0.1, Cr=0.15, Co=0.7, Mn=20, Mo=0.4, Pb=0.3, Fe=12, Se=0.5, V=0.8, Ni, Zn=1.0	UKAS (all listed) MCERTS (All soils listed except Fe)
DETSO 2303	<b>Total Hardness (By Calculation)</b>	The concentrations of calcium and magnesium are determined by following the procedures given in DETSO 2306 - Metals in Waters By ICP-MS. The hardness is calculated from the results obtained.	Standard Methods for the Examination of Water and Wastewater Part 3120 B – 21st Edition 2005 APHA, AWWA, WEF	n/a	UKAS
DETSO 2304	<b>Zinc Equivalent in Soil (By Calculation)</b>	The concentrations of copper, nickel and zinc concentrations are determined using the appropriate methodologies. The zinc equivalent is a measure of the combined toxicity of the three metals, relative to the toxicity of zinc.	In-house Method	n/a	Not Accredited
DETSO 2306	<b>Metals in Waters by ICP-MS</b> Ag, Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Sn, V, Zn	Concentrations of metals in water are determined by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS). Any metals not listed can be determined but are not accredited under UKAS.	Standard Methods for the Examination of Water and Wastewater Part 3125 B – 21st Edition 2005 APHA, AWWA, WEF	<b>High Level µg/l:</b> Ag=0.13, Al=10.0, As=0.16, Ba=0.26, Ca=90, Cd=0.03, Co=0.16, Cr=0.25, Cu=0.40, Fe=5.50, Hg=0.01, K=80, Mg=20, Mn=0.22, Mo=1.1, Na=70, Ni=0.50, P=18.0, Pb=0.09, Sb=0.17, Se=0.25, Sn=0.40, V=0.60, Zn=1.3  <b>Low Level µg/l</b> Al=10.0, Cd=0.02, Cr=0.25, Cu=0.21, Fe=6.50, Ni=0.31, P=3.0, Pb=0.09, Zn=0.50	<b>High Level Dissolved:</b> UKAS (all listed except Mo, Sn)  <b>High Level Total:</b> Not Accredited  <b>Low Level Dissolved:</b> UKAS (Al, Cd, Cr, Cu, Fe, Ni, Pb, Zn)  <b>Low Level Total:</b> UKAS (Al, Cd, Cr, Cu, Fe, Ni, P, Pb, Zn)
DETSO 2307	<b>Boron, Sulphur and Tin Content of Waters and Leachates by ICP-OES</b>	Filtered water and leachate samples are analysed for boron, sulphur and tin content by ICP-OES. The wavelengths used for the determination are 249.772nm for boron, 181.972nm for sulphur and 189.925nm for tin.	Standard Methods for the Examination of Water and Wastewater Part 3125 B – 21st Edition 2005 APHA, AWWA, WEFT	Boron: 5µg/l Tin: 17µg/l Sulphur: 0.65mg/l	Not Accredited
DETSO 2308	<b>Copper, Nickel and Zinc Content of Topsoil</b>	Dried and crushed soil samples are digested on a temperature controlled hotblock with hydrogen peroxide and nitric acid. The digested sample is then filtered and made up to a set volume before analysis for copper, nickel and zinc by ICP-OES.	BS 3882 – Specification for Topsoil	Copper: 0.40mg/kg Nickel: 0.65mg/kg Zinc: 0.65mg/kg	Not Accredited
DETSO 2309	<b>Extractable Magnesium and Potassium in Soil by ICP-OES</b>	Extractable metals in soil are extracted by shaking the soil in 1M Ammonium Nitrate for 30 minutes. The concentration of each metal extracted is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES)	BS 3882:2015 - Specification for topsoil. The Analysis of Agricultural Materials – MAFF/ADAS Reference Book 427	n/a	Not Accredited
DETSO 2310	<b>Extractable Phosphorus in Soil by ICP-MS</b>	Extractable phosphorus in soil is extracted by shaking the soil in 0.5M Sodium Hydrogen Carbonate for 30 minutes. The concentration of phosphorus extracted is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS 3882:2015 - Specification for topsoil. The Analysis of Agricultural Materials – MAFF/ADAS Reference Book 427	n/a	Not Accredited



DETS 2311	Water Soluble Boron in Soil by ICP-OES	The sample is mixed with boiling water and then heated on a hotblock for 20 minutes. The sample is then filtered to remove the solid materials and then analysed for boron by ICP-OES at a wavelength of 249.772nm.	The analysis of Agricultural materials MAFF/ADAS – reference book 427 HMSO	0.20mg/kg	Not Accredited
DETS 2312	Metals in Oils by ICP-OES	The sample is first oxidised using potassium permanganate and sulphuric acid. The oxidised sample is then digested in aqua regia on a hotplate, followed by analysis of the extract by ICP-OES.	US EPA Method 3031 – Acid Digest of Oils for Metals Analysis	<b>mg/kg:</b> As, Be Cu =0.2, Ba=1.5, Cd=0.1, Cr=0.15, Co=0.7, Mn=20, Mo=0.4, Pb=0.3, Fe=12, Se=0.5, V=0.8, Ni, Zn=1.0	Not Accredited
DETS 2320	Total Sulphur in Soil and Aggregate by ICP-OES	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H <sub>2</sub> S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. Aggregate analysis is not comparable to BS EN 1744.	TRL 447 Sulphate Specification for Structural Backfills 2005. BRE SD1 Concrete in Aggressive Ground 2005	0.01%	UKAS (Soils) Not Accredited (Aggregates)
DETS 2321	Total Sulphate Content of Soil and Aggregate by ICP-OES	The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Aggregate analysis is not comparable to BS EN 1744.	BS1377 : Part 3: 1990 Method 5. BRE SD1 Concrete in Aggressive Ground 2005	0.01%	MCERTS(Soils) Not Accredited (Aggregates)
DETS 2322	Total Potential Sulfate and Total Oxidisable Sulphur (By Calculation)	Sulphur compounds in soil are extracted using aqua regia and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H <sub>2</sub> S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The wavelength used for identification and quantification of sulphate is 181.972nm. The sulphate in the soil is extracted in dilute hydrochloric acid and the insoluble residue is removed by filtration. The filtrate is made up to volume and the concentration of sulphate in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). The wavelength used for identification and quantification of sulphate is 181.972nm. The two results obtained from the above tests may then be combined to calculate the Total Potential Sulphate and Total Oxidisable Sulphur content	BS1377 : Part 3: 1990 Method 5. BS1377 : Part 1 : 1990	0.01%	Not Accredited
DETS 2324	Mercury in Waters by Atomic Fluorescence Spectroscopy	Waters and aqueous samples are preserved by fixing with concentrated nitric acid. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry. For low level analysis, samples are filtered for dissolved mercury, but left un-filtered for total mercury. Samples are then digested with hydrochloric acid and bromide solution before analysing as above.	Standard Methods for the Examination of Water and Wastewater Part 3112 B – 21st Edition 2005 APHA, AWWA, WEF. PSA Method – Millennium Merlin Method for Total Mercury in Drinking, Surface, Ground, Industrial and Domestic Wastewaters and Saline Waters. USEPA Method 1631 – Determination of Low Level Mercury in Water	0.05µg/l 1.00ng/l (low level)	UKAS (Low level ONLY)
DETS 2325	Mercury in Soil Atomic Fluorescence Spectroscopy	The mercury is extracted from soil in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments	0.05 mg/kg	MCERTS(Soils)
DETS 2332 (DRAFT)	Inorganic and Methyl Mercury Speciation	Soils are air-dried and crushed before being subjected to hotblock extraction. Waters and aqueous samples are filtered to remove particulates. An aliquot is treated with bromate-bromide and tin (II) chloride to generate mercury and the mercury is determined by atomic fluorescence spectroscopy.	In-house Method	<b>Soil:</b> 100µg/kg <b>Water:</b> 1µg/l	Not Accredited
DETS 2333	Elemental Mercury Speciation	Soils, waters and aqueous samples are tested on an as-received bases. A known quantity of sample is extracted using argon and the released elemental mercury is trapped. The trapped mercury is released upon heating in a scarifier module and determined by atomic fluorescence spectroscopy.	In-house Method	<b>Soil:</b> 0.6µg/kg <b>Water:</b> 1µg/l	Not Accredited
DETS 2400	Unified Barge Bioaccessible Metals in Soils	The Unified BARGE Method (UBM) is an in vitro method for simulating the human digestive system. Synthetic digestive fluids are used to simulate the fluids present in the body. Both inorganic solutions (Containing inorganic salts such as KCl, NaCl etc), and organic solutions (Containing organic compounds such as Urea, Glucose etc) are mixed with enzymes to produce 4 Synthetic digestive fluids saliva (S), Gastric fluid (G), duodenal fluid (D) and bile (B). These solutions are then used to mimic the effect of a sample passing through a human gastro intestinal tract by shaking portions of the sample at 37°C, human body temperature (17.4).	EPA 9200.2-86 April 2012- Standard Operating Procedure for an In Vitro Bioaccessibility Assay for Lead in Soil. BGS Chemical & Biological Hazards Programme Open Report OR/07/027 - Inter-laboratory Trial of a Unified Bioaccessibility Procedure	V = 1.0mg/kg, Cr = 5.0mg/kg, Co = 1.0mg/kg, Ni = 5.0mg/kg, As = 0.5mg/kg, Se = 0.5mg/kg, Cd = 0.5mg/kg, Pb = 1.0mg/kg	Not Accredited

DETS 2501	Leachate Preparation by Up-Flow Percolation	The sample to be tested is compacted into a 5cm diameter column. A continuous vertical up-flow of water is then pumped through the sample and the resulting leachate is collected, changing the collection vessel every 24 hours. The leachates are then analysed using existing test methods for the components requested by the client.	Draft British Standard BS EN 14405 – Characterisation of Waste – Leaching Behaviour Test- Up- Flow Percolation Test	n/a	Not Accredited
DETS 2502	Particle Size Distribution of Topsoils	Samples to be analysed are first air dried at 28±2°C. The dried sample is passed through sieves of 50, 20 and 2mm pore sizes. The portion of the sample passing the 2mm sieve is mixed with a dispersant solution to assist in breaking down any soil aggregates into the component sand/clay/silt particles. The sample is then wet-sieved through a 63µm sieve. The portion of sample passing this final sieve is allowed to settle out and separate into clay and silt fractions. From the weights of sample retained on each sieve and from the settled fractions, the proportions of cobbles, gravel, sand, silt and clay can be determined.	BS 7755 – Soil Quality; Section 5.4: Determination of particle size distribution in mineral soil material – Method by sieving and sedimentation  BS 1377 – Soils for civil engineering purposes; Part 2: Classification tests  Simplified Method for Soil Particle-Size determination to Accompany Soil-Quality Analyses – Kettler, Doran & Gilbert, American Journal of Soil Science May/June 2001	n/a	Not Accredited
DETS 3001	Solvent Extractable Matter in Soil	Soil samples are extracted with a water-immiscible solvent and filtered to remove the water. The solvent is evaporated and the amount of extractable matter in the sample is determined gravimetrically.	In-house method based on:- Problems Arising from the Redevelopment of Gas Works and Similar Sites - AERE Harwell Laboratory 1981.  Environmental Agency - The Determination of Material Extractable by Carbon Tetrachloride and of Certain Hydrocarbon Oil and Grease Components in sewage Sludge – 1978	40mg/kg	Not Accredited
DETS 3002	Oil & Grease/Solvent Extractable Matter in Waters	A known volume of sample is acidified to pH<2 and extracted three times with an organic solvent, such as n-Hexane, in a separating funnel. The solvent is removed by evaporation and the amount of extractable matter in the sample is determined gravimetrically.	APHA 21st Edition, 2005 – Method 5520 B. Oil & Grease - Partition Gravimetric Method.  USEPA Method 1664, Revision A: n-Hexane Extractable Material (HEM: Oil & Grease) and Silica Treated N-Hexane Extractable Material (SGT-HEM; Non Polar Material) by Extraction and Gravimetry.	1mg/l for 500ml sample	UKAS
DETS 3049	Elemental Sulphur in Soils and Waters by HPLC	Soils are extracted in dichloromethane (DCM) by sonication. The elemental sulphur concentration is determined by high performance liquid chromatography (HPLC) with UV detection using a C <sub>18</sub> (e.g. 250mm x 4.6mm) column and a mobile phase composed of 95% methanol and 5% water. Waters and aqueous extracts of soils are extracted using DCM in a separating funnel, filtered, and the concentration determined using HPLC.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Elemental Sulphur.	Soil: 0.75mg/kg  Waters: 90ug/l	Soil: MCERTS  Water: UKAS
DETS 3072	Aliphatic / Aromatic TPH by GC-FID	Aliphatic and aromatic petroleum hydrocarbons (C <sub>10</sub> -C <sub>35</sub> ) are extracted from soil and water using n-Hexane. The fractions are separated by solid phase extraction using silica columns, whereby the aliphatic fraction is eluted first with n-Hexane and the aromatic portion is eluted second with dichloromethane. The total, aliphatic, and aromatic concentrations are determined by gas chromatography flame ionisation detection (GC-FID) using a capillary column and hydrogen as the carrier gas. The chromatographic data is further characterized by subdivision into approximate boiling point/carbon number ranges with respect to n-alkane retention time markers.	National Grid Property Holdings Limited, Methods for the Collection and Analysis of Samples from National Grid Sites, Version 1, September 2006. Section 3.12 Soil Analysis: Draft TNRCC Method 1006	Soil mg/kg: AL10-12 =1.5, AL12-16 =1.2, AL16-21 =1.5, AL21-35 =3.4, AR10-12 =0.9, AR12-16 =0.5, AR16-21 =0.6, AR21-35 =1.4  Water: 1ug/l	Soil: MCERTS(C10-C35 only)  Water: Not Accredited
DETS 3301	PAH in Soil by GC-FID	Soils and associated materials are extracted in dichloromethane (DCM) using sonication. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m, 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.5 mg/kg each  1.6 mg/kg Total PAH	UKAS (16 PAH's only)
DETS 3302	Hexane / Acetone Extracted PAH in Soil by GC-FID	Soils are extracted into hexane: acetone by shaking. The PAH concentration is recorded both as "Total PAH" and as "Speciated PAH", specified in terms of the 16 US EPA "Priority Pollutant" Polycyclic Aromatic Hydrocarbons. Concentrations are determined by gas chromatography using a BPX 50 (30m; 0.25µm ID; 0.25µm film) capillary column (or equivalent).	In-house method based on US EPA Method 8100, Polynuclear Aromatic Hydrocarbons	0.1 mg/kg each  1.6 mg/kg Total PAH	Not Accredited
DETS 3303	Polyaromatic Hydrocarbons in Soils by GC-MS	The PAHs in the soil sample are extracted into hexane: acetone by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision C, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	0.03 mg/kg each  0.10 mg/kg Total PAH	UKAS (All 16 PAH's)  MCERTS (not Fluorene, Anthracene, Chrysene or Total)
DETS 3304	Polyaromatic Hydrocarbons in Waters by GC-MS	The PAHs in the water sample are extracted into dichloromethane by shaking. The PAHs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each PAH is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semivolatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS).  In-house method based on EPA Method 3510C- EPA Method 3510C, Revision 3, Separatory Funnel Liquid-Liquid Extraction	10 ng/l each	UKAS (16 PAH's only)

DETS 3311	Extractable Petroleum Hydrocarbons (EPH) in Soil, Ballast and Water	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid and aqueous matrices. This method uses a dichloromethane (DCM) extraction followed by quantification using gas chromatography/ flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10-C24), and "mineral oil range" (C24-C40).	USEPA Method 3550C – Ultrasonic Extraction. USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	Soil: 10 mg/kg Ballast: 10mg/kg Water: 10µg/l	Soil: MCERTS Water: UKAS
DETS 3312	Hexane Extractable Petroleum Hydrocarbons (HPH)	This method is designed to determine total concentrations of extractable petroleum hydrocarbons (EPH) in solid matrices. This method uses a hexane: acetone (9:4) extraction followed by quantification using gas chromatography/ flame ionisation detection (GC-FID) analysis using a 1:1 mixture of diesel and mineral oil as calibration standards and n-alkane markers to establish the boiling point ranges. This method is used for the quantitative analysis of "Total EPH" (C10-C40) and as "Speciated EPH", specified in terms of the "diesel range" (C10- C24) and "mineral oil range" (C24-C40).	USEPA Method 8015B – Non-Halogenated Organics Using GC/FID	Soil: 5 mg/kg	Not Accredited
DETS 3321	BTEX, MTBE & PRO in Soils by Headspace GC-FID	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	0.01 mg/kg	MCERTS(Soils) Not accredited for PRO range (C5-10)
DETS 3322	BTEX, MTBE & PRO in Waters & Leachates by Headspace GC-FID	BTEX, MTBE and PRO in soils are determined via Headspace GC-FID. Individual aromatic compounds are quantified by external calibration against known standards. PRO range is banded using alkane markers to define retention time windows.	EPA Methods 5021 and 8015D	1 µg/l	UKAS
DETS 3401	PCBs in Soils by GC-MS	An as-received soil sample is extracted in Hexane:Acetone (1:2) using sonication methodology. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the instrument software.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	µg/kg PCB 28=1.25 PCB 52=1.12 PCB 101=1.32 PCB 118=1.43 PCB 153=2.08 PCB 138=1.35 PCB 180=1.42	MCERTS(Soils)
DETS 3402	Polychlorinated Biphenols in Waters by GC/MS	The water sample is extracted in DCM on a reciprocal shaker. The sample is separated by gas chromatography and identified by mass selective detector. Quantification is carried out within the GC-MS software using an internal standard.	EPA Method 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography.	ng/l PCB 28=208, PCB 52=161, PCB 101=211, PCB 118+123=513, PCB 153=163, PCB 138=107, PCB 180=132, PCB 105=133, PCB 114=253, PCB 126=399, PCB 156=253, PCB 157=119, PCB 167=248, PCB 169=181, PCB 189=271, PCB 77=202, PCB 81=186.	UKAS
DETS 3421	Organotin Compounds in Soils and Waters by GCMS	Organotin compounds are extracted from soil and liquid samples by shaking with hexane. The extract is derivatised with tetraethyl borate before being analysed by GC MS with selected ion monitoring (SIM).	TBC	Soil: 0.2mg/kg Water: 1µg/l	Not Accredited
DETS 3431	Volatile Organic Compounds in Soils by Headspace GC-MS	The method covers the range of volatile organic compounds with boiling points up to 220°C. Soil samples in salty water are heated and agitated in a crimp cap vial. This drives the volatile components in to the headspace. An aliquot of the headspace is taken and injected in to a gas chromatograph with mass selective detection (GC-MS).The detector operates in full scan mode and is calibrated with standards containing known concentrations of the compounds of interest.	USEPA Method 8260B, Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996	0.01mg/kg except: Chloroethane - 0.019mg/Kg Styrene - 0.025mg/Kg	UKAS
DETS 3432	Volatile Organic Compounds in Waters by Headspace GC-MS	The method covers the range of volatile organic compounds with boiling points up to 220°C. Water samples are heated and agitated in a crimp cap vial. This drives the volatile components in to the headspace. An aliquot of the headspace is taken and injected in to a gas chromatograph with mass selective detection (GC-MS).The detector operates in full scan mode and is calibrated with standards containing known concentrations of the compounds of interest.	USEPA Method 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Revision 2, December 1996	1 ug/l except: DCM (27), 2,2-Dichloropropane (2), Bromochloromethane (4), Bromodichloromethane (4), m+p-Xylene (2), 1,3-Dichlorobenzene (2)	UKAS except: Trichlorofluoromethane, Methylene Chloride, 1,1,1-Trichloroethane,
DETS 3433	Semi-Volatile Organic Compounds in Soils by GCMS	The SVOCs in the soil sample are extracted into DCM: Acetone by shaking. The SVOCs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each SVOC is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semi volatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	Individual SVOCs: 0.1 mg/kg	UKAS



DETS 3434	Semi-Volatile Organic Compounds and Pesticides in Waters by GCMS	The SVOCs in the water sample are extracted into DCM using a liquid liquid extraction. The SVOCs in the extract are separated by gas chromatography and identified by the mass selective detector. The concentration of each SVOC is determined by referencing individual mass peak areas to the appropriate internal standard mass peak area. Quantification is carried out within the instrument software.	In-house method based on EPA Method 8270- US EPA Method 8270, Revision 3, Semi volatile Organic Compounds by Gas Chromatography – Mass Spectrometry (GC/MS)	Individual SVOCs: 1mg/l	Not Accredited
DETS 3447	Acid Herbicides in Soils by LCMSMS	Acid herbicides in the sample are extracted with formic acid fortified acetonitrile by shaking. Samples are centrifuged, extracts diluted with mobile phase and directly injected into an LCMSMS. The sample is separated by LC and identified by MSMS detector. Quantification is carried out within the LCMSMS software using an internal standard.	EPA Method 536 EPA Method 615 EPA Method 8151A	35ug/kg	UKAS
DETS 3448	Acid Herbicides in Liquids by LCMSMS	Samples are filtered and directly injected into an LCMSMS. The sample is separated by LC and identified by MSMS detector. Quantification is carried out within the LCMSMS software using an internal standard	EPA Method 536 EPA Method 615 EPA Method 8151A	20ng/l	UKAS
DETS 3451	Phenol and British Gas Phenols in Soils and Waters by GCMS	The phenols in the water sample are extracted by solid phase extraction. Phenol is eluted from the SPE column with DCM evaporated to dryness under nitrogen and re-dissolved in DCM. Soils and associated materials are extracted in dichloromethane: acetone using sonication.	TBC	Phenol Liquids 0.1ug/l Phenol Soils 0.01mg/kg British Gas Phenol Liquids 0.1ug/l British Gas Phenol Soils 0.5mg/kg	Not Accredited
DETS 3501	Target Based Screening of Water Samples by GCMS	This method uses a target MS library that contains over 1000 compounds, including both volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) allowing rapid identification and reporting of organic pollutants in an extracted water sample. This is a semi-quant method. Some of the VVOCs elute either before, or underneath, the DCM solvent peak so can therefore not be identified.	Agilent note 5991-4127EN	0.1ug/l	Not Accredited
DETS 3511	Whole Oil Interpretation	This method is designed to give an interpretation of the type of oil or the type of contamination of oil in solid and aqueous matrices. Neat oil samples, oil samples diluted in dichloromethane (DCM), DCM extract from soil samples, supernatant oil from liquid samples can be tested with method.  A product or a solvent extract is directly injected onto a gas chromatograph and is analysed by temperature programmed capillary chromatography and flame ionisation detection (FID).  The chromatogram obtained serves as a "fingerprint" of the sample components and allows the determination of the bulk characteristic of the sample. A sample of crude oil and a window definer standard are analysed daily to check the retention times of the n-alkanes and compare to those within the sample. The pattern produced in the sample chromatogram is best matched to a series of 'in-house' reference materials which have been analysed previously under the same GC-FID conditions.	TBC	n/a	Not Accredited
DETS 5002	Ash & LOI Content of Solid Biomass & Solid Recovered Fuels	The ash and LOI content of the sample is determined gravimetrically. A known weight of the sample is placed in a prepared ash crucible and placed in a furnace. The furnace is heated to 550°C ±10°C where the temperature is maintained. Following combustion the crucible and sample are removed, cooled and reweighed.	BS EN 14775:2009. BS EN 15403:2011	0.10%	UKAS
DETS 5003	Volatile Matter Content of Solid Biomass, Solid Recovered Fuels and Coal	A known weight of the sample produced for volatile matter determination is placed in a suitable crucible fitted with a lid. The crucible and sample is weighed and heated in a furnace with a limited air through put at a temperature of 900°C ±10°C for 7 minutes. The sample and crucible are re-weighed and the volatile matter content determined by difference.	BSEN15148:2009 – Solid Biofuels Determination of the Content of Volatile Matter. BS EN 15402:2011 - Solid Recovered Fuels - Determination of the Content of Volatile Matter	0.10%	UKAS (except Coal)
DETS 5004	Total Moisture / Dry Solids Content of Solid Biomass & Solid Recovered Fuels & Coal	The sample produced for general analysis is placed into a suitable prepared and weighed tray and reweighed. The sample is dried at 105°C to constant weight and the total moisture / dry solids content is calculated from the reduction in weight.	BS EN 14774 Parts 1 & 2 2009. DD CEN/TS 15414 Parts 1 & 2: 2010	0.10%	UKAS (except Coal)
DETS 5005	Analysis Moisture Content of Solid Biomass, Solid Recovered Fuels & Coal	The sample produced for total moisture determination in accordance with DETS 5009 or DETS 5010 is placed in a suitable pre-weighed tray and reweighed. The sample is then dried at 105°C ±2°C to constant weight and then weighed again. The analysis moisture content is calculated from the reduction in weight.	BS EN 14774-3 2009. BS EN 15414-3 2011. BS 1016-104.1 -1999. ISO 11722 – 1999	n/a	UKAS (except Coal)

DETS 5007	Calorific Value of Solid Biomass, Solid Recovered Fuels & Coal	Calorific value of a material is determined in an Isoperbol calorimeter by burning it in pure oxygen in a combustion bomb. A known amount of sample is placed in a combustion bomb which is then pressurised to 30bar with oxygen. A calorimeter bucket is filled with a known amount of deionised water which is placed in the calorimeter and the bomb placed in the bucket. The system is allowed to equilibrate and the bomb fired by electrical connection. The difference in temperature of the water in the calorimeter bucket caused by the ignition of the material in the bomb is measured and the calorific value calculated	BS EN 14918: Solid biofuels – Determination of calorific value. BS EN 15400: Solid recovered fuels - Determination of calorific value	1MJ/kg	UKAS (except Coal)
DETS 5008	Calorific Value of Soil	A known amount of sample material is burnt in a combustion bomb that is immersed in water in a calorimeter and the difference in the water temperature before and after ignition measured. The calorific value of the sample material is calculated making any necessary corrections for heat generation not associated with the combusting sample. A gelatine capsule will be required to assist combustion which is also corrected for in the final calculations.	BS 1016-105 1992. ISO 19208. ASTM 5865	1MJ/kg	UKAS
DETS 5009	Sample Preparation of Solid Biomass & Solid Recovered Fuels	If analysis is required on the original material (i.e. Bulk Density) a sub-sample will be taken after initial mixing after which the sample is then reduced by cutting/chopping oversized pieces of material. The material is then mixed and subdivided by manual means during which process representative samples are taken for analysis i.e. total moisture. The remainder of the sample is dried and then reduced to <1mm and again mixed and subdivided to produce the sample for laboratory analysis.	BS EN 14780:2011. BS EN 15413:2011	n/a	Not Accredited
DETS 5011	Calculation of Fixed Carbon Content of Coal, SRF and Solid Biomass Fuels	The total moisture, analysis moisture, ash and volatile matter content are determined by approved methods. The values obtained are deducted from 100 and this gives the fixed carbon value of the fuel.	DD CENT/S 15296:2006. BS 1016.100:1994. BS ISO 17246:2005	0.10%	Not Accredited
DETS 5012	Determination of Biomass Content of SRF	A portion of the sample is mixed with sulphuric acid and allowed to stand for at least 16 hours. Hydrogen peroxide is then added, and the sample is left for an additional 5 hours. At the end of this period the unreacted acid and peroxide are diluted down with deionised water. The residue is filtered off using a glass fibre filter and washed with deionised water to remove any remaining acid or peroxide. The filter and residue are placed in a pre-weighed crucible and dried at 1050C. The filter is re-weighed after drying and the non-biomass residue determined. A correction for carbonate content is made by determining the ash content of the original sample. By performing a calorific value on the solid captured on the filter paper, the result can also be expressed as a percentage.	BS EN 15440 Solid recovered fuels - Methods for the determination of biomass content	n/a	UKAS
DETS 5013	Determination Of Carbon, Hydrogen, Nitrogen & Oxygen In Solid Biomass, Solid Recovered Fuels & Coal	A known mass of sample is introduced into a high temperature combustion reactor and burnt in a stream of pure oxygen. The sample is broken down into its elemental components N2, CO2, and H2O. High performance copper wires absorb the excess oxygen not used for sample combustion. The gases are separated and analysed by infrared or thermal conductivity detectors, dependent on the instrument used. The oxygen content of the sample is determined by calculation from the results obtained for carbon, hydrogen and nitrogen.	BS EN 15104:2011 Solid biofuels - Determination of total content of carbon, hydrogen and nitrogen - Instrumental methods. BS EN 15407:2011 Solid recovered fuels - Methods for the determination of carbon (C), hydrogen (H) and nitrogen(N) content. BS EN 15296:2011 Solid biofuels - Conversion of analytical results from one basis to another	Carbon 0.10%, Nitrogen 0.30%, Hydrogen 0.30%, Oxygen 3.55%	UKAS (except Coal)
DETS 5014	Metals in Coal, SRF and Biomass by ICP	Metals in coal, solid recovered fuel (SRF) and biomass samples are extracted by microwave using Hydrogen Peroxide (to oxidise and break down organic matter) and Aqua Regia (to dissolve the matrix and hold the metals in solution). Their concentrations are determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES).	BS EN 15410 - Solid recovered fuels - Methods for the determination of the content of major elements (Al, Ca, Fe, K, Mg, Na, P, Si, Ti). BS EN 15411 - Solid recovered fuels - Methods for the determination of the content of trace elements (As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mo, Mn, Ni, Pb, Sb, Se, Ti, V and Zn). BS EN 15290 - Solid biofuels - Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti. BS EN 15297 - Solid biofuels - Determination of minor elements - As, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, V and Zn	<b>0.1 mg/kg:</b> As, Be, Cd, Co, Mn, Ni, P, Pb, Sb, Se, Sn, Ti, V, Zn <b>0.2mg/kg:</b> Cr, Cu, Ti <b>0.5mg/kg:</b> Mo <b>1mg/kg:</b> Al, Fe, K, Mg <b>5mg/kg:</b> Ca <b>10mg/kg:</b> Ag, Ba, Rh, Sr, Te	UKAS (except Coal): Al, As (SRF only), Ca, Cd, Co, Cr, Cu, K, Mg, Mn, Na (SRF only), Ni, P, Pb, Se, Sn, Ti, V, Zn All other metals not accredited
DETS 5015	Mercury in Coal, SRF and Biomass by Atomic Fluorescence Spectroscopy	The mercury is extracted from coal, SRF and biomass in aqua regia with gentle refluxing. The extract is filtered to remove particulates and diluted to volume. Treatment of the resulting solution with tin (II) chloride reduces mercury (II) to mercury (0) vapour which is then quantitatively detected using atomic fluorescence spectrometry.	PSA Method – Millennium Merlin Method for Mercury in Sludge, Soils and Sediments.	0.055mg/kg	UKAS (except Coal)
DETS 5016	Total Sulphur Content Of Coal, SRF And Biomass	Sulphur compounds in SRF and biomass are extracted using aqua regia / hydrogen peroxide and the insoluble residue is removed by filtration. The concentration of sulphur in the filtrate is determined by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Loss of sulphur as H2S is prevented by oxidation of the sulphur compounds to sulphate by the aqua regia. The use of hydrogen peroxide enhances the oxidation properties of nitric acid especially in the digestion of organics. Sulphur compounds in coal are determined by ICP-OES from the aqueous washings of the combustion products after firing in a bomb calorimeter.	TRL Report TRL447 (Updated) - Sulphate specification for structural backfills 2005	0.001mg/kg	UKAS (Except Coal)

DETS 5017	Sulphur, Chlorine, Fluorine & Bromine Content of Solid Biomass, Solid Recovered Fuels and Coal by IC	A known weight of fuel is burnt in a pressurised bomb in pure oxygen. After firing of the bomb, it is stood for a minimum of five minutes to allow the combustion products to settle then the oxygen is slowly released over a period of at least three minutes. The bomb is then taken apart and the bomb electrodes rinsed with deionised water into the inside of the bomb. These washings are then decanted into a 50ml volumetric flask. The inside of the bomb is rinsed with deionised water and the washings added to those in the volumetric flask. The contents of the volumetric flask are made up to volume with deionised water and stored for the analysis of sulphur, chloride, fluoride and bromide by ion chromatography.	Operating Instruction Manual No. 442M 6200 Parr Oxygen Bomb Calorimeter. Operating Instruction Manual No. 205M 1108 Oxygen Combustion Bomb. Operating Instruction Manual No. 454M 6510 Water Handling System	0.01% Chlorine, 0.01% Fluorine, 0.01% Bromine, 0.04% Sulphur (Coal only)	UKAS (Except Coal and Br)
DETS 5018	XRF Analysis of Coal, Biomass, SRF and Cement	When X-rays are targeted at a material they will cause electrons to be ejected from the component atoms (ionisation). The ejection of electrons will cause the electronic structure of the component atoms to become unstable resulting in electrons from the higher energy outer orbitals "falling" into the inner orbitals to compensate. This causes a release of energy in the form of a photon equal to the energy difference between the two orbitals involved. Thus the material emits radiation which has energy characteristics of the atoms present. In energy dispersive X-ray fluorescence the fluorescent X-rays emitted are directed to a detector from which the data is processed by a multichannel analyser, producing a digital spectrum which is processed to obtain analytical data. The instrumental analytical parameters are set up for the matrix type. A sample cell is prepared by placing a piece of prolene film over the outer cell and then inserting the inner cell. This gives a complete cell with a clear prolene base. A portion of the sample is placed into the cell and then analysed.	Rigaku NEX CG EDXRF instruction manual	<b>Cement:</b> 0.01% BaO, Cr <sub>2</sub> O <sub>3</sub> , CuO, PbO, Rb <sub>2</sub> O, SrO, ZnO 0.02% Cl, V <sub>2</sub> O <sub>5</sub> 0.05% TiO <sub>2</sub> 0.1% Mn <sub>2</sub> O <sub>7</sub> , P <sub>2</sub> O <sub>5</sub> , SO <sub>3</sub> 0.5% K <sub>2</sub> O 1% Al <sub>2</sub> O <sub>3</sub> , CaO, CdO, Co <sub>2</sub> O <sub>3</sub> , Fe <sub>2</sub> O <sub>3</sub> , MgO, Na <sub>2</sub> O, NiO, SiO <sub>2</sub> , Y <sub>2</sub> O <sub>3</sub> <b>Fuel:</b> 0.01% Co, Cr, Cu, I, Li, Mn, Ni, P, Pb, Sn, Ti, V, Zn 0.02% Al, Ba, S, Si 0.1% Mg 0.2% Ca 0.5% As, Cd, Hg, Mo, Na, Sb, Se, Th, Tl 1% Ag	Not Accredited
DETS 5019	Determination of Biodegradable Municipal Waste Content (Compositional Analysis)	The method is based on handpicking the BMW fraction from the municipal waste sample, and then weighing the amount of BMW sorted and expressing this as a percentage on a wet weight basis of the weight of the whole municipal waste sample.	ENVIRONMENT AGENCY: Guidance on monitoring of MBT and other treatment processes for the landfill allowances schemes (LATS and LAS) for England and Wales	n/a	Not Accredited
DETS 5020	Determination of Bulk Density in Solid Biomass and Solid Recovered Fuels	The test portion is filled into a standard container of a given size and shape and weighed afterwards. Bulk density is calculated from the net weight per standard volume and reported for the moisture content.	BS EN 15103:2009 Solid Biofuels- Determination of bulk density DD CEN/TS 15401:2010 Solid Recovered Fuels- Determination of bulk density	0.5kg/m <sup>3</sup>	Not Accredited
DETS 5021	Auto Ignition Temperature	A quantity of the sample is placed into a metal tray or crucible and placed into an oven or furnace. The temperature of the oven / furnace is increased in predefined increments and the temperature in which the sample ignites is noted.	None	25°C	Not Accredited
DETS 5022	LOI Content of Fines	The sample is dried to constant weight and its particle size reduced to <2mm. The LOI content of the sample is then determined gravimetrically. A known weight of the prepared sample is placed in a crucible and placed in a furnace. The furnace is heated to set temperature and following combustion the crucible and sample are removed, cooled and reweighed.	The Landfill Tax (Qualifying Material) Order 2011	0.10%	Not Accredited
DETS 5023	Crude Fibre	The sample after defatting is sequentially treated with boiling dilute sulphuric acid, and with boiling potassium hydroxide solution. The loss in mass resulting from incineration corresponds to the mass of crude fibre.	FAO - Quality Assurance for Animal Feed Analysis Laboratories – Part II Analysis Section	1%	Not Accredited
DETS 5024	Void Space	Water is added to a known volume of biofilter media until it fills all the void spaces and percentage voids is calculated.	<a href="https://www.sdstate.edu/abe/faculty/upload/Determining-Pressure-Drop-through-Compost-No-014080.pdf">https://www.sdstate.edu/abe/faculty/upload/Determining-Pressure-Drop-through-Compost-No-014080.pdf</a>	0.1%	Not Accredited
DETS 5025	Theoretical Biogas Potential	The Baserga equation determines how much biogas a feedstock may theoretically produce based on nutrient content.	An Analysis of Available Mathematical Models for Anaerobic Digestion of Organic Substances for Production of Biogas. Mandy Gerber, Chair of Thermodynamics, Germany, International Gas Union Research Conference, 2008. Biogas: Calculation of Gas Yield of co-substrates	0.1% Total Methane 1m <sup>3</sup> /tonne Yield	Not Accredited
DETS 5026	Determination of Particle Size Distribution	A sample is subjected to sieving through horizontally oscillating sieves, sorting the particles in decreasing size classes either manually or by machine sieving. For particles less than 25mm, only machine sieving is used, for particles greater than 25mm, manual or machine sieving is applied.	BS EN 15415-1 – Solid recovered fuels - Determination of particle size distribution BS EN 15149-2 – Solid biofuels - Determination of particle size distribution	n/a	Not Accredited

DETS C 5027	Flammability Potential Screening Analysis	<p>The method is split into three parts which can be ran independently of each other:</p> <ul style="list-style-type: none"> <li>• exposure to heat and flame</li> <li>• exposure to a spark source</li> <li>• exposure to heat and a spark source (flash point)</li> </ul> <p>Exposure to heat and flame: the as-received sample is exposed to heat and flame. Observations are used to report if the sample has a negative or positive flammability potential.</p> <p>Exposure to a spark source: the as-received sample is placed into a beaker with a watchglass placed on top. Sparks are introduced to the vapour space above the sample and observations made to report if the sample has a negative or positive flammability potential.</p> <p>Exposure to heat and a spark source (flash point): the as-received sample is placed into a beaker with a watchglass placed on top. Sparks are introduced to the vapour space above the sample and if the sample flashes, the temperature is reported. The analysis is repeated at 5°C intervals until the vapour flashes or the temperature of 100°C is reached.</p>	ASTM D4982-12: Standard Test method for Flammability Potential Screening Analysis of Waste	n/a	Not Accredited
DETS C 5028	Determination of Length and Diameter of Pellets	<p>The length and diameter of fuel pellets of a representative sample of fuel pellets are measured by using a calliper. The length of a pellet is always measured along the axis of the cylinder. The diameter is measured perpendicular to the axis.</p>	BS EN 16127 – Solid biofuels - Determination of length and diameter of pellets	n/a	Not Accredited



**Archaeology Monitoring Report  
(Tested Externally)**





## GI MONITORING REPORT

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## A66 NTP BOWES TO SCOTCH CORNER GEOTECHNICAL INVESTIGATIONS ARCHAEOLOGICAL MONITORING REPORT

prepared for  
Allied Exploration and Geotechnics  
Ltd

on behalf of  
Amey

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# A66 NTP BOWES TO SCOTCH CORNER GEOTECHNICAL INVESTIGATIONS ARCHAEOLOGICAL MONITORING REPORT

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# **A66 NTP BOWES TO SCOTCH CORNER GEOTECHNICAL INVESTIGATIONS**

## **ARCHAEOLOGICAL MONITORING REPORT**

### **Summary**

*NAA conducted a scheme of archaeological monitoring in conjunction with Ground Investigation (GI) works along the eastern stretch of the A66, from Bowes to Scotch Corner, as part of an assessment to inform proposed upgrades to the existing carriageway.*

*The route of the A66 passes through a corridor of significant Roman archaeology, intersecting the Scheduled Monument of Carkin Moor Roman Fort and close to further scheduled forts at Greta Bridge and Bowes. Excavations in recent years have highlighted substantial Iron Age and early Roman occupation at Scotch Corner (Fell 2020, NAA 2020) as well as a Roman roadside settlement to the west of Carkin Moor (NAA in prep.) and have demonstrated that widening of the existing routeway has the potential to encounter considerable archaeological remains dating from the early Prehistoric through to the post-medieval period (Zant and Howard-Davis 2013).*

*In total, 74 GI interventions were monitored during the current scheme. Most of the archaeological remains were recorded across the area from Stephen Bank to Carkin Moor in the east, within four trial pits. In addition, an impressive suite of ridge and furrow was encountered near Bowes.*

*Two potential stone trackways were recorded in the vicinity of Carkin Moor. The first, in trial pit (TP) SBC041 had a surface constructed entirely of angular sandstone slabs, while the second in TP SBC042, appeared to have a kerb of large stones flanking a metalled surface, potentially constructed atop an earlier hollow-way. Only the edges of the features were revealed in their respective trial pits and no finds were recovered; however, they both appeared to run along a north-east to south-west alignment, perpendicular to the route of the A66 and, significantly, both were recorded in an area of known Roman archaeology. The potential trackway in TP SBC042 was located directly to the south of the roadside settlement excavated in 2016 (NAA in prep.).*

*The remaining archaeological features were encountered to the west, in the vicinity of West Layton. In a field directly to the south-west of West Layton Manor, TP SBC012 exposed a cobble foundation for an earthen bank or hedgerow, that probably defined an east-to-west field boundary parallel to the old Roman Road. To the east, two irregular-shaped pits containing charcoal and burnt daub were excavated in TP SBC018. They potentially belonged to a larger pit grouping or structure that was near a kiln or hearth, from which the burnt material likely originated, and which could still survive in the surrounding field.*

*Although none of the archaeological features contained diagnostic finds, the presence of remains confirms the potential archaeological significance of the stretch of road from Stephen Bank to Carkin Moor, highlighted in earlier work. Despite negative results within the GI interventions, the significance of the remainder of the proposed route cannot be discounted owing to the prevalence of known historic sites along its alignment that include a large number of listed buildings and scheduled monuments.*





## **1.0 INTRODUCTION**

- 1.1 Amey was commissioned by Highways England to undertake the Project Control Framework (PCF) Stage 3 design and assessment of proposed upgrades to the A66 between Junction 40 of the M6 at Penrith and the A1(M) at Scotch Corner. As part of the assessment programme, Ground Investigation (GI) works were carried out along parts of the proposed scheme. This report presents the results of a programme of archaeological monitoring during GI works in four areas along the eastern part of the A66 route between Bowes and Scotch Corner (NGR: c.NY 9865 1350 to c.NZ 2165 0525; Fig. 1).
- 1.2 The report has been produced by Northern Archaeological Associates (NAA) for Allied Exploration and Geotechnics Ltd, on behalf of Amey. The results of the work will be used to inform the Stage 3 Cultural Heritage Assessment for the project (NAA in prep.).

## **2.0 LOCATION, GEOLOGY AND TOPOGRAPHY**

### **Location**

- 2.1 Groundworks were proposed in four separate areas along the A66 route (Fig. 1), although monitoring was ultimately not required at the eastern section around Scotch Corner. The monitored sections comprised: a c.2.6km stretch where the current A66 passes to the north of Bowes village (Bowes Bypass section, 14 trial pits); a c.3.3km stretch to the south of Barnard Castle between Cross Lanes and Rokeby (17 trial pits); and c.5km between New Road (to the south of Hutton Magna) and Carkin Moor (Stephen Bank to Carkin Moor section, 43 trial pits).

### **Geology**

- 2.2 In the area of the proposed works at Bowes, the solid geology is primarily mudstones, siltstones and sandstones of the Stainmore formation, although immediately to the east of the village the route crosses an area of Carboniferous limestone (part of the Great Limestone Member formation). The second area, Cross Lanes to Greta Bridge, overlies the same Carboniferous limestone. In the area of Carkin Moor and extending east to Scotch Corner, the solid geology consists of limestone and sandstone of the Alston Formation. In all three areas the bedrock is covered by superficial deposits of Devensian Diamicton Till (BGS 2021).

### **Topography and land use**

- 2.3 The majority of the trial pits were excavated on farmland within arable fields or those set to pasture. Two trial pits were excavated along the line of the South Durham and Lancashire Union Railway near Bowes.

## **3.0 SUMMARY ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

- 3.1 There have been surprisingly few prehistoric sites identified along the Scotch Corner to Bowes section of the A66. However, investigations during previous upgrading of the road from Carkin Moor to Scotch Corner identified a scatter of sites of Late Mesolithic/Early Neolithic to Iron Age date (Zant and Howard-Davis 2013).
- 3.2 Known archaeological remains directly relevant to the current works date almost entirely to the Roman period. For much of the route between Scotch Corner and Bowes, the A66 closely follows the line of the Roman road running westwards from Dere Street (the modern A1(M)) towards the Stainmore Pass, which passes the Pennines *en route* to Carlisle (Margary road 82 (Margary 1973, 433–6).
- 3.3 The Roman road junction at Scotch Corner was the site of a substantial Late Iron Age and early Roman settlement, part of which was excavated and surveyed during recent A1 improvements (Fell 2020). Although the site has not yet been granted statutory designation, the archaeological remains are considered by Historic England to be of at least national, and probably international, significance.
- 3.4 Military installations were spaced along the Roman road. Passing westwards from Scotch Corner, the A66 bisects the scheduled Roman fort and prehistoric or Romano-British enclosed settlement 400m west of Carkin Moor Farm (National Heritage List No. 1015418; Zant and Howard-Davis 2013). In 2016, during construction of a water pipeline at the southern side of the A66 immediately to the west of Carkin Moor Roman fort, excavations identified extensive remains of a Roman roadside settlement extending westwards towards Mainsgill Bridge on the south side of the Roman road (NAA 2016 and in prep.). Finds included elements of the Roman Road, seven roadside enclosures (two of which had been walled), cobbled surfaces, the footings of a possible building, refuse dumps and a pottery kiln.
- 3.5 To the west, the route passes a probable Roman camp at Rokeby Park and the scheduled Roman Fort and vicus at Greta Bridge (National Heritage List No. 1019074). At Bowes there lies another scheduled Roman fort (*Lavatrae*), part of which was reused as a

medieval castle (National Heritage List Nos 1002316 and 1002318; Frere and Fitts 2009). The modern A66 bypasses the village to the north, although the Roman road passes through the modern settlement, which is built over the vicus associated with the fort.

- 3.6 Detailed comparison of the proposed trial-pit locations against other known archaeological evidence suggested that the GI works would have no impact upon them. However, there was still the possibility of encountering previously unknown archaeological features and deposits. The potential presence of previously undetected prehistoric evidence has been noted above. The modern A66 does not, in all areas, precisely follow the alignment of the Roman road (where it is known) and the recent excavations to the west of the Carkin Moor fort have demonstrated that remains of the Roman route can survive below the modern verge or within adjacent fields. Peripheral features such as Roman quarry pits (for road materials) have been recognised further to the west, and may also be present on the current part of the route, while some Roman roads may have been flanked at a distance by parallel boundaries as has been recognised on the route leading northwards from Bowes to Barnard Castle (Margary road 82 (Margary 1973, 437); Ambrey *et al.* 2017, 105–6).
- 3.7 None of the trial-pit locations impacted directly upon any recorded sites of medieval or post-medieval significance.

### **Geophysical survey**

- 3.8 Geophysical survey was conducted in advance of the current work (Headland Archaeology unpublished) in addition to an extensive survey of the route between Scotch Corner and Greta Bridge carried out as part of the earlier widening along the A66 (GeoQuest Associates 1999).

## **4.0 AIMS AND OBJECTIVES**

- 4.1 The aim of the archaeological monitoring was to identify the presence and location of archaeological remains within the area of development. The objectives of the monitoring were to:
- establish the presence, nature, extent, preservation and significance of any archaeological remains within the area of the proposed road improvements;
  - provide a detailed record of any such archaeological remains;



- recover and assess any associated structural, artefactual and environmental evidence, where safe to do so;
- undertake a programme of investigation that meets with national and regional standards (Historic England 2015a; ClfA 2014b–d; South Yorkshire Archaeology Service 2018); and
- prepare an illustrated report on the results of the archaeological monitoring to be deposited with Durham County Council Historic Environment Record (HER).

## **5.0 METHODOLOGY**

- 5.1 The trial pits were excavated down to natural geology or archaeological deposits using a tracked excavator fitted with a toothless bucket and measured 2m by 2.5–4m. Borehole starter pits were excavated by hand. Where structures, features, deposits or finds of archaeological interest were exposed, mechanical excavation ceased to allow the investigating archaeologist to assess and record the remains. Once archaeological observations were complete, the monitoring archaeologist allowed mechanical operations to recommence. A toothed bucket was used to excavate the trial pit down to the specified depth, which varied between 3m and 6m.
- 5.2 Where archaeological features extended beyond the limits of the trial pits, as in TP SBC12, TP SBC41 and TP SBC42, the exposed remains were cleaned and recorded and the pit moved. In this way, the presence of archaeology was noted and an interpretation made, but it is possible to preserve the remains in situ until full excavation of the features can be undertaken.
- 5.3 Archaeological designations for each intervention conform to those used by the GI contractors (AEG). A full record (written, graphic and photographic, as appropriate) was made for all work, using pro-forma record sheets and text descriptions appropriate to the work. The location of each intervention was surveyed by the GI contractors.
- 5.4 A photographic record of all contexts was taken in digital format and include a clearly visible, graduated metric scale where possible. A register of all photographs will be kept. The digital photographs will be submitted to the Archaeology Data Service (ADS) for long-term archive storage.
- 5.5 No finds of archaeological interest were recovered.

5.6 Upon discussion between the contractor and the monitoring archaeologist, it became clear the trial pits to be excavated at Scotch Corner were within areas of made ground previously subjected to archaeological excavation (Fell 2020), and therefore monitoring of these interventions was not required.

## **6.0 RESULTS**

6.1 Monitoring of the GI works revealed very little archaeological evidence. The majority of trial pits did not contain archaeological features, deposits or finds; those that were present probably related to known nearby Roman-period settlement or post-medieval agricultural regimes.

6.2 Only the trial pits that revealed potential archaeological remains will be discussed in detail here. An inventory of archaeological contexts recorded is listed in Appendix A, while a tabulated inventory of all trial pits, their deposit depths and characteristics are listed in Appendix B.

### **TP BB006**

6.3 The trial pit was located north of the A66, within the footprint of the old South Durham & Lancashire Union Railway cutting (Fig. 2).

6.4 Beneath a thin topsoil layer was revealed a 0.2m-thick layer of compacted stone and black cinders that is likely to have formed the bedding material for the rail tracks (12, Plate 1). The trackway material had been laid upon natural mid-brownish grey boulder clay, which turned increasingly grey and stony towards the base of the trial pit, at a depth of 4.5m.



*Plate 1: TP BB006 through the Bowes railway cutting. Stone, clay and cinder deposit 12 can be seen at the southern edge of the pit.*

**TP BB008 and BB009**

- 6.5 The trial pit was located to the north of the A66 in a field that contained large and prominent ridge and furrow, aligned north to south (Plate 2, Fig. 2).
- 6.6 The pit was excavated through a plough ridge, revealing it to be made up of a 0.45m-thick mixed plough-soil of mid-greyish brown silty clay and redeposited yellow natural clay (13). No finds were recovered to enable potential dating of the ridge-and-furrow earthworks. TP BB009 was located in the field directly to the east, which also contained large ridge and furrow earthworks, presumably of the same regimen. A comparable mixed plough-soil horizon was also recorded in this pit.





*Plate 2: prominent ridge-and-furrow earthworks in the vicinity of TP BB008, looking south-east.*

#### **TP CLR007**

- 6.7 The trial pit was located immediately north of the A66 in the vicinity of Cross Lanes (Fig. 3). Stripping of topsoil revealed a concentration of large stones (14) along the southern edge of the pit. The accumulation of stones perhaps related to field clearance and distribution along a boundary, but there was a possibility they could also be associated with the alignment of the Roman Road. No further exploration was conducted, and to avoid disturbing the remains further at this stage, the decision was made to move the pit c.0.7m to the north where no potential archaeological remains were present.

#### **TP SBC012**

- 6.8 The trial pit was located on the north side of the A66, to the south-east of West Layton Manor. The pit was situated in the south-eastern corner of a field set out to pasture, in proximity to its western, tree-lined boundary (Fig. 4).
- 6.9 Removal of a c.0.5m-thick turf and topsoil layer revealed the remnants of a cobble foundation (05) running roughly east to west at the southern end of the pit (Plate 3). Foundation 05 was a rubble construction of large, natural limestone cobbles and small,



sub-angular sandstone fragments within a matrix of grey clayey-silt, that could indicate that it was originally the foundation for an earthen bank. The rubble construction appeared to be sat directly atop the natural yellow clay, although it is possible that it could have been situated within a shallow construction cut. The width of **05** within the pit was 0.6m; however, it extended into the southern Limit of Excavation (L.O.E) and its full dimensions remain unknown. No earthworks were visible on the surface of the field to give any further indication of the extent or orientation of wall **05** and no finds were recovered during cleaning that could provide any dating evidence.

- 6.10 Aside from an initial surface clean for photographing, no further excavation of wall **05** was conducted. The trial pit was subsequently moved c.2m to the north to avoid any further disturbance to the in situ archaeological remains.



Plate 3: cobble wall foundation **05** in TP SBC012, looking south.

#### TP SBC018

- 6.11 The trial pit was located to the north of the A66, in an arable field opposite the junction with Waitlands Lane (Fig. 4).
- 6.12 Removal of a 0.5m-thick topsoil layer revealed the natural yellow clay into which were cut two irregular pits (**02**, **04**). Pit **02** was the smaller of the two, measuring 0.5m wide



by 0.12m in depth, with shallow sloping sides culminating in a flat but uneven base. It had been backfilled with a single deposit (01) of mid-brownish grey silty clay that contained patches of burnt orange clay and frequent flecks of charcoal. Pit 04 was located 0.6m east of 02 and was 0.6m wide by 0.13m deep. It displayed a similar shallow, irregular profile to pit 02 and had been backfilled with a comparable deposit of mid-brownish grey silty clay with burnt clay and charcoal inclusions (03). Neither pit demonstrated evidence of in situ burning, indicating the backfill material had been redeposited from elsewhere. No finds or diagnostic material was recovered from either feature to help ascertain a potential date or function.

- 6.13 Pits 02 and 04 were fully excavated and recorded before recommencement of the GI works.



Plate 4: pits 02 (top) and 04 (bottom) in TP SBC018.

#### TP SBC041

- 6.14 The trial pit was excavated into the roadside verge to the south of Warrener Lane, close to the junction with an unnamed lane leading to Pond Dale Farm (Fig. 5).



- 6.15 Removal of an initial thin (0.1m) layer of turf and topsoil and 0.4m of underlying subsoil revealed the edge of what appeared to be a sandstone trackway (**11**), running north-east to south-west at the eastern LOE of the pit.
- 6.16 The upper surface comprised medium to large, angular sandstone slabs of up to 0.5m in width, which appeared to be laid atop smaller and more irregular sandstone fragments within a matrix of mid-orange-brown silty clay. The western edge of **11** was defined by a series of orthostatic sandstone pieces. It was unclear whether the stonework had been situated within a cut or had merely sunk into the natural sandy clay. No further excavation was conducted. The trench was backfilled to preserve the archaeology in situ and the trial pit moved to the east to prevent further disturbance.



*Plate 5: overview of sandstone trackway **11** in TP SBC041.*

#### **TP SBC042**

- 6.17 The trial pit was located to the south of the A66 within an arable field to the east of Mainsgill Farm Shop and within the vicinity of the 2016 NAA excavations (Fig. 5, NAA 2016 and in prep.).



- 6.18 Removal of a 0.3m-thick topsoil layer exposed the natural yellow clay, which was cut at the north-eastern end of the pit by feature **06** (Plate 6). The feature was visible in plan over a span of 2.5m and extended into the eastern LOE of the pit. It had been infilled with a mid-greyish brown deposit of clayey silt (**09**), into which had slumped a layer of rounded and sub-angular sandstone fragments (**08**), of various widths up to a maximum of 0.4m. The larger stones were concentrated along the edge of cut **06**, indicating that the feature was potentially linear and ran along a north-north-east to south-south-west alignment. An area of smaller sandstone fragments (**10**) was recorded in the south-eastern corner of the pit and could represent the remnants of a metallised surface above deposit **09**.
- 6.19 Feature **06** was cleaned and recorded in plan but was not investigated or disturbed further, the trial pit being moved to the north-west where no archaeological remains were present. No diagnostic finds were recovered and without additional excavation, the form and function of **06** are unclear. However, the concentration of stone and apparent linear form suggests a trackway, potentially belonging to the Roman roadside settlement previously identified in excavations directly to the north (NAA 2016 and in prep.). The degree of slumping of stone deposit (**08**) along the edge of **06** could indicate that the cut is of fairly substantial depth and therefore belongs to an initial ditch or hollow-way that was later capped with a stone track.





Plate 6: feature **06** in TP SBC042, showing sandstone fragments (**08**) along the western edge and area of metalling to the south-east corner.

## 7.0 DISCUSSION

- 7.1 Only seven of the 74 trial pits excavated for Geotechnical Investigations exposed archaeological remains. This may be considered a surprisingly sparse result considering the historical importance of the trans-Pennine corridor and the prevalence of known archaeological sites distributed along the A66.
- 7.2 The majority of the trial pits were excavated in pasture or arable fields and in some places the plough horizon and resulting topsoil layer was in excess of 0.5m thick. This intensive cultivation resulting from post-medieval farming practices has potentially erased many shallower, negative archaeological features, as well as levelling any extant earthworks. Several trial pits were also located in the verge along the current A66, the construction of which would also likely have resulted in significant truncation to any archaeological remains in the corridor. However, the 2016 excavations to the west of Carkin Moor Roman Fort demonstrate that there are areas where the creation of the verge has helped to preserve archaeological remains beneath (NAA 2016 and in prep.).
- 7.3 Aside from ephemeral remnants of the 19th-century South Durham & Lancashire Union Railway in TP BB006 and the impressive ridge and furrow earthworks recorded to the west of Low Broats Farm (TP BB008/BB009, Plate 2), all further archaeological remains were encountered along the stretch from Stephen Bank to Carkin Moor. Unfortunately, no finds were recovered to date these features and the small footprint of the trial pits (2m wide by 2.5–4m in length) precluded confident interpretation.
- 7.4 Shallow pits **02** and **04** within TP SBC018 contained similar charcoal rich fills that indicated they had been backfilled contemporaneously. The fills included heat-affected clay, potentially burnt daub perhaps originating from a nearby kiln or hearth/oven. Without further excavation, it is unclear whether these features represent an isolated pit cluster or belong to a wider, potentially structural, group of features. The extensive truncation appears to preclude the survival of archaeological occupation horizons; however, there is the possibility that the bases of related features still survive in the surrounding field.
- 7.5 The remainder of the archaeological features encountered were apparently linear, each extending beyond the LOE of their respective trial pits, meaning their full forms and

extents were unclear, but enough of the features were visible to inform ideas about their functions. None of the features can be related to any documented previously on historic mapping of the area, implying that they could pre-date the mid-19th century.

- 7.6 Cobble and stone construction **05** in TP SBC012 probably provided a foundation for a wall or earthen bank or hedgerow that defined a former field boundary. It ran from east to west, roughly parallel to the line of the current A66 and perhaps reflected the line of the old routeway, still visible to the west.
- 7.7 Excavation of a Roman period roadside settlement along the southern verge of the A66 to the west of Mainsgill Farm (NAA 2016 and in prep.) revealed a series of partial enclosures set out perpendicular to the road. Located to the south of that excavation area, it is probable that feature **06** in TP SBC042 represents a trackway relating to the roadside settlement. The stonework on top of deposit **09** perhaps represented formalisation of an earlier hollow-way with an outer kerb (**08**) and metalled surface (**10**). Recent excavations of Pre-Roman and Roman settlement at Scotch Corner (Fell 2020; NAA 2020; Zant and Howard-Davis 2013) demonstrated that such trackways often defined the boundaries between distinct enclosures and often connected the areas of occupation with an agricultural hinterland beyond and this is likely the case with feature **06**.
- 7.8 A second potential trackway (**11**) was uncovered in TP SBC041. Like **06**, the upper surface was of large angular sandstone slabs, set upon a deposit of mid brown silty-clay that could represent the infill of an earlier hollow-way. There was also a possible kerb of on-edge sandstone blocks pressed into the lower deposit along the western edge. There was no evidence of a metalled surface and it is likely the entirety of the trackway surface was made up of angular sandstone slabs, the gaps being infilled with rubble. The south-western orientation of the track points directly towards Pond Dale Farm to the south and it is plausible that feature **11** was an original packhorse track leading to the farm when it was initially constructed.
- 7.9 There is also the possibility that feature **11** is much older and potentially Roman in date. Sandstone has been a favoured local building material from at least the 1st century AD due to its availability. It was used for walls, floors and road surfaces of early Roman date at Carkin Moor (NAA in prep.) and Scotch Corner (Fell 2020). It has been extensively quarried in the surrounding area up to the present day, with a large modern quarry still active along the A66 at Gatherley Moor. The location of the feature within a hinterland

of known Roman archaeology, directly to the north-west around the fort at Carkin Moor, is also a contributing factor, along with its orientation towards the main trans-Pennine thoroughfare of the Stainmore Pass to the north (Margary road 82; Margary 1973, 433–6).

- 7.10 The linear nature of features **5**, **6** and **11** means that there is potential for continuations of these features to be revealed and studied during future work when it may be possible to ascertain dates of construction and a more comprehensive interpretation of their functions and contexts.
- 7.11 Results of the archaeological monitoring of the GI works have demonstrated significant archaeological potential to exist within the stretch between Stephen Bank and Carkin Moor. This area was largely untouched by the previous A66 widening scheme, aside from three test pits excavated within the Scheduled Monument of Carkin Moor Roman Fort (Zant and Howard-Davis 2013, 17–18), only one of which, sited over the defensive ditch, encountered archaeological remains (*ibid.*, Trench 13). However, the discovery of a substantial Roman settlement along the southern verge of the A66, to the west of the fort (NAA 2016 and in prep.), serves to confirm that the surrounding area is likely to be rich in surviving subterranean archaeological remains.
- 7.12 The previous A66 widening scheme also demonstrated that archaeological remains were encountered less frequently to the west of Stephen Bank, the area westwards to Greta Bridge being found to be largely devoid of archaeological remains aside from post-medieval ridge and furrow (GBA12) and a post-medieval quarry (GBA21; Zant and Howard-Davis 2013, 14). An earlier geophysical survey carried out along the same stretch (GeoQuest Associates 1999) did, however, highlight areas of archaeological potential outside the development corridor; therefore, the presence of archaeological remains should not be entirely discounted based on the negative results of the current GI works between Cross Lanes and Rokeby.
- 7.13 A number of trial pits in the vicinity of Greta Bridge were excluded from the works described here (TP CLR016–019, TP CLR021–022). As the location of a Roman fort and associated *vicus*, this area arguably holds significant archaeological potential. Previous excavations within the scheduled area revealed a well-preserved section of the Roman road and demonstrated that the *vicus* extended to the north of the fort, both to the east and west, for a considerable distance, with remains also surviving beneath the existing carriageway of the A66 (Casey 1998). The full extent of the *vicus* and hinterland of the

fort at Greta Bridge is unknown and therefore any further work in the area as part of the carriageway upgrade could provide valuable information regarding the potential western limit of Roman occupation in this area.

- 7.14 Aside from an assemblage of large stones in CLR007 that could potentially relate to an archaeological feature, no further remains were encountered in the trial pits between Bowes and Rokeby. Even so, the historical and archaeological potential of the area cannot be discounted owing to the number of scheduled monuments and known historical sites distributed along the route of the A66. The course of the routeway is one which has funnelled human traffic through the trans-Pennine corridor for millennia and therefore the presence of multi-period archaeology should be anticipated during the execution of future works.

## **8.0 ARCHIVE DEPOSITION**

- 8.1 The full digital archive from the archaeological investigations is to be deposited online in the Archaeology Data Service website.



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**APPENDIX A**  
**CONTEXT CATALOGUE**

Context Number	Description	Trial Pit
1	Fill of pit 02	TP SBC018
2	Cut of pit	TP SBC018
3	Fill of pit 04	TP SBC018
4	Cut of pit	TP SBC018
5	Wall foundation	TP SBC012
6	Cut of ditch/trackway	TP SBC042
7	Alluvial clay deposit	TP SBC035
8	Stone 'trackway' surface in 06	TP SBC042
9	Brownish-grey fill of 06	TP SBC042
10	Metalled surface on 09	TP SBC042
11	Sandstone farm track	TP SBC041
12	Stone, clay and cinder bedding material of railway	TP BB006
13	Mixed plough-soil of furrow	TP BB008/BB009
14	Assemblage of large stones	TP CLR007

**APPENDIX B**  
**TRIAL PIT DEPOSIT MODELS**

The values given in the table below relate to the depths of the deposits within each GI intervention. Where bedrock was reached, the depth at which it was encountered is given.

<b>Trial Pit</b>	<b>Deposit Sequence</b>
<b>Bowes Bypass</b>	
TP BB001	0.3m Topsoil 0.3–0.6m Subsoil 0.6–3.1m Natural Yellow Clay
TP BB002	0.2m Topsoil 0.2–0.5m Subsoil 0.5–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB003	0.2m Topsoil 0.2–0.5m Subsoil 0.5m–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB004	0.2m Topsoil 0.2–0.5m Subsoil 0.5–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB005	0.2m Topsoil 0.2–1m Modern Backfill of Service Trench 1–4.5m Natural Yellowish-Brown Sandy Clay 4.5m+ Limestone Bedrock
TP BB006	0.2m Topsoil 0.2–0.4m Mixed stone, clay and cinders 12 0.4–4.5m Mid Brown to Dark Grey Boulder Clay
TP BB007	0.15m Topsoil 0.15–0.35m Subsoil 0.35–2.5m Natural Yellow Clay to Dark Grey Boulder Clay 2.5–4.5m Mudstone
TP BB008	0.15m Topsoil 0.15–0.6m Mixed plough-soil of ridge 13 0.6–1.7m Natural Mid Orange-Grey Gravelly Clay 1.7m+ Sandstone Bedrock
TP BB009	0.15m Topsoil 0.15–0.6m Mixed plough-soil of ridge 13 0.6–1.9m Natural Mid Orange-Grey Gravelly Clay 1.9m+ Sandstone Bedrock
TP BB010	0.2m Topsoil 0.2–1.5m Natural Yellow Clay 1.5–3.1m Natural Dark Grey Sandy Silt and Gravel – Riverine?
TP BB011	0.3m Topsoil 0.3–0.5m Subsoil 0.5–2.5 Natural Yellow Clay to Dark Grey Boulder Clay 2.5+ Mudstone
TP BB012	0.2m Topsoil 0.2–0.3m Subsoil 0.3–4m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB013	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB014	0.15m Topsoil 0.15–0.3m Subsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
<b>Cross Lanes to Rokeby</b>	
TP CLR001	0.25m Topsoil 0.25–0.65m Subsoil 0.65–2m Natural Yellow Clay and Gravel 2.0–3.7m Natural Dark Grey Boulder Clay
TP CLR002	0.3m Topsoil (N-S plough-scars visible in clay beneath)



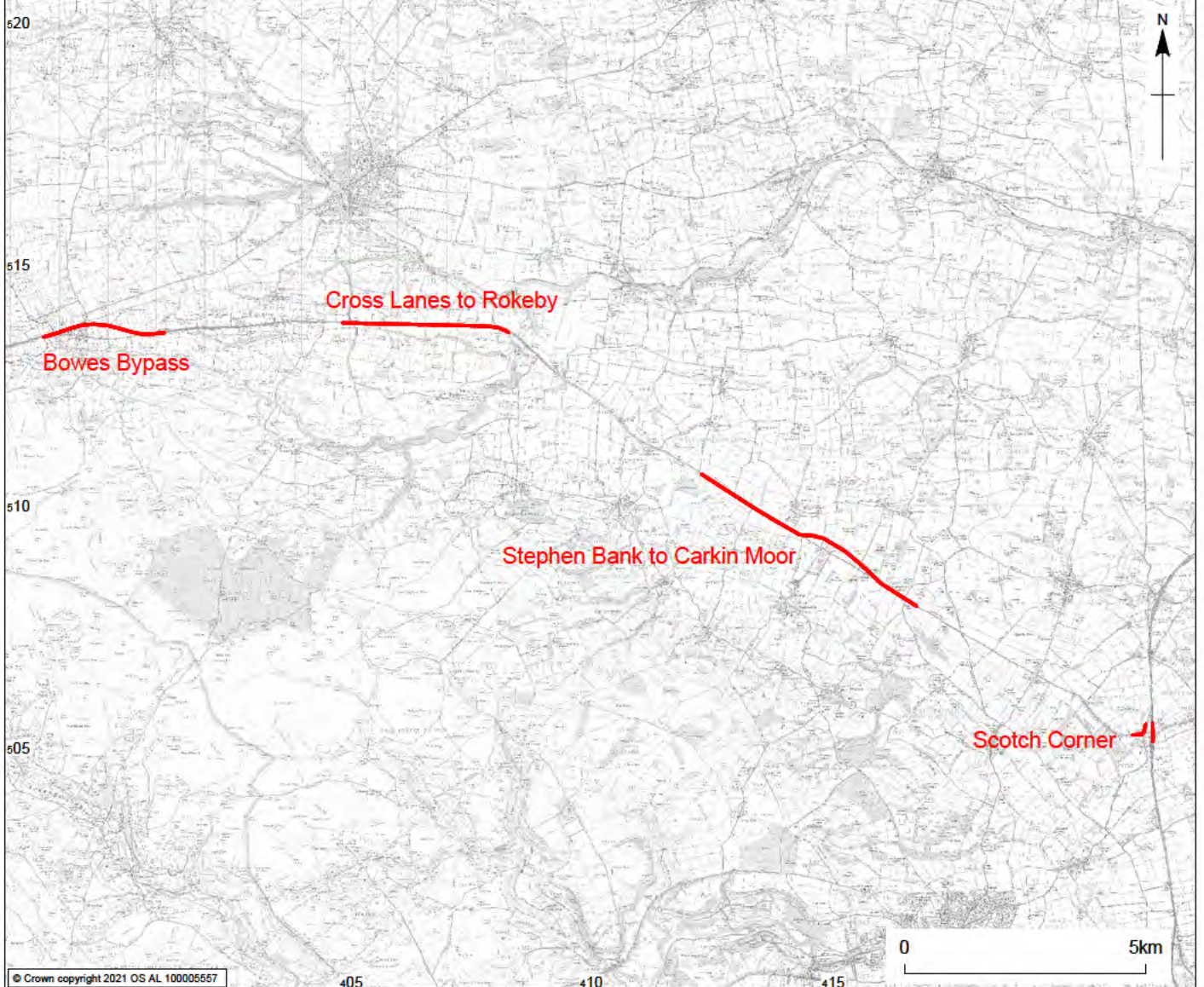
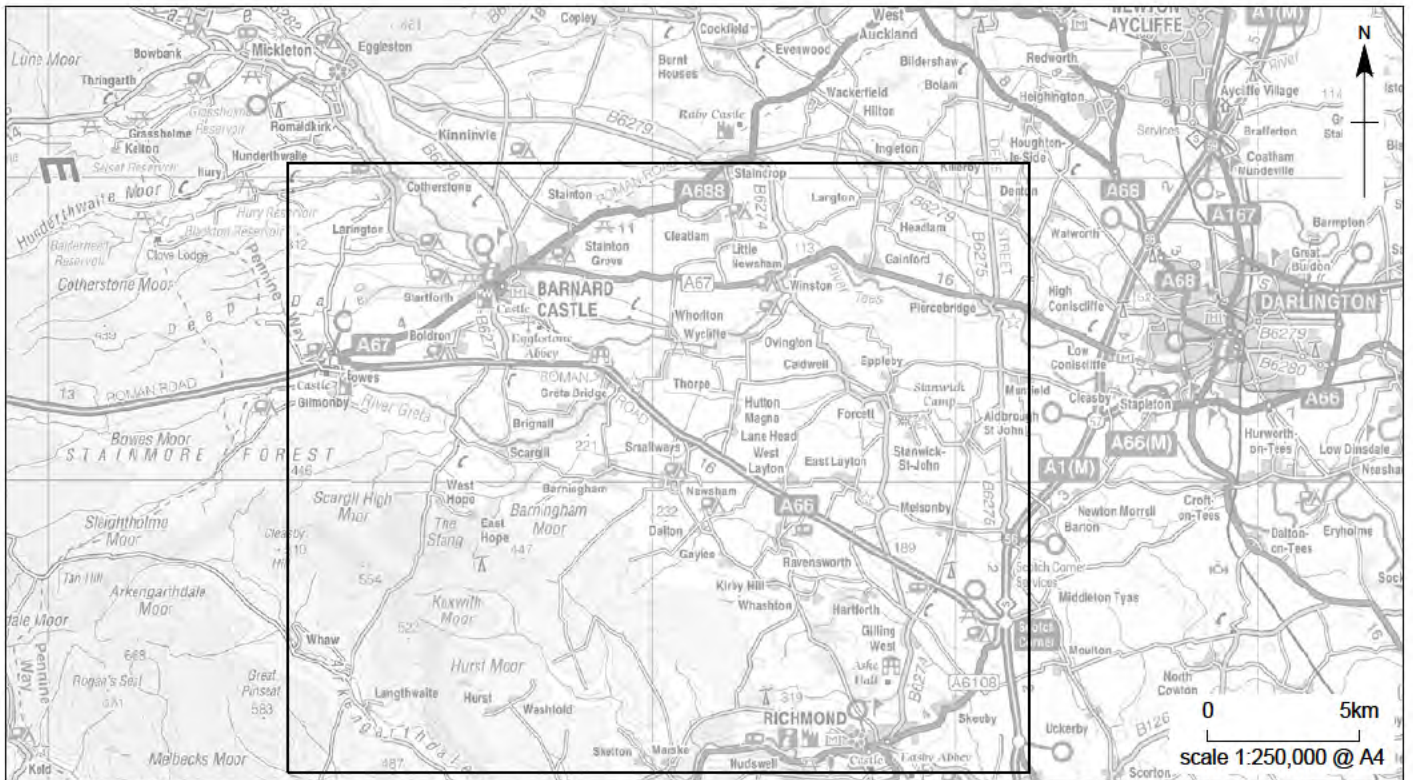
<b>Trial Pit</b>	<b>Deposit Sequence</b>
	0.3–2m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR002a	0.3m Topsoil (E-W plough-scars visible in clay beneath) 0.3–2.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR003	0.3m Topsoil 0.3–2m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR004	0.25m Topsoil 0.25–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR005	0.2m Topsoil 0.2–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
TP CLR006	0.2m Topsoil 0.2–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
TP CLR007	0.25m Topsoil 0.25–0.55m Subsoil overlying stones 14 0.55–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR008	0.2m Topsoil 0.2–0.4m Subsoil 0.4–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR009	0.2m Topsoil 0.2–0.4m Subsoil 0.4–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR010	0.25m Topsoil 0.25–0.7m Natural Yellow Clay 0.7–4m Dark Grey Boulder Clay
TP CLR011	0.3m Topsoil 0.3–0.8m Natural Yellow Clay 0.8–4.5m Dark Grey Boulder Clay
TP CLR012	0.25m Topsoil 0.25–0.55m Subsoil 0.55–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR013	0.25m Topsoil 0.25–0.35m Subsoil 0.35–3m Natural Brownish-Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR015	0.3m Topsoil 0.3–0.4m Subsoil 0.4–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR020	0.15m Topsoil 0.15–0.45m Subsoil 0.45–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
TP CLR023	0.2m Topsoil 0.2–0.45m Subsoil 0.45–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
<b>Stephen Bank to Carkin Moor</b>	
TP SBC001	0.25m Topsoil 0.25–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC002	0.15m Topsoil 0.15–2.5m Natural Orange-brown Stony, Gravelly Clay to Dark Grey Boulder Clay
TP SBC003	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC004	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC005	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Brownish-Yellow Clay to Dark Grey Boulder Clay
TP SBC006	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Brownish-Yellow Clay to Dark Grey Boulder Clay
TP SBC007	0.15m Topsoil 0.15–0.5m Subsoil 0.5–3.5m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC008	0.15m Topsoil 0.15–2m Natural Yellow Stony Clay to Dark Grey Boulder Clay

Trial Pit	Deposit Sequence
	2–5.5m Mudstone
TP SBC009	0.1m Topsoil 0.1–0.2m Subsoil 0.2–1.2m Natural Light-Yellow Clay 1.2–3.5m Dark Grey Boulder Clay
TP SBC010	0.2m Topsoil 0.2–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC011	0.2m Topsoil 0.2–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC012	0.4m Topsoil 0.4–0.8m Natural Yellow Stony Clay 0.8–3m Dark Grey Boulder Clay
TP SBC013	0.25m Topsoil 0.25–0.35m Subsoil 0.35–0.8m Natural Yellow Stony Clay 0.8–3m Dark Grey Boulder Clay
TP SBC014	0.3m Topsoil 0.3–0.7m Gravelly Subsoil 0.7–1.5m Natural Brownish-Yellow Stony Clay 1.5m Water table encountered
TP SBC015	0.25m Topsoil 0.25–0.35m Subsoil 0.35–0.8m Natural Brownish-Yellow Clay 0.8–3m Dark Grey Boulder Clay
TP SBC016	0.3m Topsoil 0.3–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC017	0.4m Topsoil 0.3–0.7m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC018	0.5m Topsoil <b>01, 03 – Fills of pits 02 and 04</b> <b>02, 04 – Cuts of pits</b> 0.5–0.8m Natural Yellow Clay 0.8–3.5m Dark Grey Boulder Clay
TP SBC019	0.4m Topsoil 0.4–1m Natural Yellow Clay 1–3m Dark Grey Boulder Clay
TP SBC020	0.3m Topsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC021	0.3m Topsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay Sandstone Bedrock outcrop at c.1m at northern edge.
TP SBC022	0.30m Topsoil 0.3–0.70m Natural Yellow Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC023	0.3m Topsoil 0.3–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC024	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC025	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC026	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC027	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC028	0.3m Topsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC029	0.2m Topsoil



Trial Pit	Deposit Sequence
	0.2–0.6m Natural Yellow Clay 0.6–3.5m Dark Grey Boulder Clay
TP SBC030	0.3m Topsoil 0.3–0.6m Natural Yellow Clay 0.6–1.6m Yellowish-Brown Sandy Clay 1.6–3.5m Dark Grey Boulder Clay
TP SBC031	0.2m Topsoil 0.2–3.2m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC032	0.3m Topsoil 0.3–0.8m Natural Yellow Clay 0.8–3.5m Dark Grey Boulder Clay
TP SBC033	0.4m Topsoil 0.4–1m Natural Yellow Clay 1–3m Dark Grey Boulder Clay
TP SBC034	0.25m Topsoil 0.25–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay.
TP SBC035	0.3m Topsoil 0.3–0.5m Subsoil 0.5–0.7m Natural Yellow Clay with lens of Bluish Grey Clay 0.7–1.2m Natural Yellow Sandy Clay 1.2–3.5m Dark Grey Boulder Clay
TP SBC036	0.3m Topsoil 0.3–0.70m Natural Yellow Stony Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC038	0.4m Topsoil 0.4–0.60m Subsoil 0.6–1.2m Natural Yellow Stony Clay 1.2 – 3.5m Dark Grey Boulder Clay
TP SBC039	0.3m Topsoil 0.3–0.70m Natural Yellow Stony Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC040	0.0.25m Topsoil 0.25–0.55m Subsoil 0.55–1.2m Natural Orange-Grey Sandy Clay 1.2-3.5m Dark Grey Boulder Clay
TP SBC041	0.2m Topsoil 0.2–3m Natural Yellowish-Brown Sandy Clay to Dark Grey Boulder Clay
TP SBC042	0.3m Topsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay 3.5m+ Laminated Sandstone Bedrock
TP SBC043	0.3m Topsoil 0.3–1.2m Natural Brownish-Yellow Sandy Clay 1.2-3.5m Dark Grey Boulder Clay
TP SBC044	0.0.25m Topsoil 0.25–0.55m Subsoil 0.55–1.2m Natural Brownish-Yellow Sandy Clay 1.2-3.5m Dark Grey Boulder Clay

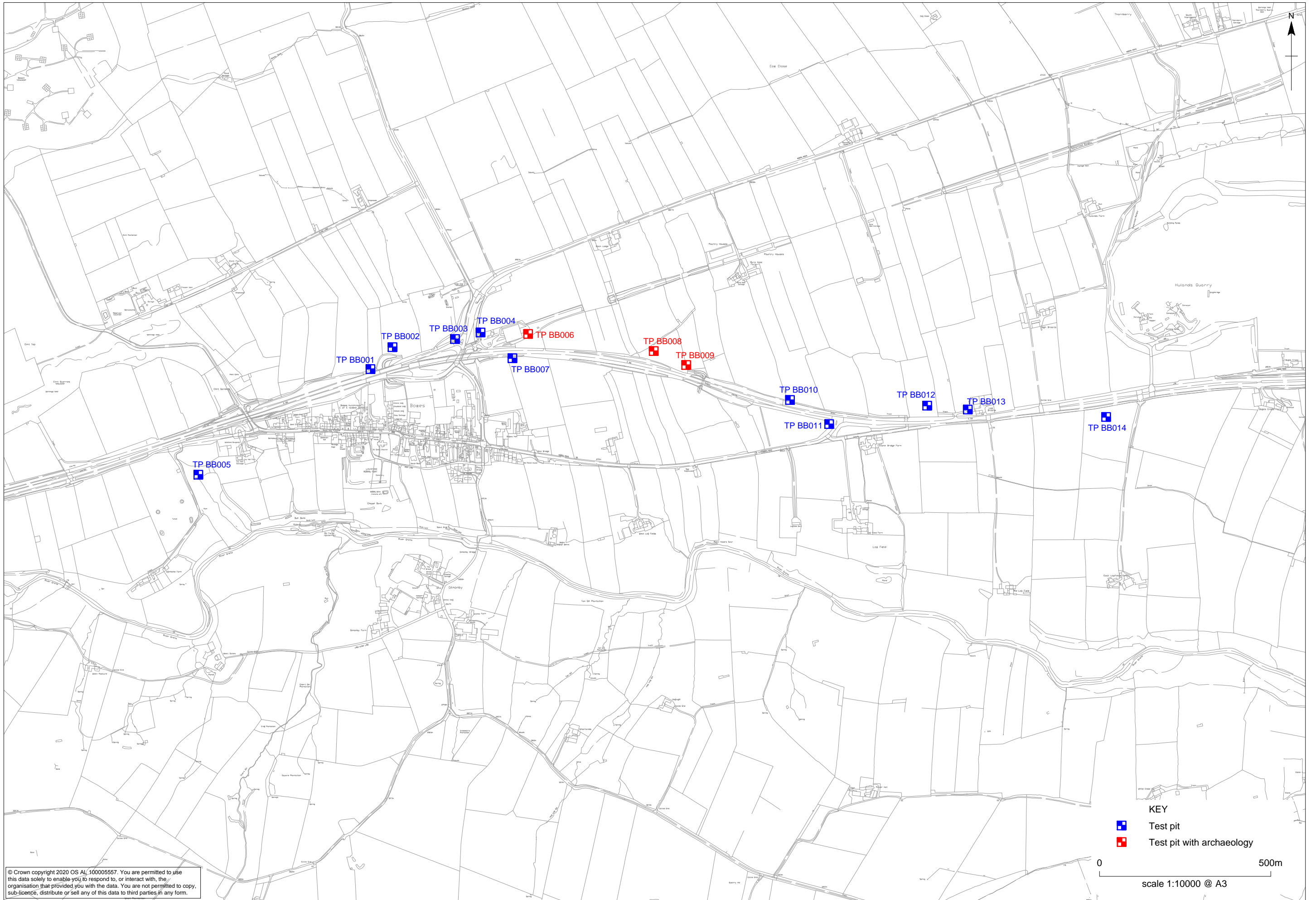




A66 Bowes to Scotch Corner: general location of ground investigations

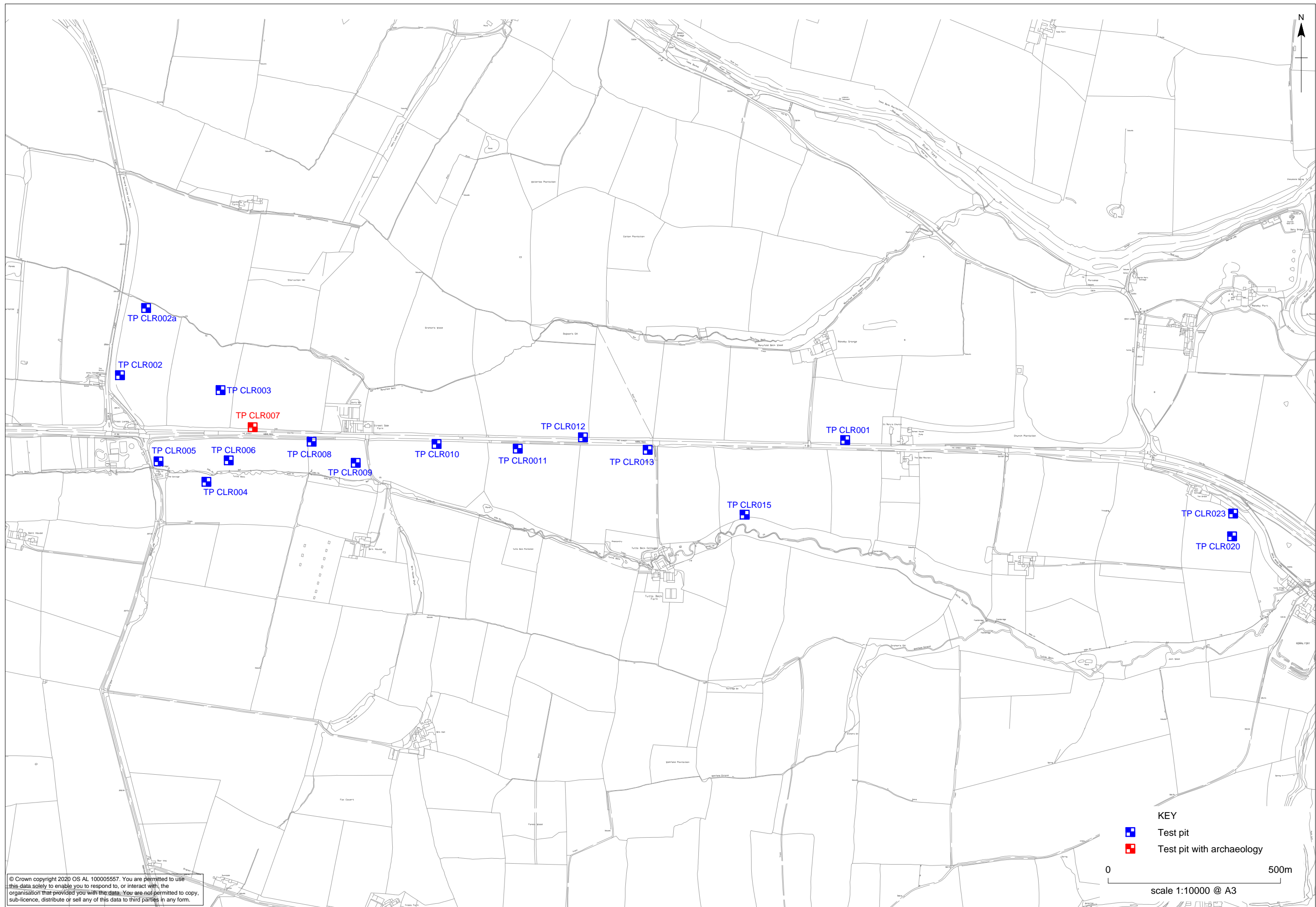
Figure 1





A66 Bows to Scotch Corner: location of test pits, Bows Bypass

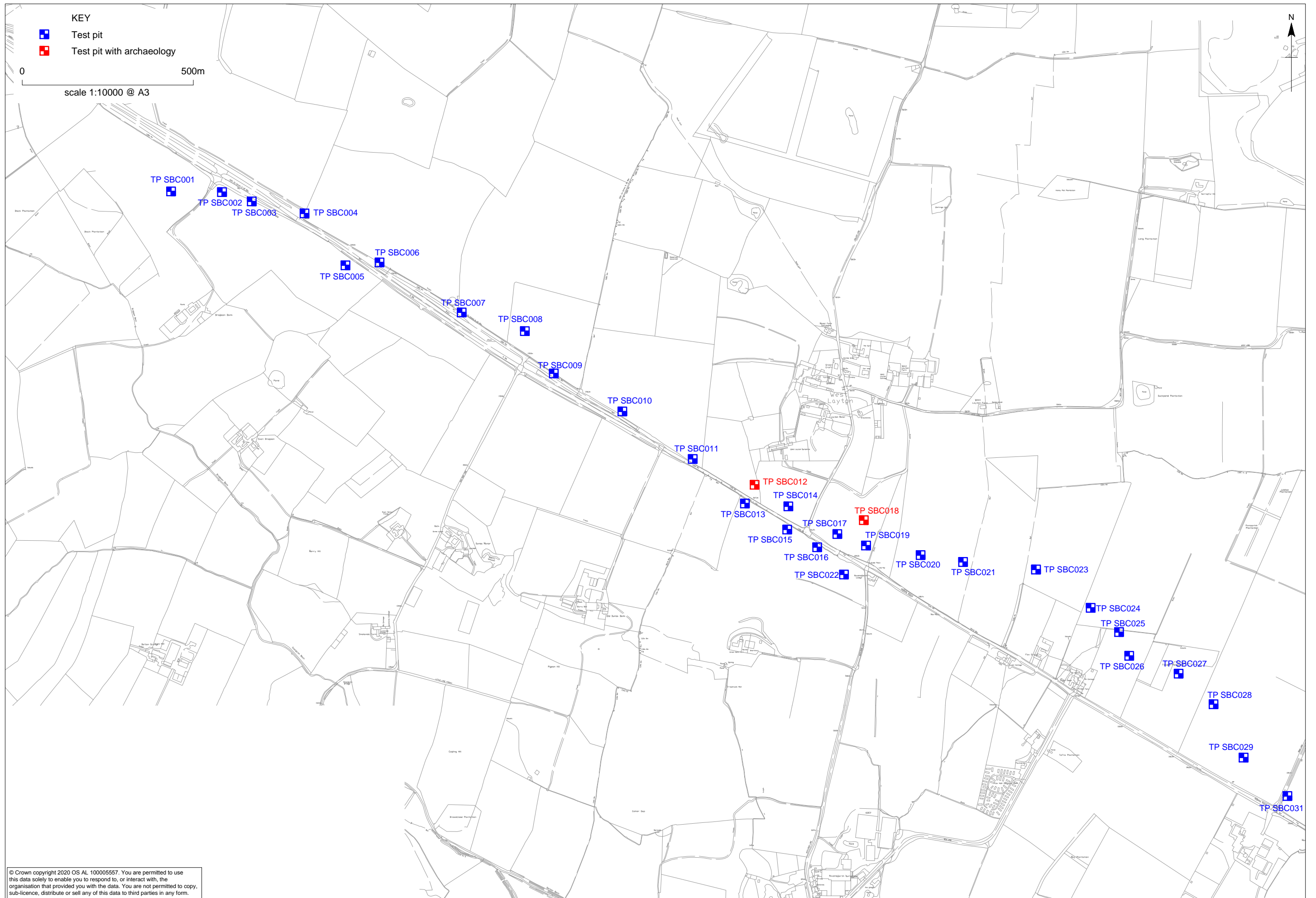
Figure 2



A66 Bowes to Scotch Corner: location of test pits, Cross Lanes to Rokeby

Figure 3

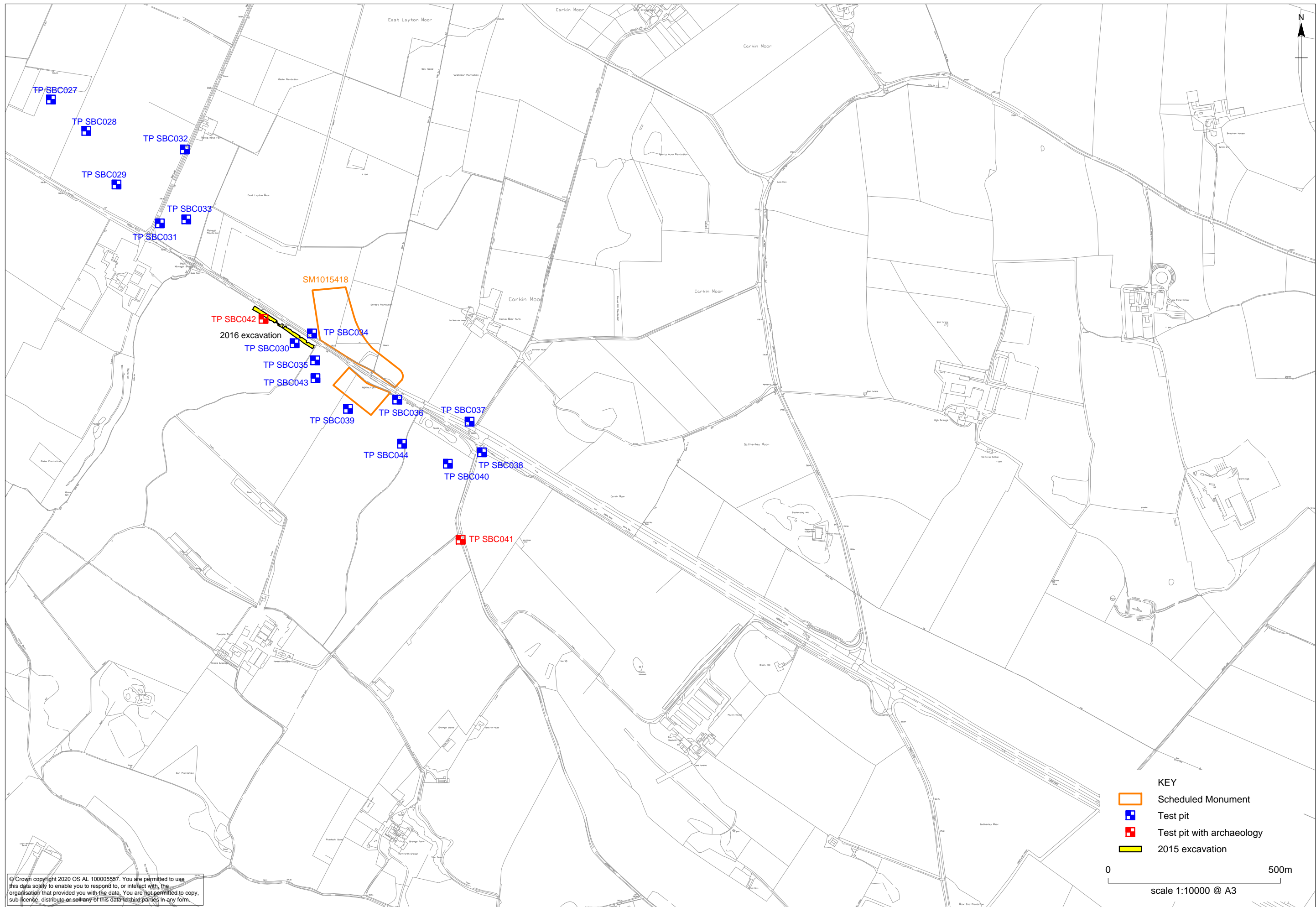




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A66 Bowes to Scotch Corner: location of test pits, Stephen Bank to Carkin Moor (north-west)

Figure 4



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A66 Bowes to Scotch Corner: location of test pits, Stephen Bank to Carkin Moor (south-east)

Figure 5

# A66 NORTH TRANS PENNINE SCHEME D SECTION 8



Final Factual Report  
(Rev.00)

**Allied  
Exploration &  
Geotechnics Ltd.**

Contract Number: 4322D  
Client: AMEY OW Limited  
Consulting Engineer: Arup

Date: September 2021

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## REPORT CONTROL SHEET

### Contract Details

Contract Title	A66 North Trans Pennine Scheme D Section 8
Contract Number	4322D
Location	Cross Lanes to Rokeby
National Grid Reference	Between NZ 049 139 and NZ 082 136

### Report Details

Report Status	Final (Rev.00)		
Report Type	Factual		
Volume Number	1	of	1
Copy Number	PDF	of	PDF
Report Recipient	Rob Nuthall	Arup	

### Client/Consultant Engineer Details

<b>Client</b> AMEY OW Limited Chancery Exchange 10 Furnival Street London EC4A 1AB	<b>Consultant Engineer</b> Arup Central Square Forth Street Newcastle upon Tyne NE1 3PL
---	--

### Signed & Approved On Behalf of Allied Exploration & Geotechnics Limited

Reports Engineer  Laura Clarke BSc (Hons).	Approved:	Date:
Technical Manager  Kerry Wade BSc (Hons), MSc, FGS, MCI		Date:
Managing Director  PP Nick Vater BSc (Hons), MSc, CGeol, EurGeol, FGS.		Date:
		15/09/2021
		15/09/2021
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6 NORTH TRANS PENNINE SCHEME D SECTION 8

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**FIELD DATA ENCLOSURES:**

Key Sheets	0
Exploratory Hole Location Plan	1
Borehole and Drillhole Records	2
Window/Windowless Sample Hole Records	3
Trial Pit Records	4
Groundwater Observation Made at the Time of Site Works	5
Groundwater Monitoring Results	6

**IN-SITU TESTING ENCLOSURES:**

Test Report Certificate	0
Standard Penetration Test Results	1
Hand Shear Vane Test Results	2
Variable Head Permeability Test Results	3
<i>In-situ</i> Water Quality Parameter Test Results	4
Photo-ionisation Detector Test Results	5
Determination of the Soil infiltration Rate for Soakaway Design Test Results	6
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**LABORATORY ENCLOSURES:**

Laboratory Report Certificate	0
Sample Description Sheets	1
Moisture Content/Plasticity Index and Moisture Content	2
Determination of Particle Density	3

Particle Size Distribution Sieving and Sedimentation	4
Determination of Chloride, Total Sulphur, Sulphate and pH (Tested Externally)	5
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**APPENDICES:**

Specialist Chemical Testing (Tested Externally)	Appendix I
Archaeological Monitoring Report	Appendix II

Abbreviation	Definition
CP	Cable Percussion
RC	Rotary Coring
RO	Rotary Openhole
WLS	Windowless Sampling

**Text Abbreviations**

## 1. INTRODUCTION

The investigation works were commissioned in order to determine the ground and groundwater conditions on site on the A66 between Cross Lanes and Rokeby prior to the proposed works.

Allied Exploration & Geotechnics Limited (AEG) were contracted by AMEY OW Limited with Arup acting in the capacity of Consulting Engineer to perform a ground investigation at this site in order to provide information on the subsurface ground and groundwater conditions as well as to obtain samples for geotechnical and specialist chemical testing.

### 1.1 Scope of Works

The investigation works consisted of the following main elements:

- Seven cable percussion boreholes, three of which were further advanced using rotary coring/openhole techniques.
- One drillhole advanced using rotary coring/openhole techniques.
- Three windowless sample holes, advanced using a removable liner system.
- Eighteen mechanically excavated trial pits.
- Associated sampling.
- *In-situ* standard penetration, hand shear vane, variable head permeability, water quality parameter photo-ionisation, soakaway and plate load testing.
- Installation of groundwater monitoring instrumentation.
- Post site works groundwater monitoring.

Site work was carried out between the 10<sup>th</sup> February and 10<sup>th</sup> March 2021 with subsequent post site work monitoring, laboratory testing and reporting thereafter. A factual report only was requested.

The comments and opinions expressed in this report are based on the ground conditions encountered during the site work and on the results of tests carried out in the field and in the laboratory. There may, however, be special conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report.

## 2. THE SITE

### 2.1 Location

The approximate National Grid Reference of the site is between NZ 049 139 and NZ 082 136. This can be found on Ordnance Survey 1:50,000 Sheet Number 92 (Barnard Castle, Richmond & Teesdale). Part of this sheet is reproduced as Figure 1, the Site Location Plan.

The site is located approximately 3km south of Barnard Castle in the fields adjacent to the A66.



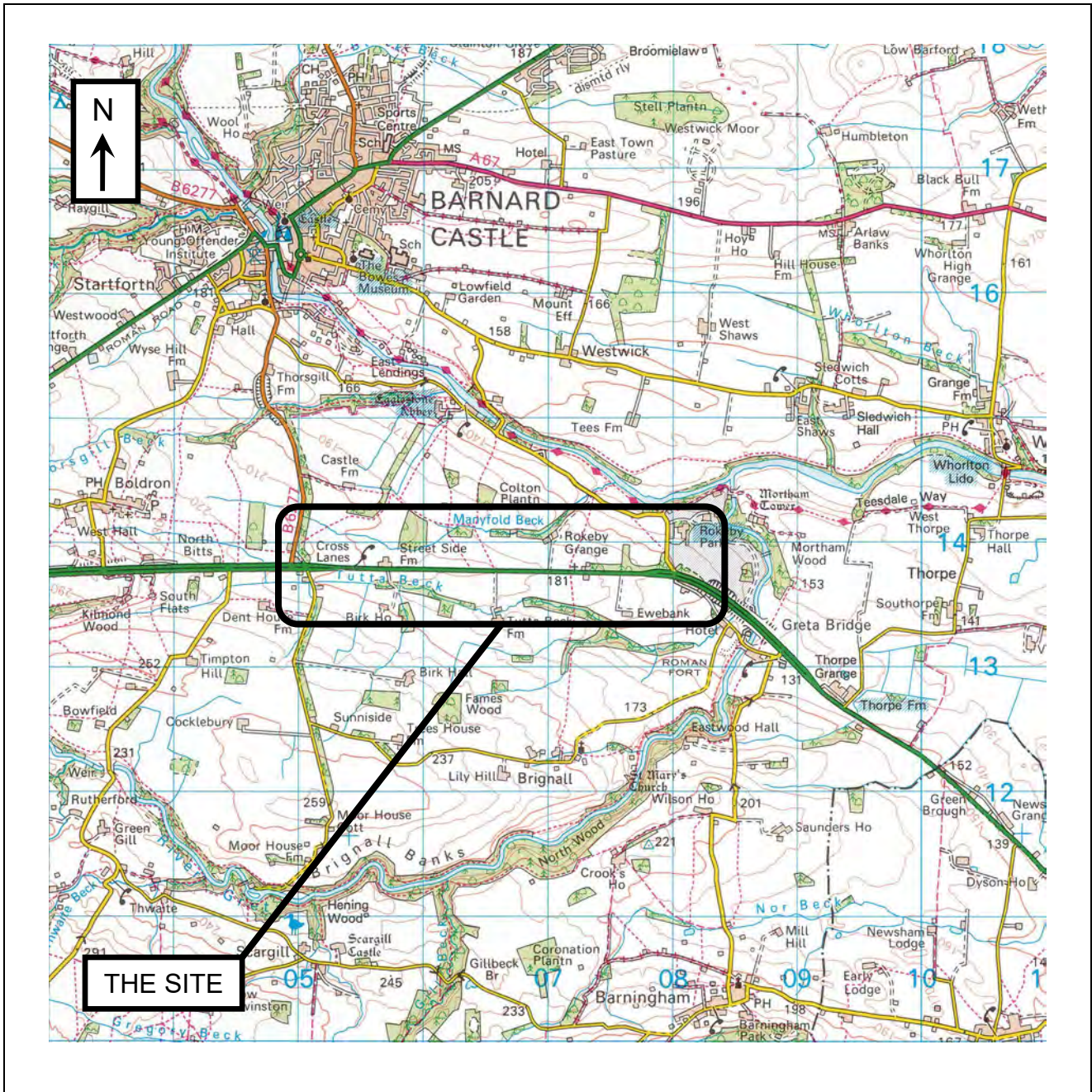


Figure 1: Site Location Plan

Reproduced from the Ordnance Survey 1:50,000 scale Landranger map by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, Crown Copyright. All rights reserved. Licence number AL 10002282.

## 2.2 Site Description and Topography

The site is located to the south of Barnard Castle and comprises a number of undulating fenced farm fields adjacent to the A66. The carriageway of the A66 mainly comprises of a single carriageway road on top of a raised embankment. The River Tees runs past the northwest of the site and another small water course, Tutta Beck, runs past the south of the site.

## 3. SITE OPERATIONS

### 3.1 General

All exploratory hole work, associated sampling, *in-situ* testing and logging was carried out in accordance with techniques outlined in Table 1, as appropriate; at positions as near as practicable to those supplied by the Consulting Engineer. These are shown on the Exploratory Hole Location Plan, Field Data Enclosure 1.

Reference Code Number	Title
BS 1377:1990	Methods of Test for Soils for Civil Engineering Purposes (where not in contravention or superseded by Eurocode references)
BS 5930:2015	Code of Practice for Ground Investigation (where not in contravention or superseded by Eurocode references)
BS EN ISO 14689-1:2003	Identification and Classification of Rock
BS EN ISO 14688-1:2002 & 14688-2:2004	Identification and Classification of Soil
BS 10175:2011+A2:2017	Investigation of Potentially Contaminated Sites
BS EN ISO 22476-3: 2005	Geotechnical investigation and testing - Field testing - Part 3 Standard Penetration Testing

**Table 1: British Standard Reference Code Number**

The depths of all exploratory holes, descriptions of the material encountered, details of any groundwater encountered, samples taken and *in-situ* testing carried out together with any other relevant information can be found on the Borehole and Drillhole Records (Field Data Enclosure 2), Window/Windowless Sample Hole (Field Data Enclosure 3) and Trial Pit Records (Field Data Enclosure 4). A key to all symbols and abbreviations used throughout the report is included in the Key Sheets.

The primary purpose of ground investigation exploratory holes is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusion should be drawn concerning the presence of, size, lithological nature, and numbers per unit volume of ground cobbles and boulders in soil types such as glacial till (boulder clay). With respect to rotary coring, driller's records and observations of the recovered core are used to determine any zones of no recovery (core loss). These zones are based on the interpretation of the logging engineer and are therefore subjective. Refer to the Key Sheets for further information.

Some of the works were undertaken with coordinated traffic management installed by Premier Traffic Management Limited along the carriageway to facilitate the investigation operation.

### 3.2 Environmental Considerations: Ecology Watching Brief

All positions were observed and cleared by an ecologist from specialist subcontractor AES. None of the exploratory holes were moved from their original locations due to any ecological constraints.

### 3.3 Environmental Considerations: Archaeology Watching Brief

An archaeological watching brief was undertaken at the site during the works by specialist subcontractor Northern Archaeological Associates Ltd. An archaeologist was present during the excavation of all trial pits on the site. On completion of the works a report was provided of their findings. This report is presented as Appendix II.

### 3.4 Health & Safety Considerations: Services

Prior to excavation each position was cleared of services by specialist subcontractor Discovery Surveys Ltd.

In addition, before the commencement of any exploratory hole a search for underground services was conducted as prescribed in HSE publication 'Avoiding Underground Services (HSG47)' and in accordance with in-house internal safety procedure AEG-14.

Service plans were provided by the Client and were consulted prior to using a service locating device (such as a Cable Avoidance Tool or C.A.T.) to scan a working area around the proposed exploratory hole location. Where no services were indicated a 'Permit-to-Work' form was issued by the investigation supervisor and, with the exception of trial pits, the position was commenced with a hand excavated inspection pit. The inspection pit was also scanned during the excavation procedure. It should be noted that the digging of an inspection pit only confirms or guards against the possible presence of underground public utility services within the excavated pit. Where no services were indicated by the scanning procedure or inspection pit the exploratory hole was commenced in accordance with the Contract Specification.

Where services were located or there was reasonable belief that they were present, the position was relocated in agreement with the Client. Details of any services uncovered/located during this investigation are given in Table 2.

Exploratory Hole Number	Type of Service	Orientation & Depth (size where indicated)	Status (Damaged/Undamaged)	Additional Remarks
TP CLR009	Clay drainage pipe	1.20m BGL	Damaged	Repaired

Table 2: Services Encountered

### 3.5 Exploratory Holes: Boreholes

Seven boreholes were sunk using either a Dando 2000 or a Dando 3000 drilling rig, utilising cable percussive (shell and clay cutter) techniques, to depths of between 2.10m (BH CLR001 & BH CLR001A) and 13.20m BGL (BH CLR003). Three of these boreholes were further advanced using a Comacchio GEO 205 drilling rig,



utilising rotary openhole/coring methods, to depths of either 15.70m (BH CLR003) or 20.00m BGL (BH CLR001A & BH CLR004A).

One drillhole was advanced using a Comacchio GEO 205 drilling rig, utilising rotary openhole/coring methods, to a depth of 16.95m BGL (BH CLR003A).

Rotary openhole drilling was performed using a various diameter tri-cone rock bits in combination with air/mist flush. Rotary coring employed a 'P' (121mm OD) barrel in combination with a P.C.D. drill bit together with air/mist flushing medium. This coring assembly was used to recover 92mm lined cylindrical specimens of rock core.

The Borehole and Drillhole Records are presented as Field Data Enclosure 2 and a summary of any relevant remarks are detailed in Table 3.

Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Installation	Remarks
BH CLR001	CP	2.10	No – reinstated	Terminated due to an obstruction.
BH CLR001A	CP+RO+RC	20.00	Yes – refer to Section 3.10	Advanced to required depth.
BH CLR003	CP+RC	15.70	No – reinstated	Advanced to required depth.
BH CLR003A	RC+RO	16.95	Yes – refer to Section 3.10	Terminated due to collapse.
BH CLR004	CP	3.20	No – reinstated	Terminated due to an obstruction
BH CLR004A	CP+RO+RC	20.00	Yes – refer to Section 3.10	Advanced to required depth.
BH CLR010	CP	7.50	Yes – refer to Section 3.10	Terminated due to an obstruction
BH CLR011	CP	6.80	Yes – refer to Section 3.10	Terminated due to an obstruction

Any relevant photographs are presented after the applicable Borehole/Drillhole Record

**Table 3: Borehole/Drillhole Summary**

### 3.6 Exploratory Holes: Window/Windowless Sample Holes

Three windowless sample holes were sunk using a Premier Compact 110 Series tracked rig utilising a removable liner system, to depths of between 2.50m (WS CLR005) and 4.65m BGL (WS CLR003). The Window/Windowless Sample Hole Records are presented as Field Data Enclosure 3 and a summary of any relevant remarks are detailed in Table 4.

Exploratory Hole Number	Drilling Method	Completion Depth (m BGL)	Installation	Remarks
WS CLR001	WLS	3.20	Yes – refer to Section 3.10	Terminated due to an obstruction
WS CLR003	WLS	4.65	Yes – refer to Section 3.10	Advanced to required depth.
WS CLR005	WLS	2.50	No – reinstated	Terminated due to an obstruction

Any relevant photographs are presented after the applicable Window/Windowless Sample Hole Record

**Table 4: Window/Windowless Sample Hole Summary**



### 3.7 Exploratory Holes: Mechanically Excavated Trial Pits

Eighteen trial pits were mechanically excavated using the back-hoe bucket of a JCB 3CX excavator to a maximum depth of 4.50m BGL. The Trial Pit Records are presented as Field Data Enclosure 4 and a summary of any relevant remarks are detailed in Table 5.

Exploratory Hole Number	Excavation Method	Completion Depth (m BGL)	Remarks
TP CLR001	Machine Excavated	3.90	Terminated due to no progress (hard ground).
TP CLR002	Machine Excavated	2.00	Terminated due to slow progress (hard ground).
TP CLR002A	Machine Excavated	4.20	Terminated due to slow progress (hard ground).
TP CLR003	Machine Excavated	4.20	Terminated due to slow progress (hard ground).
TP CLR004	Machine Excavated	4.50	Advanced to required depth.
TP CLR005	Machine Excavated	4.50	Advanced to required depth.
TP CLR006	Machine Excavated	4.50	Advanced to required depth.
TP CLR007	Machine Excavated	4.40	Terminated due to slow progress (hard ground).
TP CLR008	Machine Excavated	3.00	Terminated – unable to progress (hard ground).
TP CLR009	Machine Excavated	1.60	Terminated due to breaking clay field drain.
TP CLR009A	Machine Excavated	4.50	Advanced to required depth.
TP CLR010	Machine Excavated	4.50	Advanced to required depth.
TP CLR011	Machine Excavated	4.50	Advanced to required depth.
TP CLR012	Machine Excavated	4.20	Terminated due to slow progress.
TP CLR013	Machine Excavated	4.50	Advanced to required depth.
TP CLR015	Machine Excavated	4.50	Advanced to required depth.
TP CLR020	Machine Excavated	4.50	Advanced to required depth.
TP CLR023	Machine Excavated	4.00	Terminated due to boulder obstruction.

Any relevant photographs are presented after the applicable Trial Pit Record

**Table 5: Trial Pit Summary**

### 3.8 Samples

Representative samples of soil and rock were obtained from the exploratory holes and were taken to the laboratory for selected geotechnical and specialist chemical testing.

Environmental samples were taken in accordance with the contract specification during the investigation using an approved selection of container types in order to suit the encountered material properties and designated laboratory analytical parameters. Full chain of custody procedures were in place post sampling and during the transportation stage to the nominated specialist chemical laboratory. Environmental samples were administered appropriately following the best practice guidance provided in the contract specification.

### 3.9 Groundwater

The comments on groundwater conditions are based on the observations made at the time of investigation. It should be noted that groundwater levels may vary due to seasonal and other effects. Furthermore, water was added during advancement of the majority of boreholes in order to facilitate drilling operations. As a consequence there is a possibility that this could have masked the discrete ingress of natural groundwater into the boreholes and the drillhole, which subsequently may have been sealed as a result of progressing the casing.

Groundwater was encountered in a number of the exploratory holes during the site works operation. Where groundwater observations were made details are given on the relevant Exploratory Hole Record and in greater detail (collectively in tabulated format) as Field Data Enclosure 5: Groundwater Observations Made at the Time of Site Works. Standing water levels were also recorded in a number of boreholes at the beginning and/or end of each drilling shift. The water level is indicated on the applicable Borehole Record as part of the boring progress information.

Artesian water conditions were noted when extracting the casing from BH CLR003 at approximately 15.00m BGL. The hole was subsequently sealed with compressed bentonite cement and relocated to BH CLR003A. Artesian water was also encountered during the post site works monitoring period from the installation in BH CLR003A.

### 3.10 Instrumentation & Monitoring

Four boreholes, the drillhole and two windowless sample holes were installed with monitoring instrumentation in accordance with the requirements of the Consulting Engineer. Details of the installations are shown in Table 6 and on the relevant Exploratory Hole Records.

Exploratory Hole Number	Instrumentation	Installation Depth (m BGL)	Response Zone (m BGL)
BH CLR001A	1 No. 19mm diameter standpipe piezometer	15.50	15.00-6.00
BH CLR003A	1 No. 19mm diameter standpipe piezometer	6.00	5.00-7.00
BH CLR004A	1 No. 19mm diameter standpipe piezometer	4.00	3.00-5.00
BH CLR010	1 No. 19mm diameter standpipe piezometer	2.00	1.00-3.00
BH CLR011	1 No. 19mm diameter standpipe piezometer	3.00	1.00-3.00
WS CLR001	1 No. 19mm diameter standpipe piezometer	2.00	1.50-2.50
WS CLR003	1 No. 19mm diameter standpipe piezometer	2.00	1.00-3.00

**Table 6: Instrumentation Summary**

Instruments were monitored for groundwater on five occasions at weekly intervals after the completion of the site works in accordance with the Contract Specification. A record of the readings is presented as Field Data Enclosure 6 (Groundwater Monitoring Results).

Groundwater sampling was undertaken from selected installations during the first round of post site works monitoring. Water Quality Parameters were recorded for the purged water prior to sampling (see Section 4.5). Surface water samples were also taken during the first monitoring round at locations provided by the Consulting Engineer.

AEG were unable to undertake post site works monitoring/sampling from BH CLR001A, WS CLR001 and WS CLR003 due to landowner issues.

### 3.11 Operative Observations: Potential Contamination

For the purposes of determining the condition of the site, with regard to human health and environmental issues, reference should specifically be made to any specialist chemical testing undertaken as part of the investigation scheme, as well as any supporting desk study and risk assessment documentation. The information given herein collates the observations made by the operatives involved in the investigation only and comments that have been indicated on the engineering records.

Where there was potential evidence of contamination, principally as a consequence of olfactory and visual identification, information is provided in Table 7.

Exploratory Hole Number	Occurrence ( <i>in-situ</i> /surface/laboratory sample)	Visual / Olfactory / Laboratory Testing	Depth (m BGL)	Occurrence Type	Additional Remarks
No occurrences recorded during the investigation.					

**Table 7: Potential Contamination Encountered**

It should be stressed that the information provided herein is subjective, as it is based on the perceptions of individuals and not specialists routinely involved in the chemical determination of contaminated residues, liquors, vapours or solid contaminants.

### 3.12 Surveying

The investigation positions were surveyed after completion of site works using a Leica Smartrover (Model ATX 1230+ GNSS) GPS based instrument which provides corrected Ordnance Survey co-ordinates in real time to an accuracy of within  $\pm 30$ mm vertical and  $\pm 30$ mm horizontal. These positions have been subsequently plotted in AutoCAD® software and are shown on the Exploratory Hole Location Plan, Field Data Enclosure 1.

## 4. IN-SITU TESTING

### 4.1 General

*In-situ* testing as specified by the Consulting Engineer was carried out in selected boreholes, drillhole, windowless sample holes and trial pits in accordance with techniques outlined in the relevant British Standard and/or AEG Quality Procedure. The results are presented in the *In-situ* Testing Enclosures with a number of

the test results summarised at the relevant depth on the Borehole, Drillhole, Window/Windowless Sample Hole and Trial Pit Records.

#### 4.2 Standard Penetration Test Results

Standard Penetration Testing (SPT) was carried out in the boreholes, drillhole and windowless sample holes in accordance with techniques outlined in BS EN ISO 22476-3: 2005 in order to determine the relative density and consistency of the strata encountered. The 'N' value (number of blows per 300mm penetration) or the penetration per blow was recorded for each test. Uncorrected 'N' values or penetration per blow data are provided on the applicable Borehole, Drillhole and Window/Windowless Sample Hole Records. (Refer to page 6 of the key sheets for further details).

More detailed information concerning the standard penetration testing is given in *In-situ* Testing Enclosure 1 which includes the following;

- Initial exploratory hole conditions prior to the test procedure.
- Calibration and energy ratio ( $E_m$ ) information for the SPT hammer device used to carry out the test.
- A breakdown of blows for each 75mm penetration interval.
- Rod length ( $C_R$ ) and energy ( $C_E$ ) correction ratios.
- Uncorrected 'N' value.
- Corrected 'N<sub>60</sub>' value that applies the rod ( $C_R$ ) and energy ( $C_E$ ) corrections indicated.
- Pertinent remarks corresponding to the test procedure.

In addition to the above, a graph has been prepared for each exploratory hole which plots the uncorrected and corrected 'N' value results against depth. Calibration certificates for the SPT apparatus used during the testing procedure are also presented for reference within this *In-situ* Testing Enclosure.

#### 4.3 Hand Shear Vane

Hand shear vane testing using calibrated Edeco Pilcon Hand Vane equipment was carried out in the exploratory holes in accordance to the ground conditions encountered. The results are presented in detail within *In-situ* Testing Enclosure 2 with the average peak and residual shear strength values provided on the applicable Borehole, Window/Windowless Sample Hole and Trial Pit Records.

#### 4.4 Variable Head Permeability Testing

Four variable head (rising) permeability tests were carried out in selected standpipe installations in accordance with the requirements of the Consulting Engineer utilising the methods described in BS5930: Section 4:1999. The data is presented in *In-Situ* Testing Enclosure 3 with reference to the individual tests carried out during drilling made in the general remarks section of the relevant Borehole and Window/Windowless Sample Hole Record.



#### 4.5 *In-situ* Water Quality Parameter Testing

Groundwater sampling was undertaken from selected installations during the first round of post site works monitoring in accordance with techniques outlined in the relevant British Standard and/or AEG Quality Procedure. Water Quality Parameters were recorded for the purged water prior to sampling. The parameters tested were pH, temperature, electrical conductivity, redox potential and dissolved oxygen. The results are presented in tabular format as *In-situ* Testing Enclosure 4.

#### 4.6 Photo Ionisation Detector (PID)

Photo-ionisation detector (PID) screening for semi-volatile and volatile organic compounds was conducted on selected environmental samples taken during the investigation using a MiniRAE 2000. The results for the sample based PID tests are recorded in tabular format as *In-situ* Testing Enclosure 5 and, where applicable, on the Exploratory Hole Records.

#### 4.7 Soil Infiltration Determination (Soakaway Design)

Four Soakaway tests were carried out in selected trial pits utilising the methods described in BRE Digest 365:1991, in accordance to the requirements of the Consulting Engineer. The results are presented in *In-Situ* Testing Enclosure 6 with reference to the individual test carried out in the general remarks section of the relevant Trial Pit Record.

#### 4.8 Plate Load Testing

Plate load and zone pad load testing was carried out at seven nominated locations within the investigated area. Results from this work are presented in *In-situ* Testing Enclosure 7.

### 5. LABORATORY TESTING

#### 5.1 General

Laboratory testing as scheduled by the Consulting Engineer was carried out on selected samples in accordance with techniques outlined in BS 1377:1990, AEG Laboratory Quality Procedures or other appropriate standard as quoted.

#### 5.2 Geotechnical Testing

The results are presented in the Laboratory Enclosures with an outline list of the procedures undertaken given in Table 8.

Test	Procedure
Moisture Content	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)
Plasticity Index and Moisture Content	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)
Determination of Particle Density	BS 1377 Part 2 1990
Particle Size Distribution Sieving	BS 1377 Part 2 1990

Particle Size Distribution Sedimentation	BS 1377 Part 2 1990
Determination of Chloride, Total Sulphur, Sulphate and pH (Tested externally)	See External Laboratory Certificates
Determination of Dry Density/Moisture Content Relationship	BS 1377 Part 4 1990
Determination of MCV / Moisture Relationship	BS 1377 Part 4 1990
Determination of California Bearing Ratio	BS 1377 Part 4 1990
Determination of One Dimensional Consolidation Properties	BS 1377 Part 5 1990
Shear Strength by Hand Vane	BS 1377 Part 7 1990
Undrained Shear Strength in Triaxial Cell without Pore Water Pressure Measurement	BS 1377 Part 7 1990
Moisture Content of Rock	ISRM 1981
Determination of Point Load Index	ISRM 1985
Determination of Unconfined Compressive Strength (Tested externally)	See External Laboratory Certificates

**Table 8: Geotechnical Testing**

### 5.3 Specialist Chemical Testing

Selected samples have been submitted for chemical analysis as specified by the Consulting Engineer, conducted under a subcontract arrangement with Derwentside Environmental Testing Services (DETS). The results of this testing are presented as Appendix I.

### 5.4 Laboratory Identified Asbestos

Selected samples were analysed for asbestos content as specified by the Consulting Engineer. Any identified asbestos is presented in Table 9 which has been summarised from specialist chemical testing results (see Appendix I for further details).

Exploratory Hole Number	Occurrence	Depth (m BGL)	Occurrence Type	Additional Remarks
No asbestos was detected within the samples selected for testing by the Consulting Engineer				

**Table 9: Laboratory Identified Asbestos**

## Key Sheets





# Allied Exploration and Geotechnics Limited

## Key Sheets



### INTRODUCTION

The following explanatory notes define the terminologies, abbreviations and symbols pertaining to each individual column or section of the Exploratory Hole records. 'Exploratory Hole' is used as a general term in this report to comprise borehole, drillhole, and trial pit. All exploratory hole records have been produced using 'gINT®', which is an integrated software environment for the storage and manipulation of subsurface data.

The primary purpose of ground investigation exploratory holes is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusion should be drawn concerning the presence of, size, lithological nature, and numbers per unit volume of ground cobbles and boulders in soil types such as glacial till (boulder clay). With respect to rotary coring, driller's records and observations of the recovered core are used to determine any zones of no recovery (core loss). These zones are based on the interpretation of the logging engineer and are therefore potentially subjective. In addition, where relevant, every effort is made to highlight material/zones that may relate to suspected old workings. However, it should be noted that this is not straightforward (especially without detailed information regarding anticipated subsurface conditions) and therefore no guarantee can be made with regards to the accuracy of the interpretation of the recovered core.

### INFORMATION COMMON TO ALL EXPLORATORY HOLE RECORDS

#### Status Box

The status box in the top right hand corner of each exploratory hole record gives the status of each individual record i.e. PRELIM1, PRELIM2, PRELIM3 FINAL etc. The date shown relates to the last instance the data was revised. This information is for AEG Quality Assurance only.

#### Exploratory Hole No

The identity number used throughout the report.

#### Project

The ground investigation project name. Occasionally the project name may be shortened or abbreviated due to string length restraints imposed by the gINT® computer programme.

#### Client

Client's name responsible for funding the ground investigation project. The Client's name may be shortened or abbreviated due to string length restraints imposed by the gINT® computer programme.

#### Location

The exploratory hole position given as either national grid co-ordinates, local grid if specified, or a reference name normally pertaining to the area of investigation.

#### Method (Equipment)

Represents the drilling, excavation or boring method(s) or equipment used.

#### Ground Level (m(AOD))

The precise ground level in metres above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated.

#### Date

The date relating to the start of the exploratory hole excavation.

#### Sheet

The sheet number and total number of sheets for the particular record.

#### Checked By

Printed signature of the person who has carried out the technical quality check on the log.

#### Logged By

The name of the engineer who has carried out the logging of the exploratory hole.

#### Contract No.

The Allied Exploration & Geotechnics Limited reference number for the project.





# Allied Exploration and Geotechnics Limited

## Key Sheets






### INFORMATION RELEVANT TO BOREHOLE AND WINDOW/WINDOWLESS SAMPLE HOLE RECORDS

#### Sample & Tests Columns

- Depth The depth over which a sample or test is taken is shown in depth column of the exploratory hole record in a "from...to" format.
- Type No Indicates the type of sample/test and number given by the driller.
- Test Result Result of the test given in the applicable units.

#### Water Column

- Water Strike Level of groundwater strike within an exploratory hole. The symbol  denotes a water strike and is suffixed with a number, which indicates the strike order. The corresponding unfilled symbol  is the depth the strike rose to.
- Seepage Groundwater seepage within an exploratory hole is denoted by the  symbol.

#### Strata Columns

- Reduced Level The corresponding reduced level of each soil or rock boundary in metres Ordnance Datum.
- Legend A graphical representation of the materials encountered using BS 5930 recommended symbols for soil and rock.
- Depth (Thickness) The depth below ground level of each soil or rock boundary in metres and the thickness of each individual stratigraphic unit (given in brackets).
- Description Engineering description of each individual soil or rock type follows recommendations outlined in the current BS 5930 with the following implementation:
- The amendment of section 6 incorporates the guidance indicated in BS EN ISO 14688-1, BS EN ISO 14688-2 and BS EN ISO 14689-1 European Standard with particular emphasis on current UK practice.
  - Supplementary laboratory or in-situ assessed measurements of undrained strength are provided where applicable information is available in parenthesis in accordance with BS 5930 after the field strength determined consistency. The description based measurement table indicating the quantitative undrained strength classification divisions is provided in Key Sheets Table 1.

Term based on measurement	Undrained strength classification definition cu, in kPa (from BS EN ISO 14688-2, 5.3, Table 6)
Extremely low	<10
Very low	10-20
Low	20-40
Medium	40-75
High	75-150
Very High	150-300
Extremely High	300-600

KEY SHEETS TABLE 1

- Cobble and boulder content is expressed in accordance with the terms provided in BS5930 where visually identified in trial pit excavations, or inferred/recovered during the drilling operations. The assessment of frequency and spatial occurrence of coarse and very coarse rock material should not be considered as precise, but only an indicator or estimate of the potential conditions. It should be noted that the recovery of coarse or very coarse particles in boreholes is dependent on the limitations imposed by the casing diameter. The terminology used is outlined in Key Sheets Table 2.



# Allied Exploration and Geotechnics Limited

## Key Sheets



Fraction	Percent by Mass	Term
Boulders	<5	Low boulder content
	5 to 20	Medium boulder content
	>20	High boulder content
Cobbles	<10	Low cobble content
	10 to 20	Medium cobble content
	>20	High cobble content

KEY SHEETS TABLE 2

- 4 Rock Strength based on assessed field or measured unconfined compressive strength follows the classification scheme given in BS5930 as outlined in Key Sheets Table 3.

Term for use in field or based on measurement	Definition for field use	Definition on basis of Unconfined Compressive Strength measurement (MPa)	Superseded Classification of Rock Strength: Terminology (Strength Range MPa)	Definition for field use
Extremely weak	Scratched by thumbnail, gravel size lumps can be crushed between finger and thumb.	0.6-1.0	<i>Extremely weak (0.6-1.0)</i>	<i>Can be indented by thumbnail. Gravel sized lumps crush between finger and thumb.</i>
Very weak	Scratched by thumbnail, lumps can be broken by heavy hand pressure, can be peeled easily by a pocket knife, crumbles under firm blows with point of geological hammer.	1-5	<i>Very weak (1-5)</i>	<i>Crumbles under firm blows with point of geological hammer. Can be peeled by a pocket knife.</i>
Weak	Thin slabs, corners or edges can be broken off with hand pressure, can be peeled by a pocket knife, shallow indentations made by firm blow with point of geological hammer.	5-12.5	<i>Weak (5-25)</i>	<i>Can be peeled by a pocket knife with difficulty. Shallow indentations made by firm blow with the point of geological hammer.</i>
Moderately Weak	Thin slabs, corners or edges can be broken off with hand pressure, can be scratched with difficulty by pocket knife, hand-held specimen can be broken with single firm blow of geological hammer.	12.5-25		
Medium Strong	Cannot be scraped or peeled with a pocket knife, specimen on a solid surface can be fractured with single firm blow of geological hammer.	25-50	<i>Medium Strong (25-50)</i>	<i>Cannot be scraped with pocket knife. Can be fractured with a single firm blow of geological hammer.</i>
Strong	Specimen requires more than one blow of geological hammer to fracture it.	50-100	<i>Strong (50-100)</i>	<i>Requires more than one blow of geological hammer to fracture.</i>
Very Strong	Specimen requires many blows of geological hammer to fracture it.	100-250	<i>Very Strong (100-250)</i>	<i>Requires many blows of geological hammer to fracture.</i>
Extremely strong	Specimen can only be chipped with geological hammer.	>250	<i>Extremely strong (&lt;250)</i>	<i>Can only be chipped with geological hammer.</i>
Based on BS EN ISO 14689-1 4.2.7, Table 2			Based on BS EN ISO 14689-1:2003 4.2.7, Table 5 (Superseded Version)	

KEY SHEETS TABLE 3

- 5 Where 'rock weathering classification' can be applied it is 'Approach 4' which will be used. If any other approach is used the factual text of the report will provide details of the applicable specific approach. (Ref.: BS5930). An outline of the 'Approach 4' rock weathering classification scheme is provided as Key Sheets Table 4.

APPROACH 4 CLASSIFICATION INCORPORATING MATERIAL AND MASS FEATURES		
Class	Classifier	Typical characteristics
A	Unweathered	Original strength, colour, fracture spacing
B	Partially weathered	Slightly reduced strength, slightly closer fracture spacing, weathering penetrating in from fractures, brown oxidation
C	Distinctly weathered	Further weathered, much closer fracture spacing grey reduction
D	Destructured	Greatly weakened, mottled, ordered lithorelics in matrix becoming weakened and disordered, bedding disturbed.
E	Residual or reworked	Matrix with occasional altered random or 'apparent' lithorelics, bedding destroyed. Classed as reworked when foreign inclusions are present as a result of transportation.

KEY SHEETS TABLE 4



# Allied Exploration and Geotechnics Limited

## Key Sheets



### Instrument/Backfill Column

A graphical representation of backfill material or instrumentation detail using graphic legends. Its placement in the column is relative to depth in metres and corresponds to the exploratory hole in scale.

### Boring Progress and Water Observations Columns

This section provides information on each day's production as a daily log.

Date	Date of shift.
Depth	Depth of hole at the start of the shift.
Casing	Casing's depth at the start of the shift.
Casing Dia	Casing's diameter at the start of the shift.
Water Depth	Water level within the borehole at the start and end of shift.

### Chiselling Columns

Indicates where hard strata occurred in the borehole and breaking out was carried out to advance the borehole.

From	The depth commenced.
To	The depth finished.
Hours	The time spent for breaking out.

### Water Added Columns

Indicates the depth range where water was added to the borehole to facilitate boring or to prevent stress relief disturbance "blowing/boiling" in granular soils.

From	Depth in metres from where water was added.
To	Depth in metres to where water was added.

### General Remarks

Any remarks believed to be relevant to the exploratory hole.

### INFORMATION RELEVANT TO PIT/TRENCH RECORDS

The pit/trench records follow the same format as the borehole and window/windowless sample hole records for the Samples & Tests, Water and Strata columns. However, in addition to these there are the following:

#### Plan

A schematic plan view of the pit showing its excavated dimensions together with its orientation, given as a compass bearing to magnetic north.

#### Groundwater

Notes on water bearing horizons.

#### Stability

The engineer's comments outlining the stability of the sides during pit excavation.

#### General Remarks

The engineer's comments of any other information relevant to construction of the pit.

#### Additional Information

An indication if a sketch and/or photographs accompany the record.



# Allied Exploration and Geotechnics Limited

## Key Sheets



### Underground Services

Depth	Depth service was encountered.
Orientation	Orientation given as a compass bearing to magnetic north.
Type	Type of service encountered.
Diameter	Diameter of service encountered.
Condition	Condition the service encountered was noticed in.

### INFORMATION RELEVANT TO DRILLHOLE RECORDS AND ROTARY CONTINUATION

#### Run Details Columns

Depth	Each drill run is highlighted by a horizontal line with the top and bottom depths shown in metres. Core diameter (C Dia) is presented also within each run.
TCR (SCR) RQD	Information provided on the total core recovery, solid core recovery and rock quality designation. Refer to Abbreviations for further details.
Fracture Index	Information given relating to the fracture index of the rock.

#### Strata Columns

As the strata columns for borehole and window/windowless sample hole records except for description which is as follows:

Discontinuities Detail	Information on core discontinuities, localised variations in weathering, lithology, strength and structure follows recommendations outlined in BS5930.
Main	Engineering description of each individual soil or rock type follows recommendations outlined in BS5930.

#### Instrument/Backfill Column

A graphical representation of backfill material or instrumentation detail using graphic legends. Its placement in the column is relative to depth in metres and corresponds to the exploratory hole in scale.

#### Drilling Progress and Water Observations Columns

Date	Date of shift.
Depth	Depth of hole at the start of the shift.
Casing	Casing's depth at the start of the shift.
Water Strike	Depth at which water was encountered.
Water Standing	Depth at which water in the hole levelled off.
Water Remarks	Any remarks believed to be relevant to the water e.g. Artesian.

#### Standard Penetration Test

Depth	The depth commenced.
Type	Type of standard penetration test (SPT).
Result	Result of SPT.

#### Flush

From	The depth commenced.
To	The depth finished.
Type	Details of the type of flush used. A = Air, F = Foam, W = Water and Pol = Polymer.
Returns	An indication of the percentage of the returned flush material.

#### General Remarks

Any remarks believed to be relevant to the exploratory hole.





# Allied Exploration and Geotechnics Limited

## Key Sheets



### SAMPLES

B	Bulk disturbed sample.
ES	Environmental soil sample.
EW	Environmental water sample.
G	Gas sample.
J	Small disturbed sample.
LB	Large bulk disturbed sample.
P	Piston sample.
P*	An attempted but failed undisturbed piston sample.
U	Undisturbed sample.
U*	An attempted but failed general purpose undisturbed sample.
U <sub>(ss)</sub>	Sample has been subsampled.
ES <sub>(U)</sub>	Brackets following a sample denotes a subsample. The sample information within the brackets is the origin of the subsample.
W	Water sample.

### IN-SITU TESTS

CBR	California Bearing Ratio mould sample or test.
HSV	In-situ hand shear vane.
HSV*	An attempted but failed in-situ hand shear vane.
HSV result of e.g. 80(20)kPa	Denotes average HSV peak result followed by average HSV residual result (in brackets).
HP	Hand penetrometer test.
K (F)	Falling head permeability test.
K (R)	Rising head permeability test.
K (C)	Constant head permeability test.
K (P)	Packer permeability test.
PT	Pressuremeter test.
PID	Photo ionisation detector test.
FID	Flame ionisation detector test.
S	Standard Penetration Test (SPT) using the split barrel sampler (shoe). The corresponding uncorrected 'N' value is given in the test result column with more detailed information provided in the In-Situ Testing Enclosures where applicable. Testing has been conducted in accordance with BS EN ISO 22476-3.
C	Denotes SPT test using a solid cone in preference to the split barrel sampler (usually in coarse granular soil) with all other reporting requirements as outlined above for the split barrel sampler.
S/C result of e.g. 1/2.94	Denotes where full penetration has not been achieved during the SPT test. In such cases the penetration (mm) per blow is recorded in the test result column e.g. 1/2.94 is 2.94mm of penetration per single blow.
SV	In-situ down-the-hole shear vane test. The remoulded shear strength is given in brackets.

### ROCK QUALITY AND CORE RECOVERY

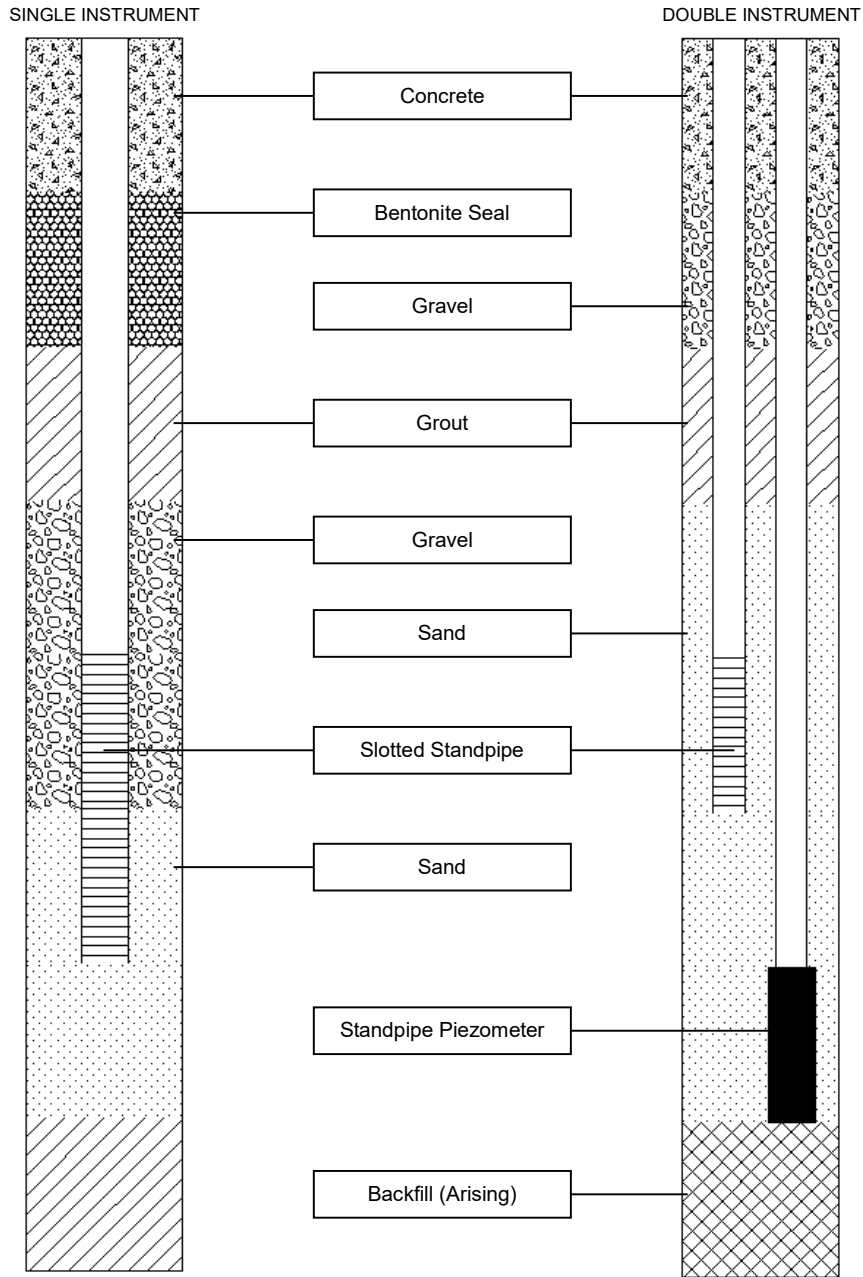
TCR	Total Core Recovery - the length of the recovered core expressed as a percentage of the length of core run.
SCR	Solid Core Recovery - the sum length of all core pieces that are recovered with at least one full diameter, expressed as a percentage of the length of core run.
RQD	Rock Quality Designation - The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.
FI	Fracture Index - The number of fractures per 1000mm length of solid core.
NI	Non-intact - The material recovered in a non-intact state.
NR	No recovery from the core run. These zones are based on the interpretation of the logging engineer and are therefore potentially subjective.



# Allied Exploration and Geotechnics Limited Key Sheets



Symbols and Abbreviations: Explanation of Instrumentation Legends Used





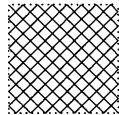
# Allied Exploration and Geotechnics Limited

## Key Sheets

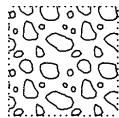


Symbols and Abbreviations: Explanation of Legends Used

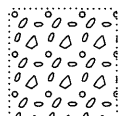
Soils	Rocks		
	<i>Sedimentary</i>	<i>Metamorphic</i>	<i>Igneous</i>



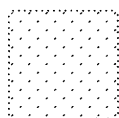
Made Ground



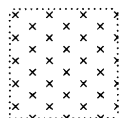
Cobbles and Boulders



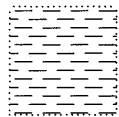
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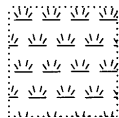
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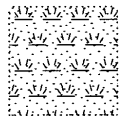
Silt



Clay

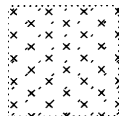


Peat

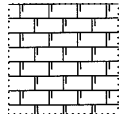


Topsoil

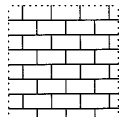
Note: Composite soil types will be signified by combined symbols e.g.



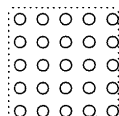
Silty Sand



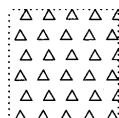
Chalk



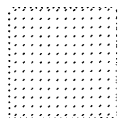
Limestone



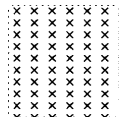
Conglomerate



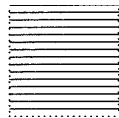
Breccia



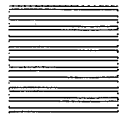
Sandstone



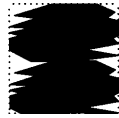
Siltstone



Mudstone



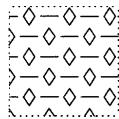
Shale



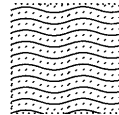
Coal



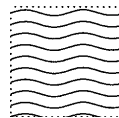
Pyroclastic  
(Volcanic Ash)



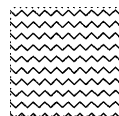
Gypsum



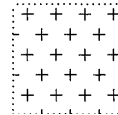
Coarse  
Grained



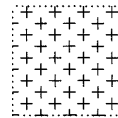
Medium  
Grained



Fine Grained



Coarse  
Grained



Medium  
Grained

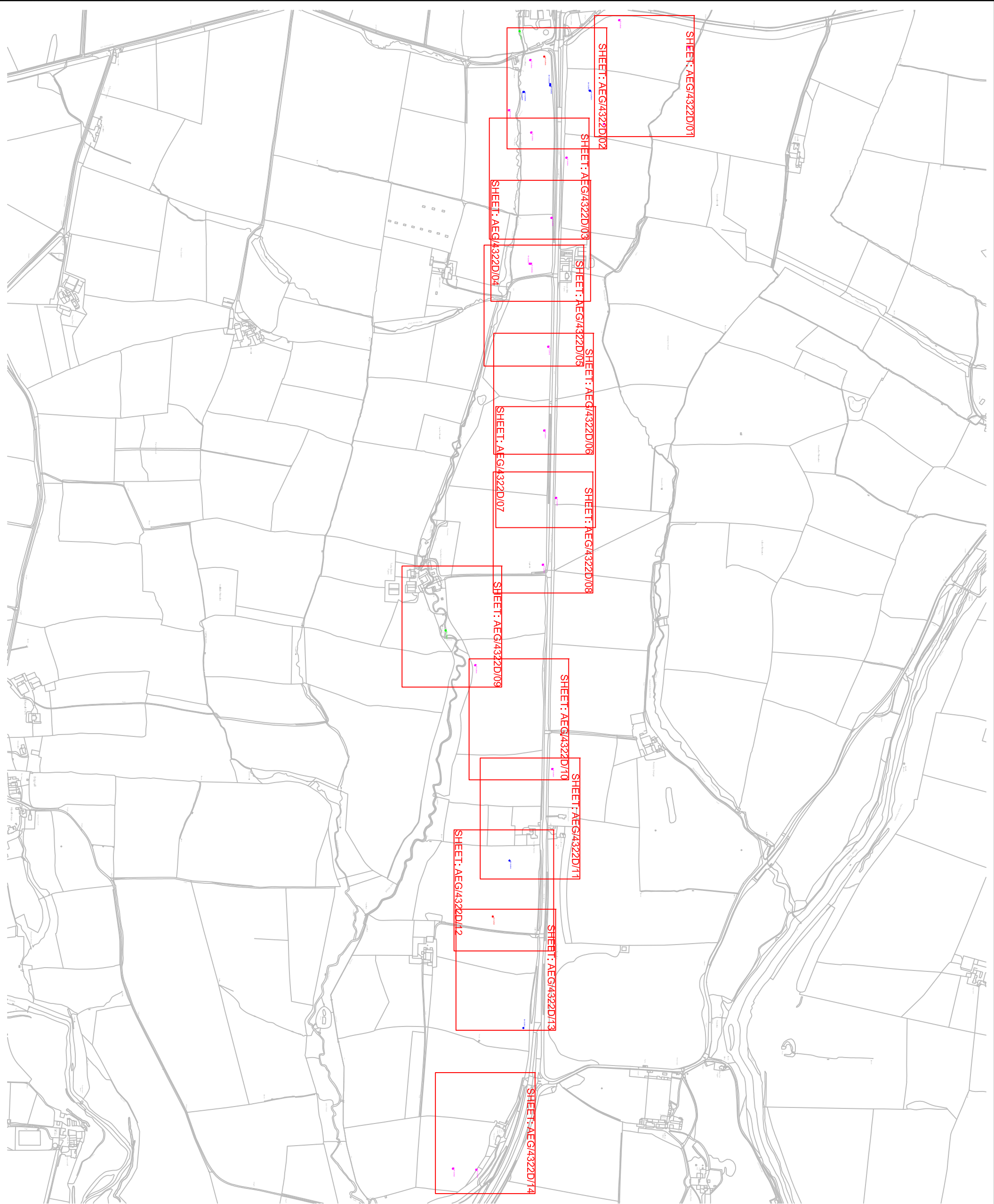


Fine Grained

## Exploratory Hole Location Plan









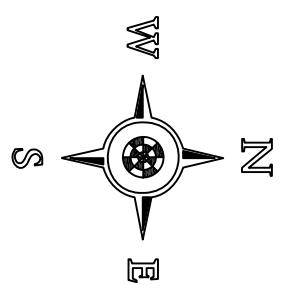


**AEQ**

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**KEY:**

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE







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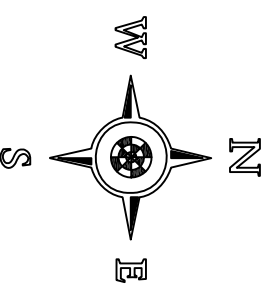
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Client:	AMEY OW Limited Charcey Exchange, 10 Furnival Street, London, EC4A 1AB
Consultant:	Arup Central Square, Forth Street, Newcastle upon Tyne, NE1 3PL
Contract No.:	4322D
Scale:	1:10000 @ A3
Date:	22/03/2021



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KEY:

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Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/01

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

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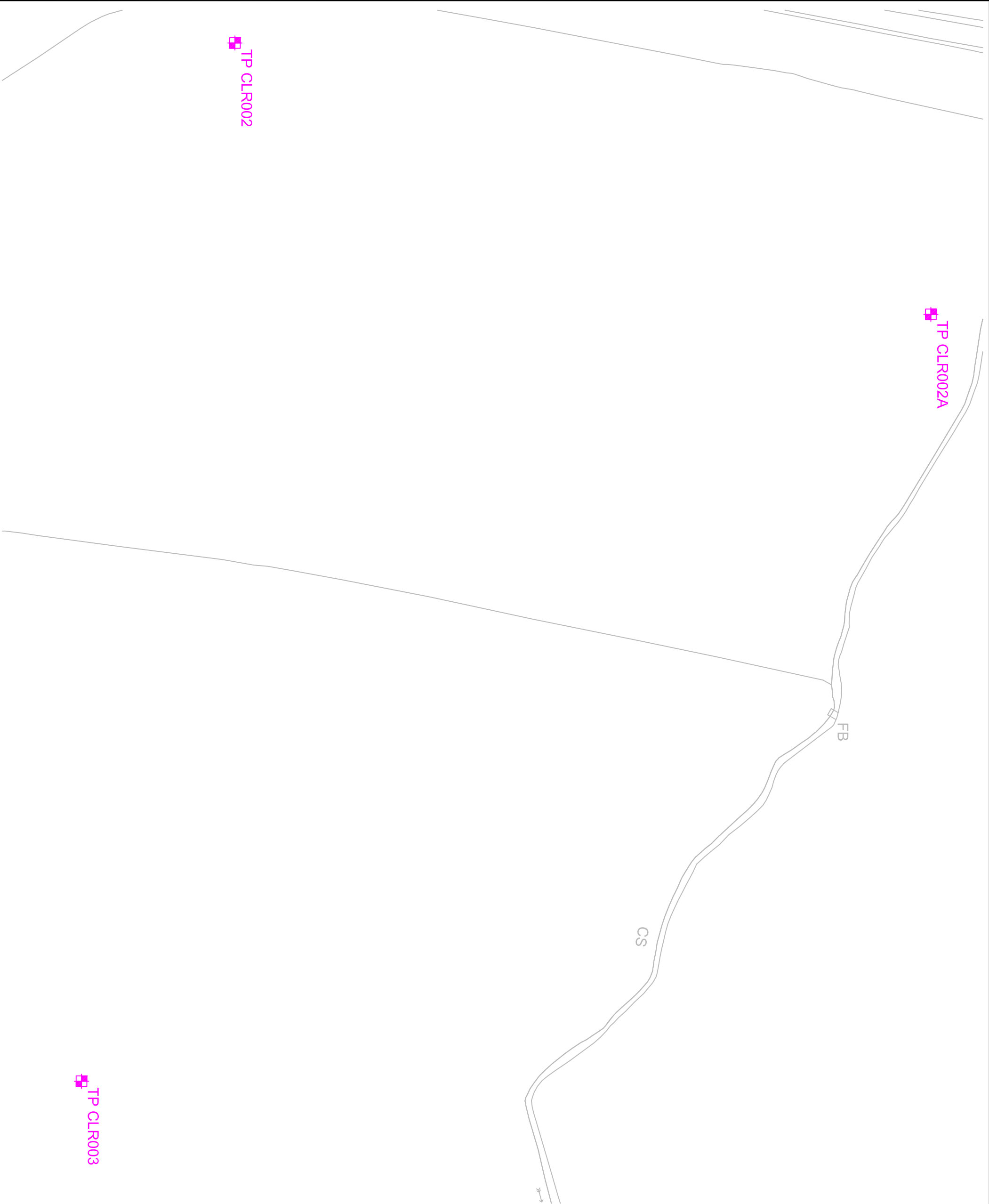
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
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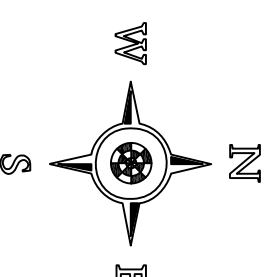




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KEY:

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-  SURFACE WATER SAMPLE



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ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/02

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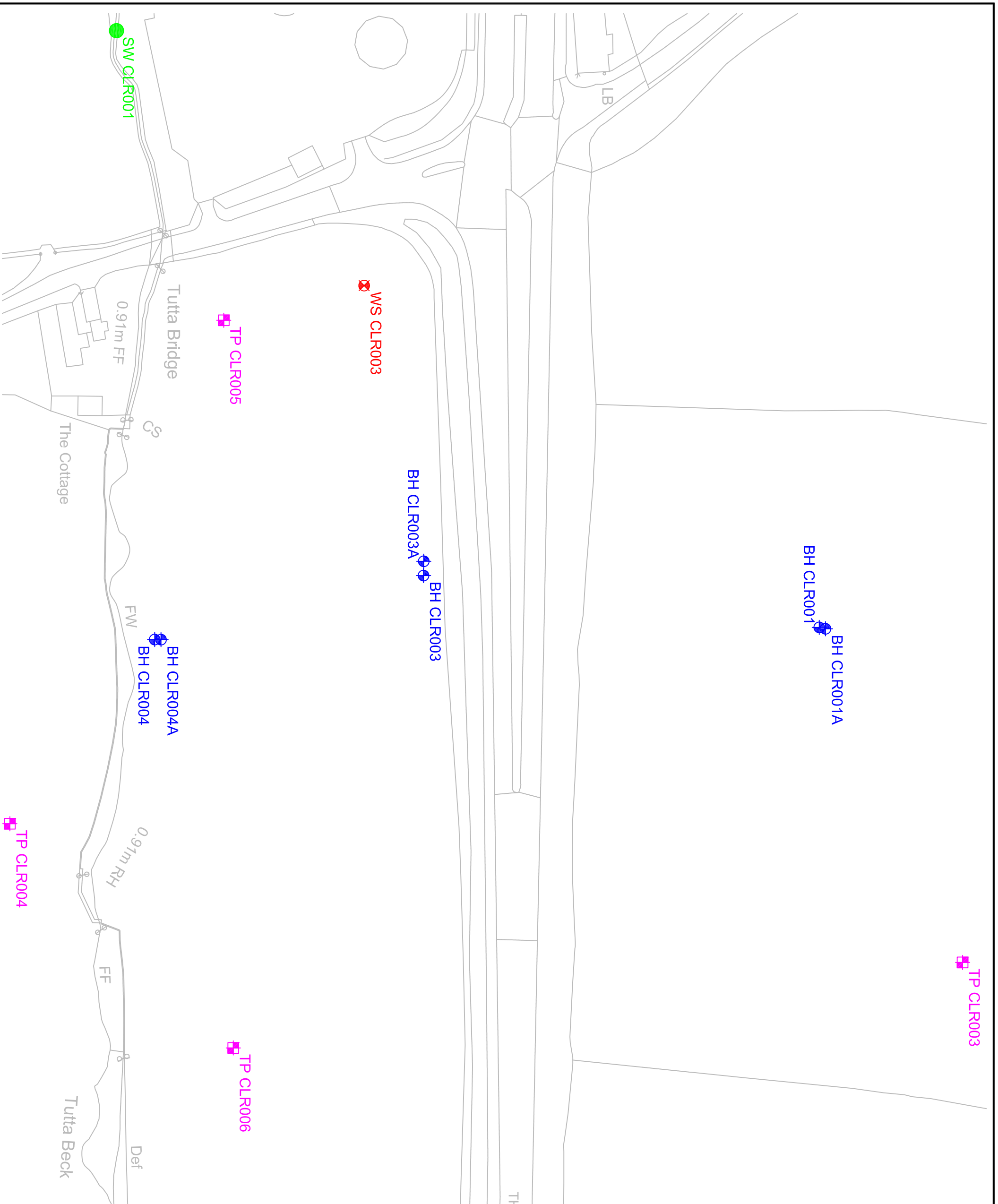
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
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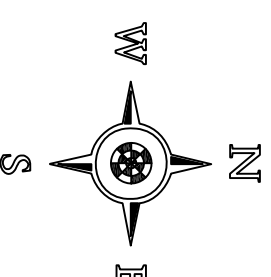




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KEY:

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-  SURFACE WATER SAMPLE



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ENC 01 : Exploratory Hole Location Plan

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A86 North Trans Pennine Scheme D Section 8

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


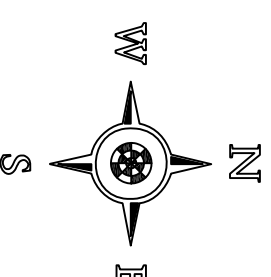




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KEY:

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-  SURFACE WATER SAMPLE



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Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/04

Contract Title:

A86 North Trans Pennine Scheme D Section 8

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Consultant:

Arup  
 Central Square, Forth Street,  
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Contract No.:

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
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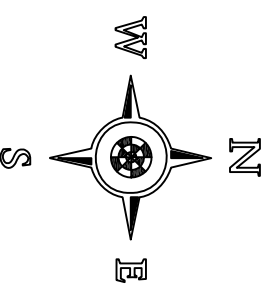




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Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/05

Contract Title:

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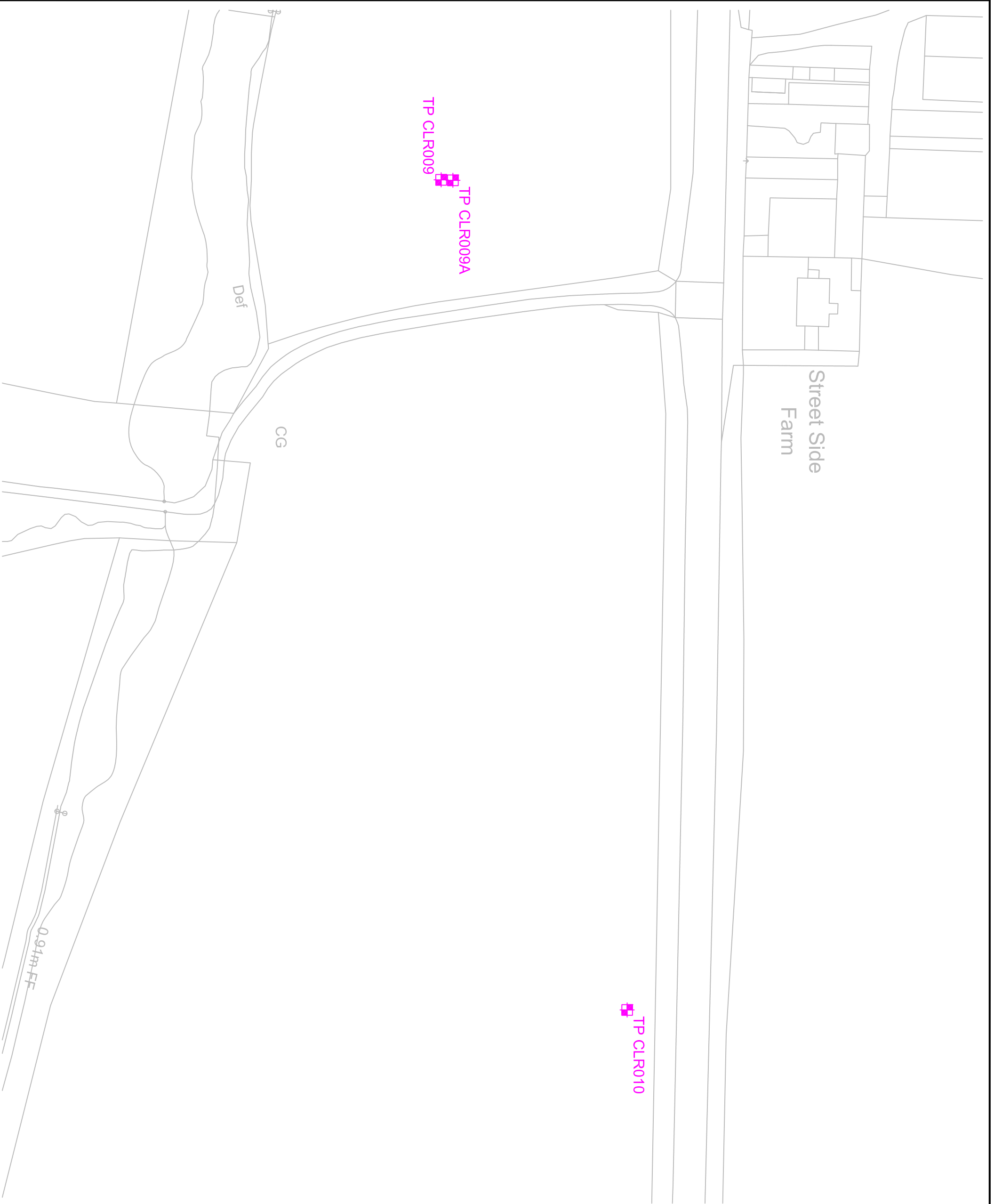
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
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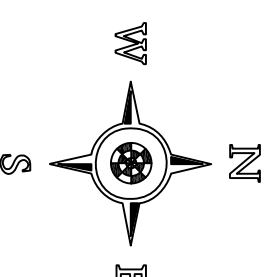




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 (Email): enquiries@aeaguk.net

**KEY:**

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

**Drawing Title:**

ENC 01 : Exploratory Hole Location Plan

**Drawing No.:**

AEG4322D/06

**Contract Title:**

A66 North Trans Pennine Scheme D Section 8

**Client:**

AMEY OW Limited  
 Chancoey Exchange, 10 Funnival Street,  
 London, EC4A 1AB

**Consultant:**

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

**Contract No.:**

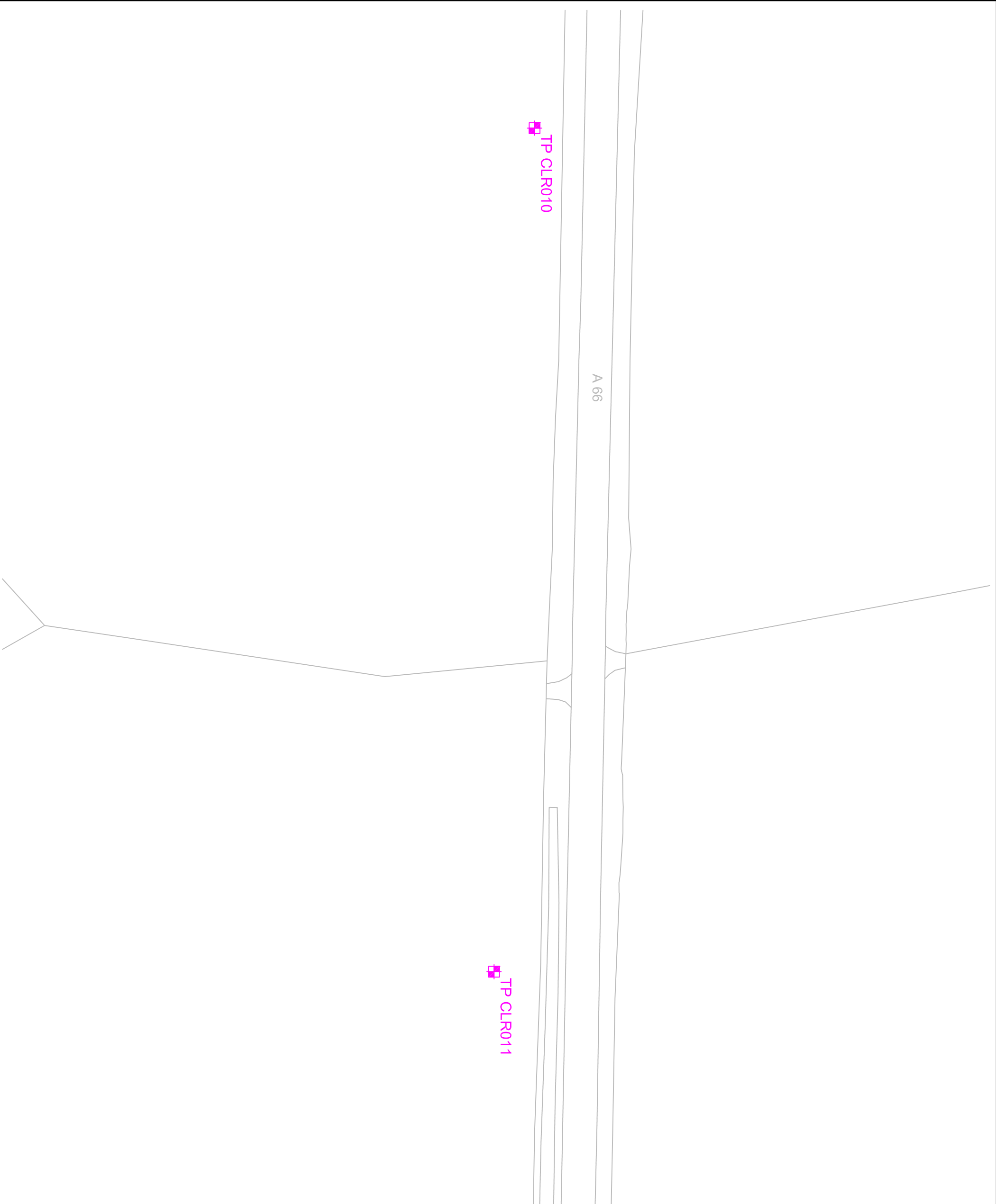
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**Scale:**

1:1000 @ A3

**Date:**





22/03/2021

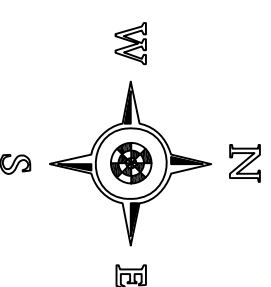




Allied Exploration and Geotechnics Limited  
 Unit 25 Steak Gill Industrial Estate  
 Pulton Fell  
 Chester - Le - Street  
 Co. Durham  
 DH2 2RS  
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 (Fax): 0191 387 4710  
 (Email): enquiries@aeaguk.net

KEY:

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/07

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Chancery Exchange, 10 Funnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

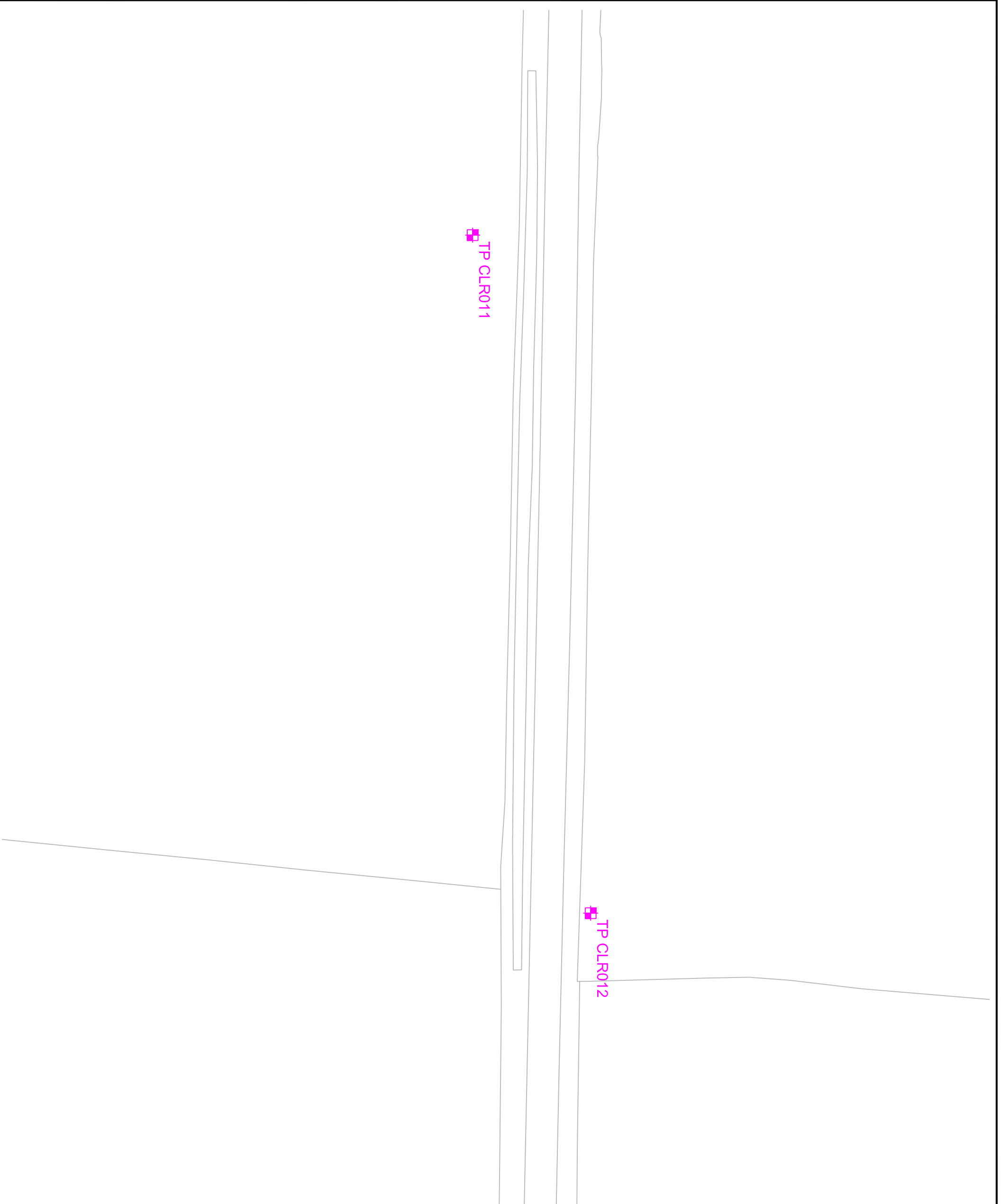
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Date:

22/03/2021







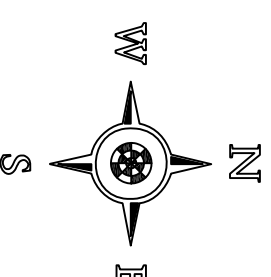




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KEY:

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/08

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Charcoery Exchange, 10 Funnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

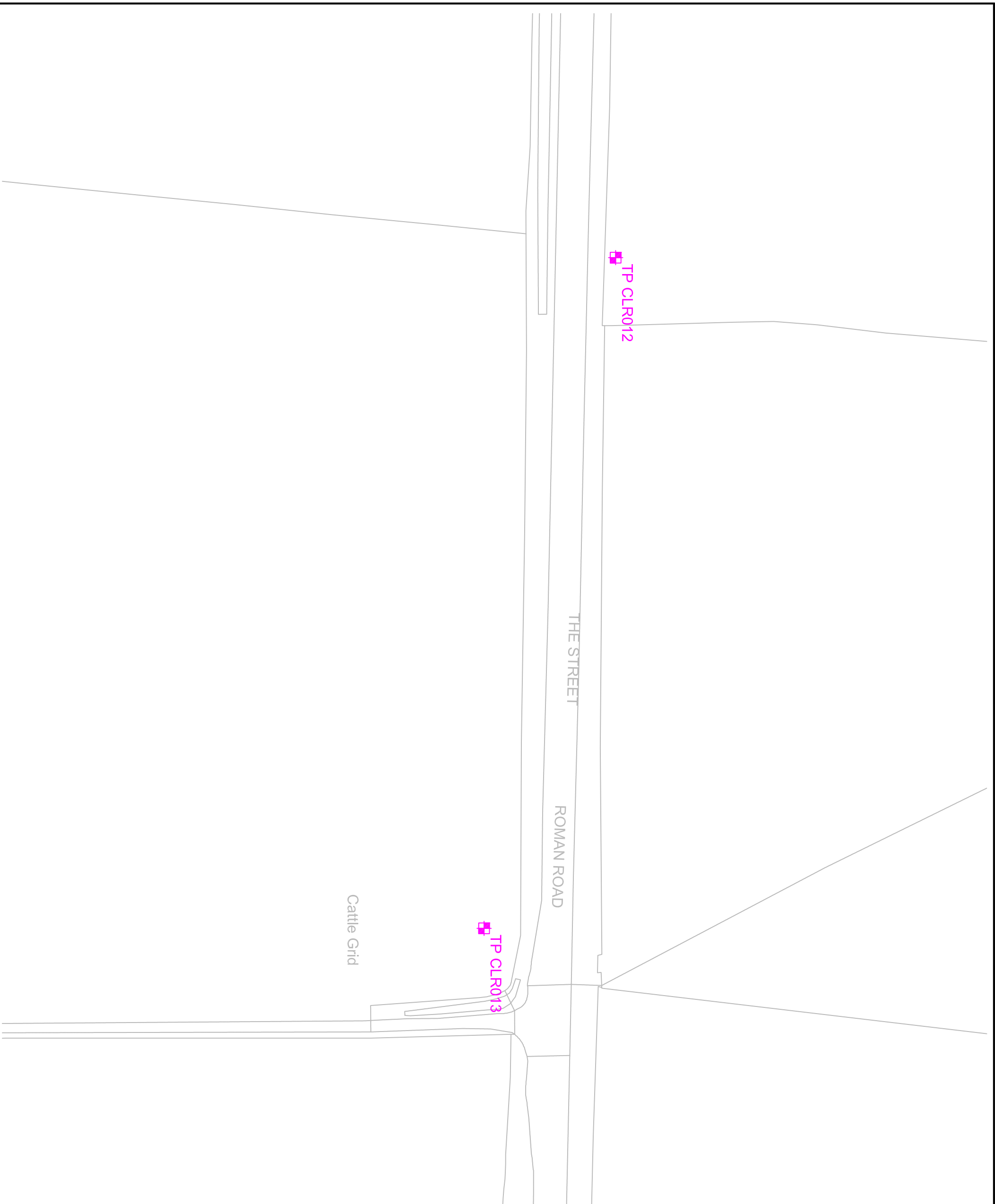
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Date:





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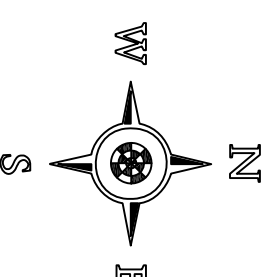




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KEY:

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/09

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Charcey Exchange, 10 Furnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

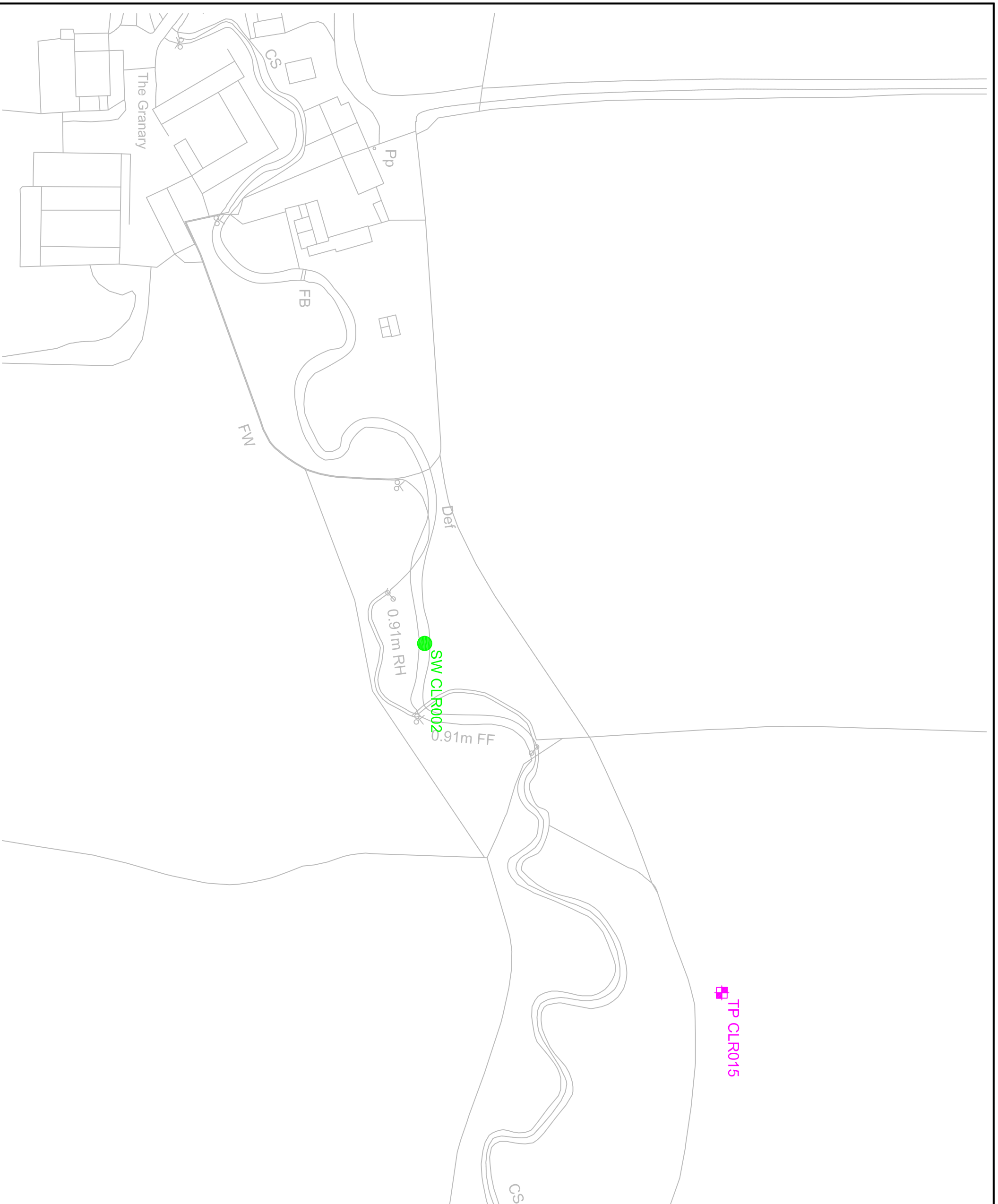
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Date:





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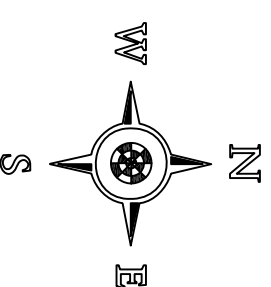




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KEY:

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/10

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Chancoery Exchange, 10 Funnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

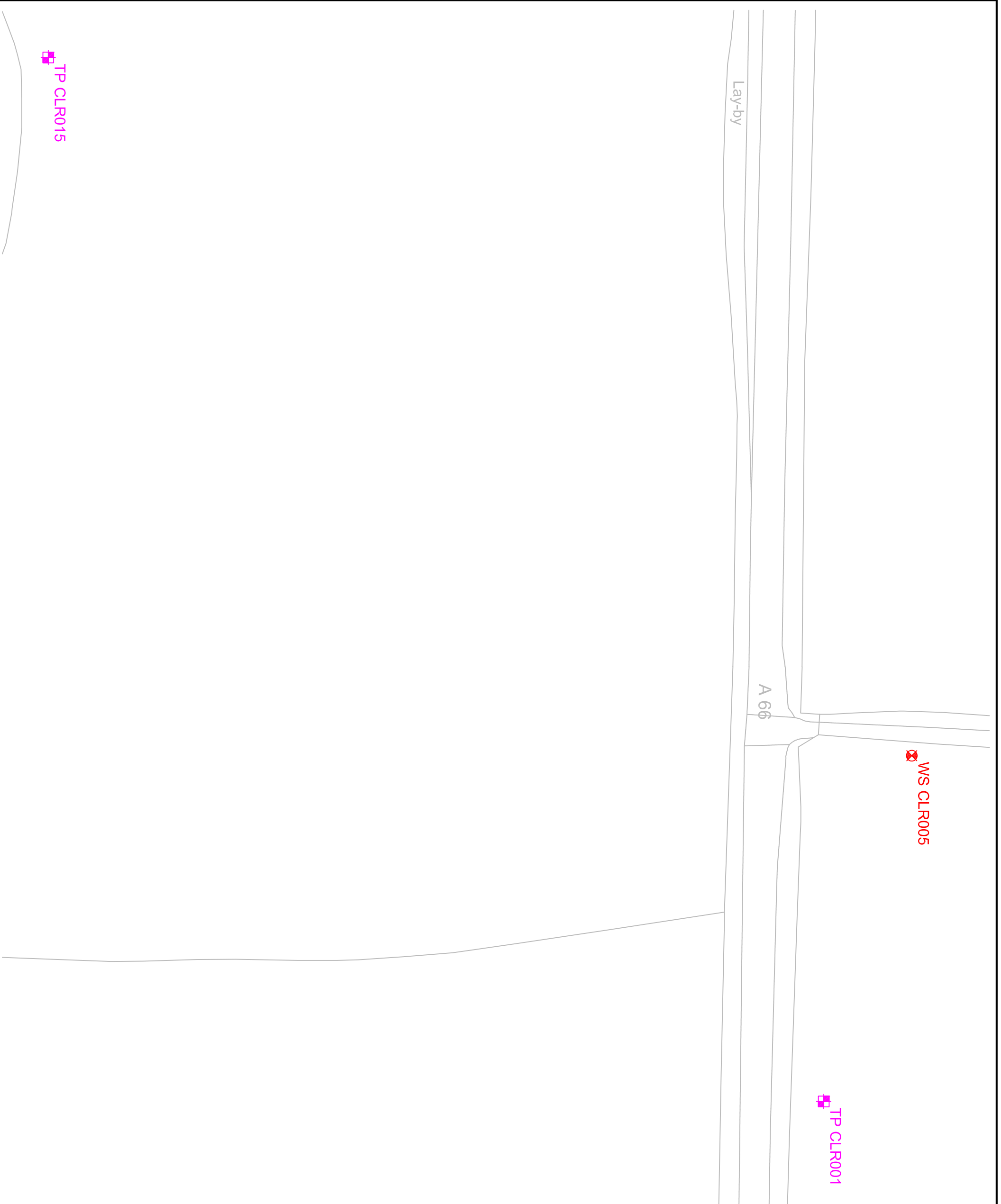
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Date:

22/03/2021







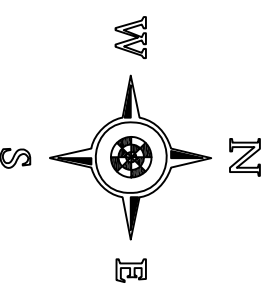
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Allied Exploration and Geotechnics Limited  
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KEY:

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/11

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Charcoery Exchange, 10 Funnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

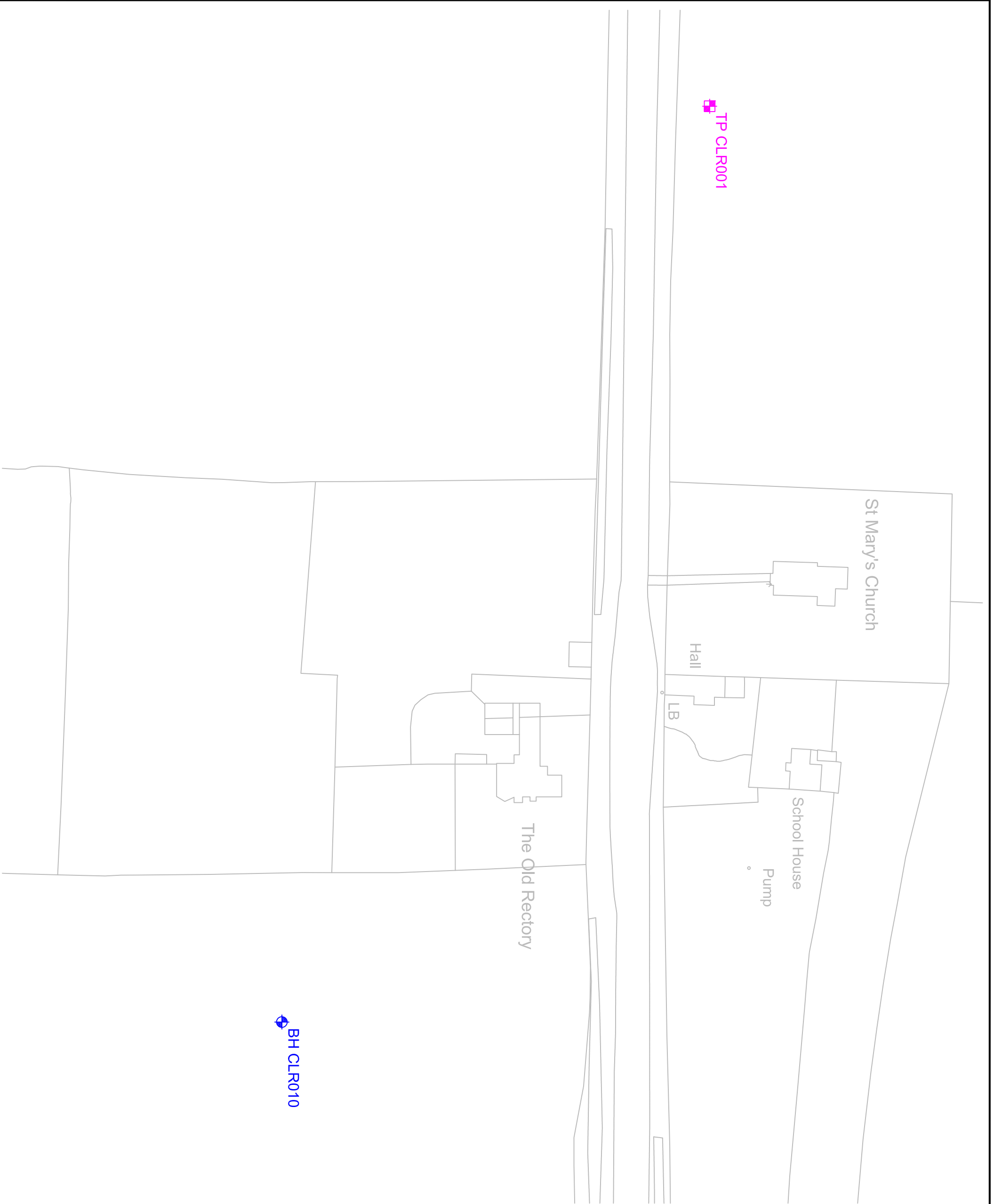
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Date:

22/03/2021







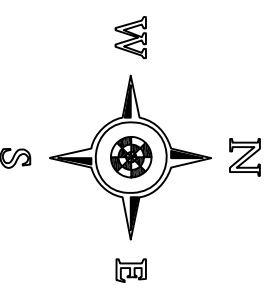




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**KEY:**

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/12

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Charcoery Exchange, 10 Furnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

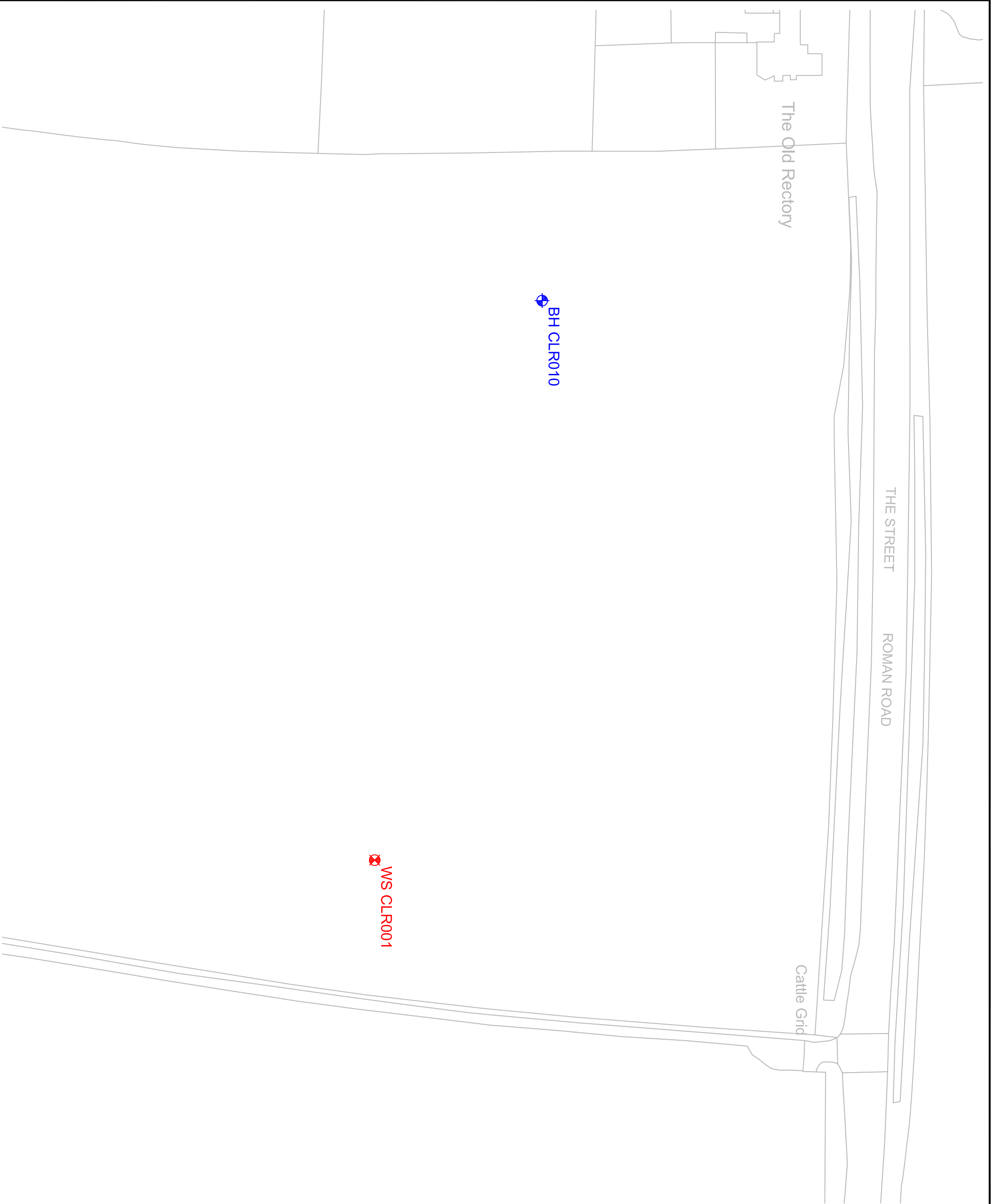
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
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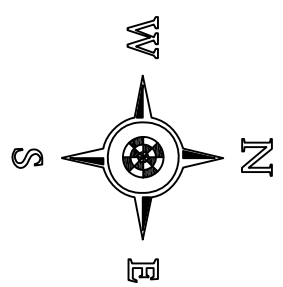




**Allied Exploration and Geotechnics Limited**  
 Unit 25 Seab, GIM Industrial Estate  
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 (Fax): 0191 361 4710  
 (Email): enquiries@aeaguk.net

**KEY:**

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

**Drawing Title:**

ENC 01 : Exploratory Hole Location Plan

**Drawing No.:**

AEG/4322D/13

**Contract Title:**

A86 North Trans Pennine Scheme D Section 8

**Client:**

AMEY OW Limited  
 Chancrey Exchange, 10 Funnival Street,  
 London, EC4A 1AB

**Consultant:**

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

**Contract No.:**

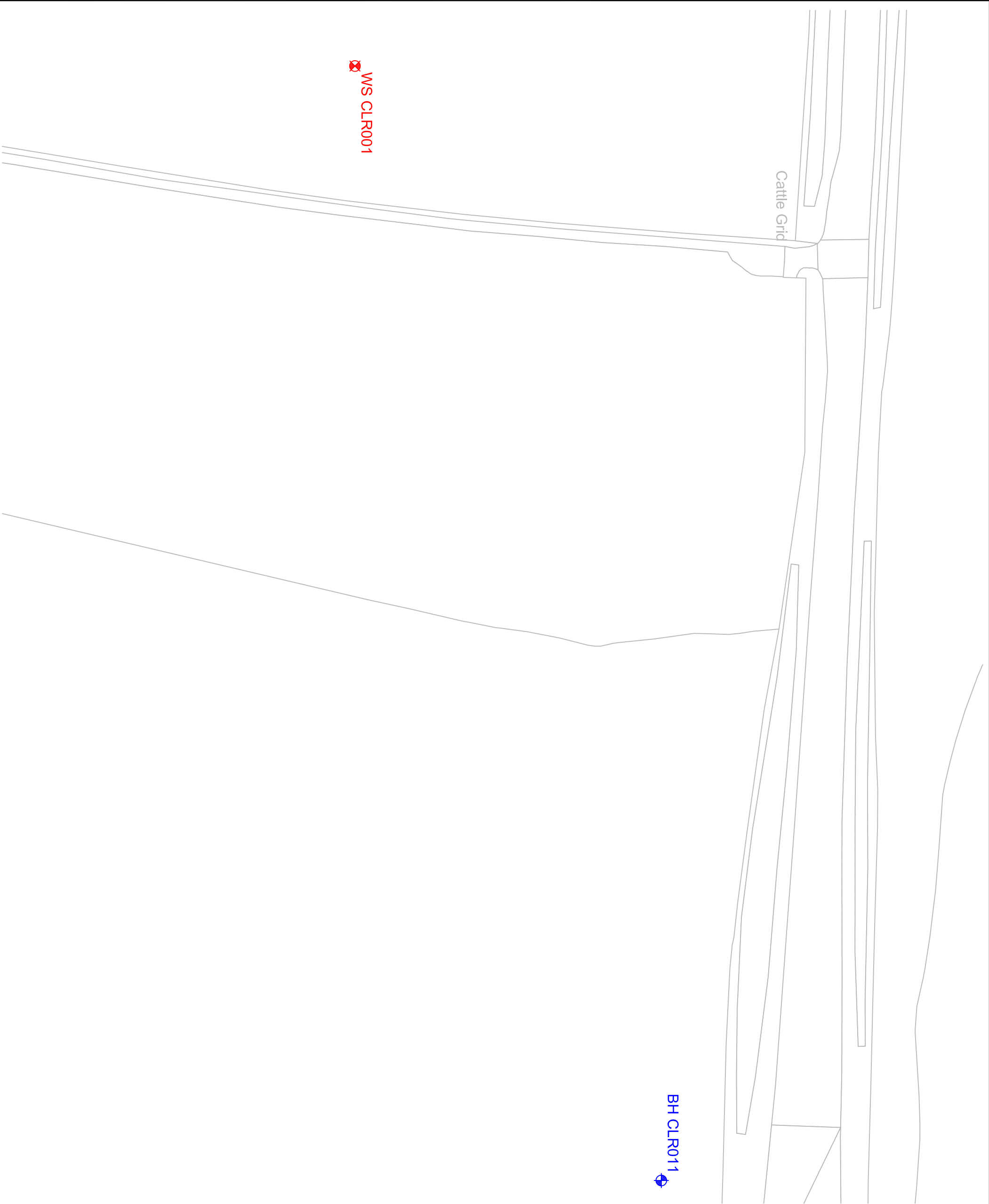
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**Date:**





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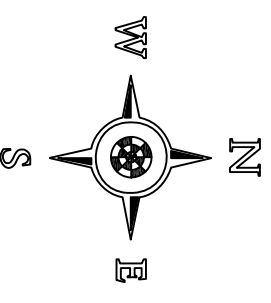




Allied Exploration and Geotechnics Limited  
 Unit 25 Sialk, GIM Industrial Estate  
 Pilton Hill  
 Chester - Le - Street  
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 DH2 2RS  
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 (Fax): 0191 387 4710  
 (Email: enquiries@aeq.uk.net)

KEY:

-  BOREHOLE
-  WINDOW/WINDOWLESS SAMPLE HOLE
-  TRIAL/INSPECTION PIT
-  SURFACE WATER SAMPLE



Base Plan Supplied by Consulting Engineer

Drawing Title:

ENC 01 : Exploratory Hole Location Plan

Drawing No.:

AEG4322D/14

Contract Title:

A86 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited  
 Charcoey Exchange, 10 Funnival Street,  
 London, EC4A 1AB

Consultant:

Arup  
 Central Square, Forth Street,  
 Newcastle upon Tyne, NE1 3PL

Contract No.:

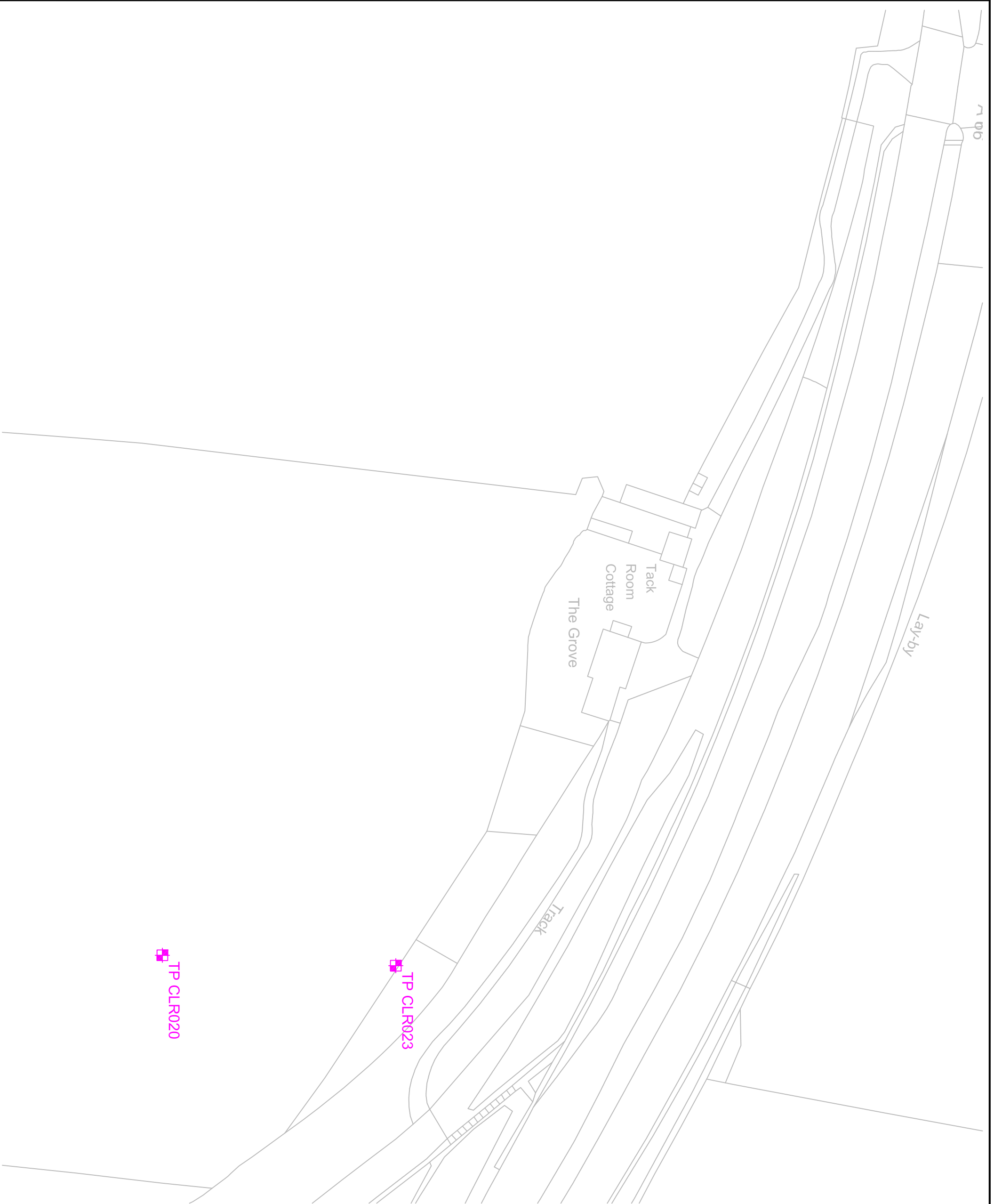
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Scale:

1:1000 @ A3

Date:

22/03/2021



## Borehole Records







# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001</b>	
Client: AMEY OW Limited	Location: E:405215.718 N:513885.968		
Method (Equipment): Cable Percussion (Dando 2000)	Ground Level (m): 206.135	Start Date: 15/02/2021	Sheet: 1 of 1

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.20	ES1			205.84		0.30	Brown very clayey slightly gravelly SAND with many rootlets. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and mudstone.	
0.40	B2						Firm grey mottled orange sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone.	
0.60	HSV	36 (21)kPa					at c.0.40m BGL ... clay is of low plasticity.	
0.70	J3							
1.20	ES4					(1.80)		
1.50-1.95	U5	(100)					at c.1.50m BGL ... clay is of low plasticity. between c. 1.50-2.00m BGL ... driller notes cobble/boulder obstruction.	
2.00	SJ6	50/74mm		204.04		2.10	Terminated at 2.10m BGL - due to an obstruction.	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
15/02/2021	0.00	0.00	150		2.00 - 2.10	1:00	1.20 - 2.10	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling.
15/02/2021	2.10	2.10	150	Dry				

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited		Location: E:405216.107 N:513887.710	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 206.247	Start Date: 15/02/2021
		Sheet: 1 of 1	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.60	HSV	35 (21)kPa		205.95		0.30	Brown very clayey slightly gravelly SAND with many rootlets. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and mudstone.	
2.00		N38		204.15		1.80	Firm grey orange mottled slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone. (Driller notes boulders).	
Boring complete at 2.10m BGL - continued by rotary drilling.								

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
15/02/2021	0.00	0.00	150		2.10 - 2.10	1:00	1.20 - 2.10	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.70m BGL - moderate inflow. (4) 19mm diameter standpipe piezometer installed to 15.50m BGL.
15/02/2021	2.10	2.10	150	Dry				

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited		Location: E:405216.107 N:513887.710	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 206.247	Start Date: 15/02/2021
		Sheet: 1 of 7	

RUN DETAILS			STRATA					Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
4.00		RO		204.15		2.10	2.10-4.00m ... rotary openhole drilling.	(1) Grey gravelly CLAY with cobbles and boulders. (Driller describes as 'stiff').	
5.00	70 (0) 0	SOIL		202.25		4.00	4.00-20.00m ... soil	Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. Cobbles are subrounded to subangular and include limestone and sandstone.	
6.00	25 (0) 0								
	50								

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
05/03/2021	2.10	2.10	Dry	3.00	C	N40	2.10 - 4.00	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.70m BGL - moderate inflow. (4) 19mm diameter standpipe piezometer installed to 15.50m BGL.
				4.00	S	N38	4.00 - 5.00	Air/Mist	100	
				5.00	C	50/10mm	5.00 - 6.00	Air/Mist	100	
				6.00	C	N49	6.00 - 7.00	Air/Mist	100	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited		Location: E:405216.107 N:513887.710	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 206.247	Start Date: 15/02/2021
			Sheet: 2 of 7

RUN DETAILS			STRATA					Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
7.00	(0) 0							Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. Cobbles are subrounded to subangular and include limestone and sandstone. (continued)	
8.00	50 (0) 0								
9.00	10 (0) 0								
10.00	40 (0) 0					(10.70)			
	20								

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
05/03/2021	10.00	3.00	Damp	7.00	C	51/161mm	7.00 - 8.00	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.70m BGL - moderate inflow. (4) 19mm diameter standpipe piezometer installed to 15.50m BGL.
08/03/2021	10.00	3.00	9.07	8.00	S	50/9mm	8.00 - 9.00	Air/Mist	100	
				9.00	C	N40	9.00 - 10.00	Air/Mist	100	
				10.00	C	N34	10.00 - 11.00	Air/Mist	100	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
 Regional Office: Unit 20 Business Development Centre, Eaman Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited		Location: E:405216.107 N:513887.710	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 206.247	Start Date: 15/02/2021
			Sheet: 3 of 7

RUN DETAILS				STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
11.00	(0) 0							Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. Cobbles are subrounded to subangular and include limestone and sandstone. (continued)	
12.00	30 (0) 0								
13.00	0 (0) 0								
14.00	30 (0) 0								
	50								

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
				11.00	C	N33	11.00 - 12.00	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.70m BGL - moderate inflow. (4) 19mm diameter standpipe piezometer installed to 15.50m BGL.
				12.00	C	N39	12.00 - 13.00	Air/Mist	100	
				13.00	C	50/85mm	13.00 - 14.00	Air/Mist	100	
				14.00	S	N32	14.00 - 15.00	Air/Mist	50-100	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited		Location: E:405216.107 N:513887.710	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 206.247	Start Date: 15/02/2021
		Sheet: 4 of 7	

RUN DETAILS			STRATA				Instrument/ Backfill		
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)		Description	
								Discontinuity Detail	Main
15.00	(0) 0		↓	191.55		14.70	Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. Cobbles are subrounded to subangular and include limestone and sandstone. <i>(continued)</i>		
16.00	0 (0) 0					(1.60)	Firm laminated brown CLAY with sand interbeds. Sand is fine to medium.		
17.00	50 (0) 0			189.95		16.30	Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. Cobbles are subrounded to subangular and include limestone and sandstone.		
18.00	0 (0) 0								

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
				15.00	S	N20	15.00 - 16.00	Air/Mist	70	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.70m BGL - moderate inflow. (4) 19mm diameter standpipe piezometer installed to 15.50m BGL.
				16.00	S	N26	16.00 - 17.00	Air/Mist	70	
				17.00	C	N32	17.00 - 18.00	Air/Mist	70	
				18.00	C	N37	18.00 - 19.00	Air/Mist	100	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited		Location: E:405216.107 N:513887.710	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 206.247	Start Date: 15/02/2021
		Sheet: 5 of 7	

RUN DETAILS				STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
19.00	(0) 0					(3.70)		Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. Cobbles are subrounded to subangular and include limestone and sandstone. (continued)	
	0 (0) 0			186.25		20.00			
								Complete at 20.00m BGL.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
08/03/2021	20.00	3.00	15.10	19.00	C	N33	19.00 - 20.00	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.70m BGL - moderate inflow. (4) 19mm diameter standpipe piezometer installed to 15.50m BGL.

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project:	A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>BH CLR001A</b>			
Client:	AMEY OW Limited	Location:	E:405216.107 N:513887.710				
Method (Equipment):	Percussion/Coring (Dando 3000/Comacchio GEO 205)	Ground Level (m):	206.247	Start Date:	15/02/2021	Sheet:	6 of 7

Figure BH CLR001A.1  
BH CLR001A - 4.00-8.00m BGL



Figure BH CLR001A.2  
BH CLR001A - 8.00-15.00m BGL







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## DRILLHOLE RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR001A</b>	
Client: AMEY OW Limited	Location: E:405216.107 N:513887.710		Sheet: 7 of 7
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)	Ground Level (m): 206.247	Start Date: 15/02/2021	

Figure BH CLR001A.3  
BH CLR001A - 15.00-20.00m BGL





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## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003</b>	
Client: AMEY OW Limited		Location: E:405201.204 N:513775.210	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 199.966	Start Date: 15/02/2021
		Sheet: 1 of 2	

SAMPLES & TESTS			STRATA					Instrument/ Backfill	
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description		
0.05	J1		↓	199.62	○	0.35	Brown very clayey slightly gravelly SAND with many rootlets. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and mudstone.	[Pattern]	
0.05-0.20	B2					0.70	○		0.70
0.20	ES3			199.27	○	(1.30)	1.00		Firm brown slightly sandy slightly gravelly CLAY with cobbles noted. Sand is fine to medium. Gravel is fine to medium subangular and include mudstone and limestone. Cobbles are rounded and include limestone and mudstone. at c.1.20m BGL ... high strength. Clay is of low plasticity.
0.35-0.50	B4								
0.40	J5			↓	197.97	○	(11.20)		at c.3.50m BGL ... clay is of low plasticity.
0.70-1.00	B6								
0.80	J7								
1.00	ES8	(40)							
1.20-1.65	U9								
1.70	J10								
2.00	J11								
2.20-2.80	B12	50/32mm							
2.20	S								
2.35	EW18								
2.80-3.30	B14	N28							
2.80-3.25	SJ13								
3.50	J15								
3.90	U*	(75)							
4.50	J16								
5.10-5.70	B19	50/259mm							
5.10-5.45	SJ17								
6.10	J20								
6.60-7.10	B22	50/154mm							
6.60	SJ21								
7.70	J23								

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
15/02/2021	0.00	0.00	150		2.25 - 2.70	1:00	1.20 - 3.50	
15/02/2021	3.50	2.70	150	Dry	3.30 - 3.50	0:30		
16/02/2021	3.50	2.70	150	Dry				

(1) Description derived from drillers daily report.  
 (2) Inspection pit dug prior to drilling.  
 (3) Water strike at 5.10m - water level rose to 2.35m BGL (20mins).  
 (4) Borehole collapsing at 14.50m BGL - advanced casing to 15.70m BGL.  
 (5) Artesian water on pulling casing at approximately 15.70m BGL. Borehole sealed on 03/02/2021.

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003</b>	
Client: AMEY OW Limited		Location: E:405201.204 N:513775.210	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 199.966	Start Date: 15/02/2021
		Sheet: 2 of 2	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
8.20-8.70 8.20	B25 SJ24	50/171mm					Firm becoming stiff grey brown slightly sandy slightly gravelly CLAY with cobbles noted. Sand is fine to medium. Gravel is fine to coarse subangular and include mudstone, sandstone and limestone. Cobbles are rounded and include sandstone and limestone. (Driller notes sand partings and boulders). (continued)	
9.30	J26							
10.00-10.45	U27	(100)					at c.10.00m BGL ... very high strength. Clay is of low plasticity.	
10.40	J28							
11.00	J29							
11.60-12.10 11.60-12.05	B31 SJ30	N44						
12.60	J32							
13.20	S	50/15mm		186.77		13.20	Boring complete at 13.20m BGL - continued by rotary drilling.	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
16/02/2021	13.20	13.10	150	6.30	9.60 - 9.80 12.00 - 13.20	0:30 2:30		(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 5.10m - water level rose to 2.35m BGL (20mins). (4) Borehole collapsing at 14.50m BGL - advanced casing to 15.70m BGL. (5) Artesian water on pulling casing at approximately 15.70m BGL. Borehole sealed on 03/02/2021.

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003</b>	
Client: AMEY OW Limited		Location: E:405201.204 N:513775.210	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 199.966	Start Date: 15/02/2021
		Sheet: 1 of 2	

RUN DETAILS			STRATA					Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
13.20	0 (0) 0	SOIL		186.77		13.20	13.20-14.20m ... soil.	Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone.	
14.20	113 (63) 13	NI		185.77		14.20	14.20-14.70m ... non-intact.	Extremely weak to very weak grey MUDSTONE distinctly weathered.	
		10					14.70-15.00m ... subhorizontal (10-15 degrees) closely spaced planar rough undulating smooth and rough tight infilled (clay) discontinuities.		
15.00	57 (0) 0	NR	↓	184.97		15.00	15.00-15.30m ... no recovery.	(1) Brown yellow black sandy CLAY. (Borehole collapsed due to artesian water - recovered material is of borehole cuttings and strata from 13.20-14.20m BGL).	
		NI					15.30-15.70m ... non-intact.		
				184.27		15.70		Complete at 15.70m BGL.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
01/03/2021	13.20	13.20	0.10	14.20	C	N44	13.20 - 14.20	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 5.10m - water level rose to 2.35m BGL (20mins). (4) Borehole collapsing at 14.50m BGL - advanced casing to 15.70m BGL. (5) Artesian water on pulling casing at approximately 15.70m BGL. Borehole sealed on 03/02/2021.
01/03/2021	15.70	15.70	7.42	15.70	C	50/241mm	14.20 - 15.00	Air/Mist	0	
							15.00 - 15.70	Air/Mist	0	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>BH CLR003</b>
Client: AMEY OW Limited	Location: E:405201.204 N:513775.210		
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)	Ground Level (m): 199.966	Start Date: 15/02/2021	Sheet: 2 of 2

Figure BH CLR003.1  
BH CLR003 - 14.20-15.70m BGL





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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003A</b>	
Client: AMEY OW Limited	Location: E:405197.201 N:513775.280		
Method (Equipment): Openhole/Coring (Comacchio GEO 205)	Ground Level (m): 200.240	Start Date: 02/03/2021	Sheet: 1 of 5

RUN DETAILS			STRATA				Instrument/ Backfill		
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)		Description	
								Discontinuity Detail	Main
		IP		200.14		0.10	0.00-1.20m ... inspection pit.	(1) Grass over TOPSOIL. (1) Yellow brown sandy CLAY.	
		RO				(1.40)	1.20-15.70m ... rotary openhole drilling.		
				198.74		1.50		(1) Limestone BOULDER.	
				198.04		2.20		(1) Dark brown grey gravelly CLAY and boulders.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
02/03/2021	0.00	0.00					1.20 - 3.10 3.10 - 7.50	Air Air	100 100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.00m BGL (Heavy inflow). (4) Drillhole collapsed from 15.70 to 11.00m BGL. Rotary openholed from 11.00-15.70m and advanced casing to 15.20m BGL. (5) Drillhole collapsing from 16.45-16.95m BGL - unable to advance casing. (6) 19mm diameter piezometer standpipe installed to 6.00m BGL.

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: N/A	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003A</b>	
Client: AMEY OW Limited	Location: E:405197.201 N:513775.280		
Method (Equipment): Openhole/Coring (Comacchio GEO 205)	Ground Level (m): 200.240	Start Date: 02/03/2021	Sheet: 2 of 5

RUN DETAILS				STRATA				Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
							(1) Dark brown grey gravelly CLAY and boulders. <i>(continued)</i>		

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
							7.50 - 10.60	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.00m BGL (Heavy inflow). (4) Drillhole collapsed from 15.70 to 11.00m BGL. Rotary openholed from 11.00-15.70m and advanced casing to 15.20m BGL. (5) Drillhole collapsing from 16.45-16.95m BGL - unable to advance casing. (6) 19mm diameter piezometer standpipe installed to 6.00m BGL.

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: N/A	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
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Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003A</b>	
Client: AMEY OW Limited		Location: E:405197.201 N:513775.280	
Method (Equipment): Openhole/Coring (Comacchio GEO 205)		Ground Level (m): 200.240	Start Date: 02/03/2021
		Sheet: 3 of 5	

RUN DETAILS				STRATA				Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
				189.64		10.60	(1) Dark brown grey gravelly CLAY and boulders. (continued)		
				188.74		11.50 (0.90)	(1) BOULDERS.		
							(1) Brown boulder CLAY.		

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
							10.60 - 15.70	Air/Mist	50-100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.00m BGL (Heavy inflow). (4) Drillhole collapsed from 15.70 to 11.00m BGL. Rotary openholed from 11.00-15.70m and advanced casing to 15.20m BGL. (5) Drillhole collapsing from 16.45-16.95m BGL - unable to advance casing. (6) 19mm diameter piezometer standpipe installed to 6.00m BGL.

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: N/A	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003A</b>	
Client: AMEY OW Limited		Location: E:405197.201 N:513775.280	
Method (Equipment): Openhole/Coring (Comacchio GEO 205)		Ground Level (m): 200.240	Start Date: 02/03/2021
		Sheet: 4 of 5	

RUN DETAILS				STRATA				Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
				186.24	(2.50)	14.00	(1) Brown boulder CLAY. (continued)		
				185.24	(1.00)	15.00	(1) Brown yellow very sandy gravelly CLAY.		
							(1) Grey black MUDSTONE. (Driller describes as 'weak').		
15.70	0 (0) 0	NR				15.70-16.95m ... no recovery.			

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
02/03/2021	15.70	11.00	Damp				15.70 - 16.45	Air/Mist	50	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.00m BGL (Heavy inflow). (4) Drillhole collapsed from 15.70 to 11.00m BGL. Rotary openholed from 11.00-15.70m and advanced casing to 15.20m BGL. (5) Drillhole collapsing from 16.45-16.95m BGL - unable to advance casing. (6) 19mm diameter piezometer standpipe installed to 6.00m BGL.
03/03/2021	15.70	11.00	0.00							

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: N/A	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR003A</b>	
Client: AMEY OW Limited		Location: E:405197.201 N:513775.280	
Method (Equipment): Openhole/Coring (Comacchio GEO 205)		Ground Level (m): 200.240	Start Date: 02/03/2021
		Sheet: 5 of 5	

RUN DETAILS				STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
16.45 (92mm)	0 (0) 0			183.29		16.95		(1) Grey black MUDSTONE. (Driller describes as 'weak'). (continued)	
								Terminated at 16.95m BGL - due to collapse and unable to advance casing.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
03/03/2021	16.95	15.20	10.90	16.45	C	50/229mm	16.45 - 16.95	Air/Mist	0-50	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Water strike at 14.00m BGL (Heavy inflow). (4) Drillhole collapsed from 15.70 to 11.00m BGL. Rotary openholed from 11.00-15.70m and advanced casing to 15.20m BGL. (5) Drillhole collapsing form 16.45-16.95m BGL - unable to advance casing. (6) 19mm diameter piezometer standpipe installed to 6.00m BGL.

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: N/A	Contract No. <b>4322D</b>
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## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004</b>	
Client: AMEY OW Limited		Location: E:405219.111 N:513699.983	
Method (Equipment): Cable Percussion (Dando 2000)		Ground Level (m): 198.387	Start Date: 16/02/2021
		Sheet: 1 of 1	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.20	ES1			198.09		0.30	Brown very clayey slightly gravelly SAND with many rootlets. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and mudstone.	
0.40	B2						Firm brown grey orange sandy slightly gravelly CLAY/clayey very gravelly SAND. Sand is fine to medium. Gravel is fine to medium subangular of mudstone and sandstone. (Driller notes cobbles).	
0.70	J3						at c.0.70m BGL .. clay/clay fines of low plasticity.	
1.20	ES4					(1.80)		
1.50-2.00	CB5	N25						
2.00	J6			196.29		2.10	Firm grey brown slightly sandy slightly gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone. Cobbles are rounded and include sandstone and limestone.	
2.10	ES7							
2.40	B8					(1.10)		
2.50-3.00	CB9	N28						
3.10	J10			195.19		3.20	at c.3.10m BGL .. clay is of low plasticity.	
3.20	SJ11	50/12mm					Terminated at 3.20m BGL - due to an obstruction.	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
16/02/2021	0.00	0.00	150		2.40 - 2.50	1:00		(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling.
16/02/2021	3.20	3.20	150	Damp	3.10 - 3.20	1:00		

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004A</b>	
Client: AMEY OW Limited		Location: E:405219.137 N:513701.749	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 198.392	Start Date: 16/02/2021
		Sheet: 1 of 1	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
				198.09		0.30	Brown very clayey slightly gravelly SAND with many rootlets. Sand is fine to coarse. Gravel is fine to medium subangular and includes sandstone and mudstone.	
						(1.80)	Firm brown grey orange slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular of mudstone and sandstone. (Driller notes cobbles).	
				196.29		2.10	Firm grey brown slightly sandy slightly gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone. Cobbles are rounded and include sandstone and limestone.	
				195.19		3.20	<i>Boring complete at 3.20m BGL - continued by rotary drilling.</i>	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
16/02/2021	0.00	0.00	150					(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 4.00m BGL.
16/02/2021	3.20	3.20	150	Damp				

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004A</b>	
Client: AMEY OW Limited		Location: E:405219.137 N:513701.749	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 198.392	Start Date: 16/02/2021
		Sheet: 1 of 8	

RUN DETAILS			STRATA					Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
4.20		RO		195.19		3.20	3.20-4.20m ... rotary openhole drilling.	(1) Limestone BOULDER.	
5.00	63 (0) 0	SOIL		194.19		4.20	4.20-9.40m ... soil.	Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone.	
6.00	50 (0) 0								
7.00	40 (0) 0					(5.20)			
	0 (0) 0								

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
04/03/2021	3.20	3.20	0.40	3.20	C	50/5mm	3.20 - 4.20	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 4.00m BGL.
				4.20	C	N33	4.20 - 5.00	Air/Mist	100	
				5.00	C	N35	5.00 - 6.00	Air/Mist	100	
				6.00	C	N34	6.00 - 7.00	Air/Mist	100	
				7.00	C	N43	7.00 - 8.00	Air/Mist	100	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004A</b>	
Client: AMEY OW Limited		Location: E:405219.137 N:513701.749	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 198.392	Start Date: 16/02/2021
		Sheet: 2 of 8	

RUN DETAILS				STRATA				Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
8.00	70 (0) 0							Stiff grey brown sandy gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to coarse subangular and includes sandstone and mudstone. (continued)	
9.00									
10.00	100 (100) 30	8	↓	188.99		9.40	9.40-11.00m ... subhorizontal and subvertical (10-15 and 80 degrees) closely spaced planar rough undulating smooth and rough open clean discontinuities.	Moderately weak to medium strong grey black inter laminated SANDSTONE, SILTSTONE and MUDSTONE partially weathered.	
11.00	100 (100) 40								
	93 (93) 40	NR 7					11.00-11.10m ... no recovery. 11.10-11.50m ... subhorizontal (10-15 degrees) closely		

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
				8.00	C	50/89mm	8.00 - 9.00	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 4.00m BGL.
				9.00	C	50/6mm	9.00 - 10.00	Air/Mist	100	
				10.00	C	50/8mm	10.00 - 11.00	Air/Mist	100	
							11.00 - 12.50	Air/Mist	100	

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004A</b>	
Client: AMEY OW Limited		Location: E:405219.137 N:513701.749	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 198.392	Start Date: 16/02/2021
		Sheet: 3 of 8	

RUN DETAILS			STRATA				Instrument/ Backfill								
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)		Description							
								Discontinuity Detail	Main						
12.50	100 (100) 67	7				spaced planar rough undulating smooth and rough open and tight clean discontinuities.  11.50-12.00m ... non-intact.  12.00-12.30m ... subhorizontal (10-15 degrees) closely spaced planar rough undulating smooth and rough open and tight clean discontinuities.  12.30-12.50m ... non-intact.	Moderately weak to medium strong grey black interlaminated SANDSTONE, SILTSTONE and MUDSTONE partially weathered. (continued)								
									14.00	100 (100) 97			12.50-19.45m ... subhorizontal (10-15 degrees) closely spaced planar rough undulating smooth and rough open and tight clean discontinuities.		

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
							12.50 - 14.00	Air/Mist	100	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 4.00m BGL.
							14.00 - 15.50	Air/Mist	100	

All dimensions in metres Scale 1:25.00

For explanation of symbols and abbreviations see Key Sheets

Logged by: D. Portsmouth

Contract No. **4322D**







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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004A</b>	
Client: AMEY OW Limited		Location: E:405219.137 N:513701.749	
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)		Ground Level (m): 198.392	Start Date: 16/02/2021
		Sheet: 5 of 8	

RUN DETAILS				STRATA				Instrument/ Backfill	
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail		Main
(92mm)		10		178.94		19.45	19.45-19.75m ... horizontal to subhorizontal (5-15 degrees) closely spaced planar rough undulating smooth and rough open clean and infilled (gravelly) discontinuities.	Weak black lustrous and dull COAL partially weathered.	
				178.64		19.75			
				178.39			20.00	19.75-20.00m ... subhorizontal (10-15 degrees) closely spaced planar rough undulating smooth and rough open and tight clean discontinuities.	Moderately weak to medium strong grey black interlaminated SANDSTONE, SILTSTONE and MUDSTONE partially weathered. <i>Complete at 20.00m BGL.</i>

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
04/03/2021	20.00	5.00	13.06							(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 4.00m BGL.

All dimensions in metres Scale 1:25.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR004A</b>	
Client: AMEY OW Limited	Location: E:405219.137 N:513701.749		Sheet: 6 of 8
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)	Ground Level (m): 198.392	Start Date: 16/02/2021	

Figure BH CLR004A.1  
BH CLR004A - 4.20-10.00m BGL



Figure BH CLR004A.2  
BH CLR004A - 10.00-12.50m BGL







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## DRILLHOLE RECORD

Status:-  
**FINAL**

Project:	A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>BH CLR004A</b>			
Client:	AMEY OW Limited	Location:	E:405219.137 N:513701.749				
Method (Equipment):	Percussion/Coring (Dando 3000/Comacchio GEO 205)	Ground Level (m):	198.392	Start Date:	16/02/2021	Sheet:	7 of 8

Figure BH CLR004A.3  
BH CLR004A - 12.50-15.50m BGL



Figure BH CLR004A.4  
BH CLR004A - 15.50-18.50m BGL





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## DRILLHOLE RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>BH CLR004A</b>
Client: AMEY OW Limited	Location: E:405219.137 N:513701.749		
Method (Equipment): Percussion/Coring (Dando 3000/Comacchio GEO 205)	Ground Level (m): 198.392	Start Date: 16/02/2021	Sheet: 8 of 8

Figure BH CLR004A.5  
BH CLR004A - 18.50-20.00m BGL







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## BOREHOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>BH CLR010</b>	
Client: AMEY OW Limited		Location: E:407378.719 N:513660.861	
Method (Equipment): Cable Percussion (Dando 3000)		Ground Level (m): 171.362	Start Date: 18/02/2021
		Sheet: 1 of 1	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.05	J1			171.11		0.25	Soft brown sandy slightly gravelly CLAY with many rootlets. Gravel is fine to medium subangular and includes sandstone and mudstone. Sand is fine to coarse.	
0.05-0.25	B2							
0.20	ES3			170.86		0.50	Firm brown grey yellow slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone.	
0.35	J4						at c.0.35m BGL .. clay is of intermediate plasticity.	
0.50-0.80	B5							
0.60	J6							
1.00	ES7							
1.20-1.65	U8	(17)				(1.50)	Firm becoming stiff brown grey yellow slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone.	
1.70	J9						at c.1.20m BGL ... low strength. Clay is of low plasticity.	
2.00	J10			169.36		2.00	Stiff grey brown slightly sandy slightly gravelly CLAY with cobbles noted. Sand is fine to medium. Gravel is fine to coarse subangular and includes mudstone and sandstone. Cobbles are subangular to subrounded and includes limestone and sandstone. (Driller notes boulders).	
2.20-2.70	B12	N33						
2.20-2.65	SJ11							
3.10	J13					(3.20)		
3.70-4.00	U*B14	(100)						
4.20-4.70	B16	50/135mm		166.16		5.20	Stiff slightly laminated brown grey CLAY.	
4.20-4.65	SJ15			165.86		5.50	Stiff to very stiff grey brown slightly sandy slightly gravelly CLAY with cobbles noted. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone. Cobbles are rounded and include sandstone and limestone. (Driller notes boulders).	
5.20	J17	N41				(2.00)		
5.20-5.50	B20							
5.30	J18							
5.40-5.85	SJ19							
5.50-6.00	B21							
7.00	U*	(65)						
7.00-7.20	B22			163.86		7.50	Terminated at 7.50m BGL - due to an obstruction.	
7.50	C	50/38mm						

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
18/02/2021	0.00	0.00	150		3.30 - 3.60	0:45		(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) Driller notes surface water seeping into borehole when advancing casing. (4) 19mm diameter standpipe piezometer installed to 2.00m BGL.
18/02/2021	7.50	6.80	150	Damp	4.45 - 4.70	0:45		
19/02/2021	7.50	6.80	150	1.60	7.30 - 7.50	1:00		

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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## BOREHOLE RECORD

Status:-  
**FINAL**

<b>Project:</b> A66 North Trans Pennine Scheme D Section 8		<b>Exploratory Hole No.</b>	
<b>Client:</b> AMEY OW Limited		<b>Location:</b> E:407849.018 N:513699.879	
<b>Method (Equipment):</b> Cable Percussion (Dando 2000)		<b>Ground Level (m):</b> 156.909	<b>Start Date:</b> 17/02/2021
		<b>Sheet:</b> 1 of 1	

SAMPLES & TESTS			STRATA					Instrument/ Backfill		
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description			
0.20	ES1		Water	156.61		0.30	Brown very clayey slightly gravelly SAND with many rootlets. Gravel is fine to medium subangular and includes sandstone and mudstone. Sand is fine to coarse.			
0.40	B2								Firm brown grey orange slightly sandy slightly gravelly CLAY with medium cobble content. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone. Cobbles are subangular and of sandstone. (Driller notes cobbles).	
0.70	J3						(1.70)		at c.0.70m BGL ... clay is of intermediate plasticity.	
1.20	ES4									
1.50-2.00	CB5	N43				154.91			2.00	Firm becoming stiff grey brown slightly sandy slightly gravelly CLAY with cobbles noted. Sand is fine to medium. Gravel is fine to medium subangular and includes mudstone and sandstone. Cobbles are rounded and include sandstone and limestone. at c.2.50m BGL ... clay is of low plasticity.
2.20	ES6									
2.40	J7									
2.50-3.00	B9									
2.50-2.95	SJ8	N31								
3.20	J10									
3.50-4.00	B12									
3.50-3.95	SJ11	N48								
4.20	J13								(4.80)	
4.50-5.00	B15									
4.50-4.95	SJ14	50/218mm								
5.20	J16									
5.50-6.00	B17	(100)								
6.00	J18									
6.20	J19									
6.50	SJ20	59/159mm		150.11		6.80	Terminated at 6.80m BGL - due to obstruction.			

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
17/02/2021	0.00	0.00	150		5.20 - 5.30	0:30	1.20 - 4.50	
17/02/2021	4.50	4.50	150	Dry	6.80 - 6.80	1:00	4.50 - 6.80	
18/02/2021	4.50	4.50	150	Dry				
18/02/2021	6.80	6.80	150	Dry				

(1) Description derived from drillers daily report.  
 (2) Inspection pit dug prior to drilling.  
 (3) 19mm diameter standpipe piezometer installed to 3.00m BGL.

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: D. Portsmouth	Contract No. <b>4322D</b>
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**Window/Windowless Sample Hole Records**





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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>WS CLR001</b>	
Client: AMEY OW Limited		Location: E:407535.917 N:513613.817	
Method (Equipment): Windowless Sampling (PC Tracker S110)		Ground Level (m): 166.917	Start Date: 16/02/2021
		Sheet: 1 of 2	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.20 0.20 0.50	J1 ES2 PID B3	<0.1ppm		166.72		0.20	TOPSOIL (Soft dark brown sandy slightly gravelly clay with many rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone, mudstone and limestone).	
1.00 1.00 1.00 1.20 1.20-1.65	ES4 HSV PID U*6 SJ5	47 (24)kPa <0.1ppm (47) N6				(2.00)	Soft dark brown mottled grey slightly sandy very gravelly CLAY with cobbles noted. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular and includes sandstone, mudstone and limestone. Cobbles are subrounded and include sandstone, mudstone and limestone.	
2.20-3.20 2.20-2.40 2.20-2.65 2.20 2.40-2.50 2.50-3.20	U8 <sub>(SS)</sub> ES10 <sub>(UB)</sub> SJ7 PID J11 <sub>(UB)</sub> B12 <sub>(UB)</sub>	(59) N3 <0.1ppm		164.72		(1.00)	Soft to firm grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone, mudstone and limestone. Cobbles are subrounded and include mudstone and limestone.	
3.20	SJ9	50/0mm		163.72		3.20	Terminated at 3.20m BGL - due to an obstruction.	

Boring Progress and Water Observations					Liner Sample Information				General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Internal Dia (mm)	Recovery (%)	Subsampled	
16/02/2021	0.00				1.20 - 2.20	87	0	No	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 2.00m BGL.
16/02/2021	3.20			1.20	2.20 - 3.20	87	100	Yes	

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Myall	Contract No. <b>4322D</b>
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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>WS CLR001</b>
Client: AMEY OW Limited	Location: E:407535.917 N:513613.817		
Method (Equipment): Windowless Sampling (PC Tracker S110)	Ground Level (m): 166.917	Start Date: 16/02/2021	Sheet: 2 of 2

**Figure WS CLR001.1**  
**WS CLR001 - 2.20-3.20m BGL**





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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>WS CLR003</b>	
Client: AMEY OW Limited		Location: E:405120.026 N:513758.596	
Method (Equipment): Windowless Sampling (PC Tracker S110)		Ground Level (m): 201.282	Start Date: 16/02/2021
		Sheet: 1 of 3	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.20 0.20 0.20-0.70 0.50	ES1 J2 B3 HSV	43 (23)kPa		200.88		(0.40) 0.40	TOPSOIL (Soft dark brown sandy slightly gravelly clay/silt with many rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone, mudstone and limestone). at c.0.20m BGL ... clay/silt is of intermediate plasticity.	
1.00 1.00 1.20-2.20 1.20-1.40 1.20-1.65 1.45-1.55 1.55-2.20	ES4 J5 U7 <sup>(SS)</sup> J13 <sup>(U7)</sup> SJ6 J14 <sup>(U7)</sup> B15 <sup>(U7)</sup>	(95) N15		199.83		(1.05) 1.45	Soft brown slightly sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular and includes sandstone, mudstone and limestone. Cobbles are subrounded and include sandstone and limestone.	
2.20-3.20 2.20-2.50 2.20-2.65	U9 <sup>(SS)</sup> ES16 <sup>(U9)</sup> SJ8	(24) N24				(3.20)	Firm grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular and includes sandstone, limestone and mudstone. Cobbles are subrounded and include limestone and sandstone.	
3.20-4.20 3.20-3.30 3.20-3.65 3.30-4.20	U11 <sup>(SS)</sup> J17 <sup>(U11)</sup> SJ10 B18 <sup>(U11)</sup>	(83) N21						
4.20-4.65	SJ12	100/25mm		196.63		4.65		
Complete at 4.65m BGL.								

Boring Progress and Water Observations					Liner Sample Information				General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Internal Dia (mm)	Recovery (%)	Subsampled	
16/02/2021	0.00				1.20 - 2.20	87	100	Yes	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling. (3) 19mm diameter standpipe piezometer installed to 2.50m BGL.
16/02/2021	4.65			Dry	2.20 - 3.20	77	10	Yes	
					3.20 - 4.20	77	100	Yes	

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Myall	Contract No. <b>4322D</b>
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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-  
**FINAL**

Project:	A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>WS CLR003</b>			
Client:	AMEY OW Limited	Location:	E:405120.026 N:513758.596				
Method (Equipment):	Windowless Sampling (PC Tracker S110)	Ground Level (m):	201.282	Start Date:	16/02/2021	Sheet:	2 of 3

Figure WS CLR003.1  
WS CLR003 - 1.20-2.20m BGL



Figure WS CLR003.2  
WS CLR003 - 2.20-3.20m BGL





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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>WS CLR003</b>
Client: AMEY OW Limited	Location: E:405120.026 N:513758.596		
Method (Equipment): Windowless Sampling (PC Tracker S110)	Ground Level (m): 201.282	Start Date: 16/02/2021	Sheet: 3 of 3

Figure WS CLR003.3  
WS CLR003 - 3.20-4.20m BGL







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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>WS CLR005</b>	
Client: AMEY OW Limited		Location: E:407024.903 N:513805.629	
Method (Equipment): Windowless Sampling (PC Tracker S110)		Ground Level (m): 180.342	Start Date: 16/02/2021
		Sheet: 1 of 2	

SAMPLES & TESTS			STRATA					Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1			180.04		0.30	TOPSOIL (Soft dark brown sandy slightly gravelly clay with many rootlets. Sand is fine to coarse. Gravel is fine to coarse subrounded and includes sandstone, mudstone and limestone). Soft brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular and includes sandstone, mudstone and limestone. Cobbles are subrounded and include sandstone and limestone. at c.1.20m BGL ... clay is of intermediate plasticity.	
0.20	ES2							
0.25	B3							
0.50	HSV	50 (27)kPa						
1.00	ES4							
1.00	HSV	48 (23)kPa (81)				(2.20)		
1.20-2.20	U6 <sub>(SS)</sub>							
1.20-1.60	J8 <sub>(U6)</sub>	N9						
1.20-1.65	SJ5							
1.80-2.20	B9 <sub>(U6)</sub>							
2.20	SJ7	50/47mm		177.84		2.50	Terminated at 2.50m BGL - due to an obstruction.	

Boring Progress and Water Observations					Liner Sample Information				General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Internal Dia (mm)	Recovery (%)	Subsampled	
16/02/2021	0.00				1.20 - 2.20	87	100	Yes	(1) Description derived from drillers daily report. (2) Inspection pit dug prior to drilling.
16/02/2021	2.50			Dry					

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Myall	Contract No. <b>4322D</b>
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## WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>WS CLR005</b>
Client: AMEY OW Limited	Location: E:407024.903 N:513805.629		
Method (Equipment): Windowless Sampling (PC Tracker S110)	Ground Level (m): 180.342	Start Date: 16/02/2021	Sheet: 2 of 2

Figure WS CLR005.1  
WS CLR005 - 1.20-2.20m BGL



## Trial Pit Records





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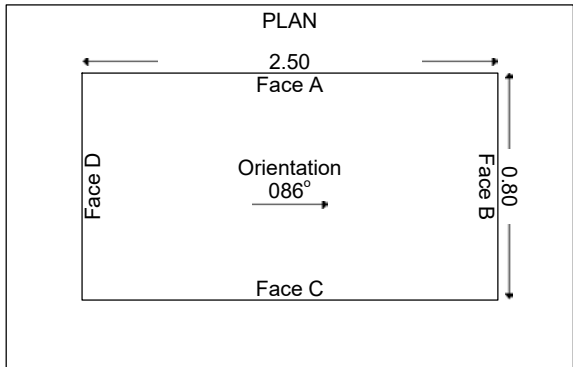
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR001	
Client: AMEY OW Limited		Location: E:407121.442 N:513781.062	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 179.473	Start Date: 12/02/2021
		Sheet: 1 of 5	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1	57 (15)kPa		179.27		0.20	TOPSOIL (Dark brown organic slightly sandy clay with frequent rootlets. Sand is fine).
0.30	J2			179.07		0.40	Soft dark grey brown sandy/silty organic CLAY. Sand is fine. at c.0.30m BGL ... clay is of intermediate plasticity.
0.30	ES3			178.77		0.70	Brown and grey brown very clayey gravelly SAND with low to medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular and include sandstone and limestone.
0.40	J4						
0.50-0.70	B5			1.70			Firm brown and grey brown slightly sandy slightly gravelly CLAY with high cobble and boulder content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles and boulders (up to 450mm x 800mm x 500mm) are subangular to subrounded and include sandstone and limestone.
0.50	HSV						
0.80	J6						
0.80-1.00	B7						
1.20	ES8	120 kPa		177.07		2.40	Very stiff grey slightly sandy slightly gravelly CLAY with medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include limestone and metamorphic lithologies.
1.80	J9						
2.00-2.20	B10						
2.20	ES11	175.57		3.90			Terminated at 3.90m BGL - due to no progress (hard ground).
2.50	J12						
3.00-3.20	B13						
3.00	HSV						
3.50	J14						



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**  
 (1) Material unsuitable for HSV testing between 0.80-2.80m BGL (too gravelly).





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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR001</b>
Client: AMEY OW Limited	Location: E:407121.442 N:513781.062		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 179.473	Start Date: 12/02/2021	Sheet: 2 of 5

Figure TP CLR001.1  
TP CLR001

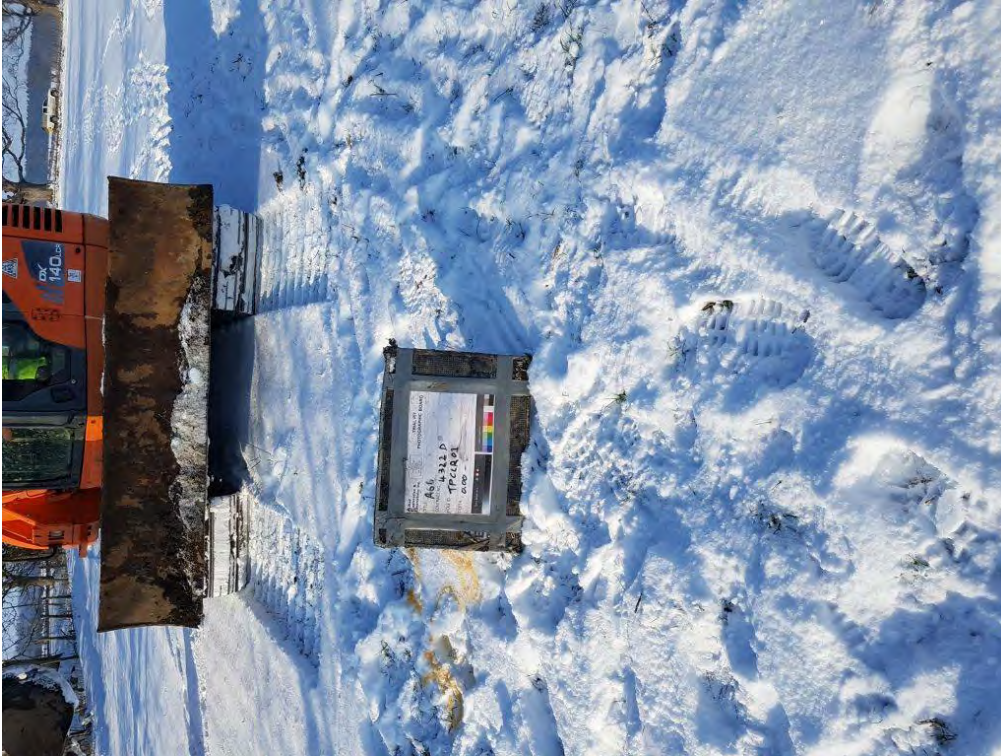


Figure TP CLR001.2  
TP CLR001







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:407121.442 N:513781.062	TP CLR001	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 179.473	Start Date: 12/02/2021	Sheet: 3 of 5

Figure TP CLR001.3  
TP CLR001



Figure TP CLR001.4  
TP CLR001







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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR001</b>
Client: AMEY OW Limited	Location: E:407121.442 N:513781.062		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 179.473	Start Date: 12/02/2021	Sheet: 4 of 5

Figure TP CLR001.5  
TP CLR001



Figure TP CLR001.6  
TP CLR001





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Tel: 01772 735 300 Fax: 01772 735 999

## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR001</b>
Client: AMEY OW Limited	Location: E:407121.442 N:513781.062		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 179.473	Start Date: 12/02/2021	Sheet: 5 of 5

Figure TP CLR001.7  
TP CLR001







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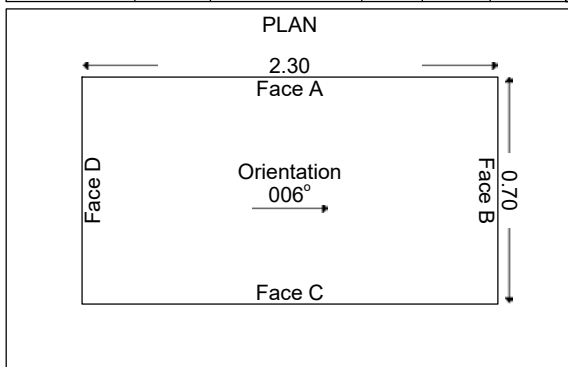
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR002</b>	
Client: AMEY OW Limited		Location: E:405017.816 N:513969.188	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 211.958	Start Date: 10/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1			211.76		0.20	TOPSOIL (Dark brown slightly sandy organic clay with frequent rootlets. Sand is fine).
0.35	ES2					(0.40)	Firm yellowish brown mottled grey sandy slightly gravelly CLAY with low cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone. Cobbles are subangular and include sandstone and limestone.
0.40	J3			211.36		0.60	
0.50-0.70	B4						
0.80	J5					(0.60)	
1.00-1.20	B6			210.76		1.20	Firm orangish brown mottled grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone. Cobbles are subangular and include sandstone and limestone.
1.20-1.20	ES6					(0.80)	Firm becoming stiff slightly sandy gravelly CLAY with high cobble and boulder content. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded and includes sandstone, granite and metamorphic lithologies. Cobbles and boulders are subangular to subrounded and include granite and sandstone.
1.20	ES7						
1.80	J8			209.96		2.00	Terminated at 2.00m BGL - due to slow progress (hard ground).
1.90-2.00	B9						



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405017.816 N:513969.188		TP CLR002
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 211.958	Start Date: 10/02/2021	Sheet: 2 of 4

Figure TP CLR002.1  
TP CLR002



Figure TP CLR002.2  
TP CLR002







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405017.816 N:513969.188		TP CLR002
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 211.958	Start Date: 10/02/2021	Sheet: 3 of 4

Figure TP CLR002.3  
TP CLR002



Figure TP CLR002.4  
TP CLR002





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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR002</b>
Client: AMEY OW Limited	Location: E:405017.816 N:513969.188		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 211.958	Start Date: 10/02/2021	Sheet: 4 of 4

Figure TP CLR002.5  
TP CLR002







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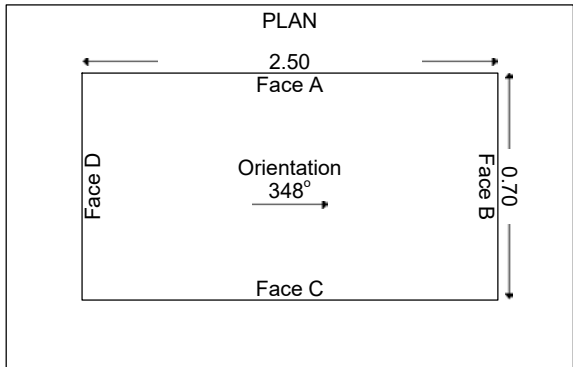
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG Tel: 0191 387 4700 Fax: 0191 387 4710  
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR002A	
Client: AMEY OW Limited		Location: E:405094.064 N:514164.704	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 204.853	Start Date: 10/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Description	
0.20	J1	65 (23)kPa	Water	204.50		TOPSOIL (Dark brown slightly sandy slightly peaty organic clay with frequent rootlets. Sand is fine).	
0.40	J2			(0.95)	1.30		Firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subangular sandstone and mudstone. Cobbles are subangular and include sandstone and limestone. at c.0.40m BGL ... clay is of intermediate plasticity.
0.40	ES3						
0.50	HSV						
0.55	J4						
0.80-1.00	B5			(1.50)	2.80		Firm orangish brown mottled grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subangular sandstone and mudstone. Cobbles are subangular and include sandstone and limestone.
1.20	J6						
1.20	ES7						
1.70	J8			(1.40)	4.20		Stiff to very stiff grey to bluish grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subrounded and includes sandstone, metamorphic lithologies and mudstone. Cobbles are subangular and includes metamorphic lithologies.
1.80-2.00	B9						
2.40	ES10						
2.50	ES11						
2.90	J12			(1.40)	4.20		Terminated at 4.20m BGL - due to slow progress (hard ground).
3.30-3.50	B13						
3.90	J14						
4.00-4.20	B15						



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405094.064 N:514164.704		TP CLR002A
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 204.853	Start Date: 10/02/2021	Sheet: 2 of 4

Figure TP CLR002A.1  
TP CLR002A



Figure TP CLR002A.2  
TP CLR002A







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405094.064 N:514164.704	TP CLR002A	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 204.853	Start Date: 10/02/2021	Sheet: 3 of 4

Figure TP CLR002A.3  
TP CLR002A



Figure TP CLR002A.4  
TP CLR002A







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405094.064 N:514164.704		TP CLR002A
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 204.853	Start Date: 10/02/2021	Sheet: 4 of 4

Figure TP CLR002A.5  
TP CLR002A



Figure TP CLR002A.6  
TP CLR002A







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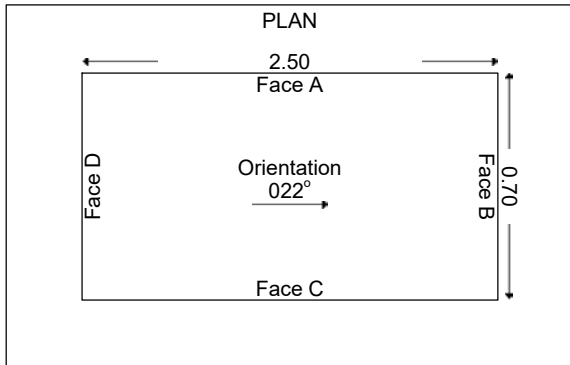
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR003</b>	
Client: AMEY OW Limited		Location: E:405309.516 N:513926.084	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 203.845	Start Date: 10/02/2021
		Sheet: 1 of 3	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1	64 (21)kPa	Water	203.60		0.25	TOPSOIL (Dark brown slightly sandy organic clay with frequent rootlets. Sand is fine).
0.30	J2			0.95		1.20	Firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone. Cobbles are subangular and include sandstone and mudstone.
0.30	ES3						
0.50	J4						
0.80-1.00	B5			1.20		2.40	Firm orangish brown mottled grey slightly sandy gravelly CLAY with medium cobble and boulder content. Sand is fine and medium. Gravel is fine to coarse angular to subangular and include sandstone and mudstone. Cobbles are subangular and include sandstone and mudstone.
1.20	ES6						
1.20	HSV						
1.30	J7						
1.60-1.80	B8			2.80		2.80	Firm to stiff greyish brown very slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, siltstone and metamorphic lithologies. Cobbles are subangular to subrounded and include sandstone, granite and metamorphic lithologies.
2.40	J9						
2.50-2.70	J10						
2.50	ES11			1.40		4.20	Stiff to very stiff grey to bluish grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine and medium. Gravel is fine to coarse angular to subrounded and includes sandstone, metamorphic lithologies and mudstone. Cobbles are subangular of metamorphic lithologies.
2.80	J12						
3.30-3.50	B13	199.65		4.20	Terminated at 4.20m BGL - due to slow progress (hard ground).		



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405309.516 N:513926.084		TP CLR003
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 203.845	Start Date: 10/02/2021	Sheet: 2 of 3

Figure TP CLR003.1  
TP CLR003



Figure TP CLR003.2  
TP CLR003





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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR003</b>
Client: AMEY OW Limited	Location: E:405309.516 N:513926.084		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 203.845	Start Date: 10/02/2021	Sheet: 3 of 3

Figure TP CLR003.3  
TP CLR003







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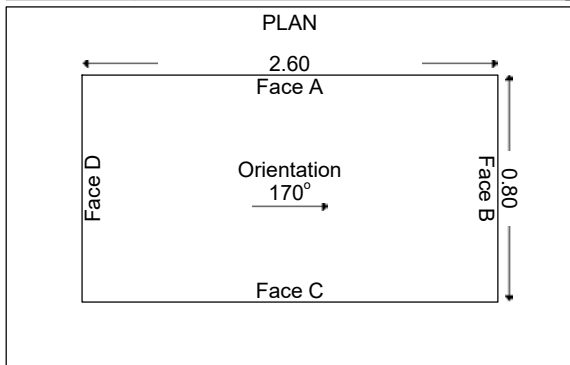
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR004</b>	
Client: AMEY OW Limited		Location: E:405270.683 N:513659.451	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 198.803	Start Date: 17/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA							
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description			
0.10	J1	60 (22)kPa		198.55		0.25	TOPSOIL (Dark greyish brown slightly sandy slightly gravelly organic clay. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies).			
0.30	J2			197.90		0.90	Soft to firm yellowish brown sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies.			
0.30	ES3						1.00	1.20	1.40-1.60	Firm dark grey slightly sandy gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles and boulders (up to 350mm x 480mm x 460mm are subangular to subrounded and include sandstone, mudstone and metamorphic lithologies. at c.1.00m BGL .. clay is of low plasticity.
0.40	HSV									
0.50-0.70	B4	197.00		1.80	3.00-3.20	3.00	120 kPa			
1.00	J5							194.90		3.90
1.20	ES6	194.30		4.50	Grey slightly clayey slightly gravelly SAND. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded and includes mudstone, sandstone and metamorphic lithologies.					
1.40-1.60	B7					194.30		4.50	Complete at 4.50m BGL.	
1.90	J8	194.30		4.50	Complete at 4.50m BGL.					
2.00-2.20	B10					194.30		4.50	Complete at 4.50m BGL.	
2.20	ES11	194.30		4.50	Complete at 4.50m BGL.					
2.50	J12					194.30		4.50	Complete at 4.50m BGL.	
3.00-3.20	B13	194.30		4.50	Complete at 4.50m BGL.					
3.00	HSV					194.30		4.50	Complete at 4.50m BGL.	
4.00	J14	194.30		4.50	Complete at 4.50m BGL.					
4.00-4.20	B15					194.30		4.50	Complete at 4.50m BGL.	



GROUNDWATER  
 Seepage at 4.50m BGL.

STABILITY  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR004	
Client: AMEY OW Limited	Location: E:405270.683 N:513659.451		Sheet: 2 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 198.803	Start Date: 17/02/2021	

Figure TP CLR004.1  
TP CLR004



Figure TP CLR004.2  
TP CLR004







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR004	
Client: AMEY OW Limited	Location: E:405270.683 N:513659.451		Sheet: 3 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 198.803	Start Date: 17/02/2021	

Figure TP CLR004.3  
TP CLR004



Figure TP CLR004.4  
TP CLR004







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR004</b>
Client: AMEY OW Limited	Location: E:405270.683 N:513659.451		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 198.803	Start Date: 17/02/2021	Sheet: 4 of 4

Figure TP CLR004.5  
TP CLR004





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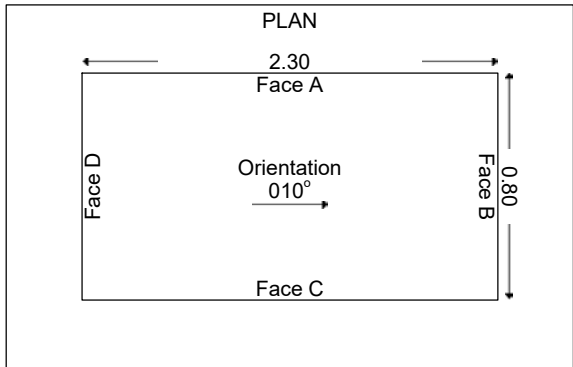
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR005</b>	
Client: AMEY OW Limited		Location: E:405129.740 N:513719.306	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 200.022	Start Date: 15/02/2021	Sheet: 1 of 3

SAMPLES & TESTS			STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.20	J1	67 (29)kPa		199.72		0.30	TOPSOIL (Dark greyish brown slightly sandy organic clay with frequent rootlets. Sand is fine).	
0.30	J2			199.32		0.40	0.70	Yellowish brown very clayey SAND and GRAVEL with low cobble content. Gravel is fine to coarse angular to subrounded and includes sandstone and limestone. Cobbles are subangular and include sandstone.
0.40-0.60	B3							
0.40	ES4			1.00-1.20		1.70	2.40	Firm to stiff dark grey mottled orange brown slightly sandy gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse subangular to subrounded and includes sandstone and mudstone. Cobbles and boulders are subangular to subrounded and includes sandstone and mudstone.
0.50	HSV							
0.80	J5			197.62		2.10	4.50	Stiff to very stiff grey slightly sandy gravelly CLAY with thin fine sand partings. Gravel is fine to coarse angular to subrounded and includes sandstone, limestone and metamorphic lithologies. at c.2.50m BGL ... clay is of low plasticity.
1.00-1.20	B6							
1.20	ES7			195.52		4.50	4.50	Complete at 4.50m BGL.
1.50	J8							
2.00-2.20	B9			195.52		4.50	4.50	Complete at 4.50m BGL.
2.40	ES10							
2.50	J11			195.52		4.50	4.50	Complete at 4.50m BGL.
3.00-3.20	B12							
3.50	J13			195.52		4.50	4.50	Complete at 4.50m BGL.
4.00-4.20	B14							



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR005	
Client: AMEY OW Limited	Location: E:405129.740 N:513719.306		Sheet: 2 of 3
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 200.022	Start Date: 15/02/2021	

Figure TP CLR005.1  
TP CLR005



Figure TP CLR005.2  
TP CLR005







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR005	
Client: AMEY OW Limited	Location: E:405129.740 N:513719.306		Sheet: 3 of 3
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 200.022	Start Date: 15/02/2021	

Figure TP CLR005.3  
TP CLR005



Figure TP CLR005.4  
TP CLR005





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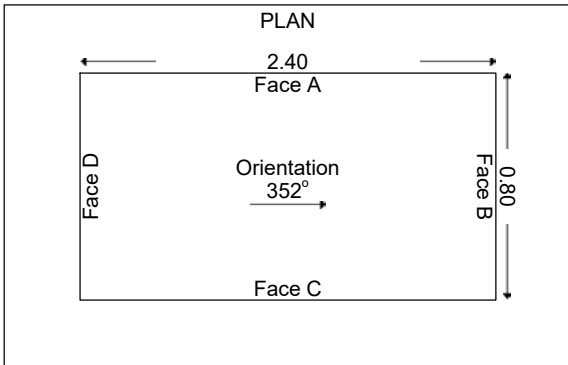
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR006	
Client: AMEY OW Limited		Location: E:405333.447 N:513721.978	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 197.544	Start Date: 15/02/2021
		Sheet: 1 of 5	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1			197.29		0.25	TOPSOIL (Dark greyish brown slightly sandy organic clay with frequent rootlets. Sand is fine).
0.30	J2					(0.45)	Soft to firm yellowish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is fine to coarse angular to subrounded and includes sandstone, limestone and metamorphic lithologies. Cobbles are subangular to subrounded and include sandstone, mudstone and metamorphic lithologies. at c.0.30m BGL ... clay is of intermediate plasticity.
0.30	ES3						
0.40-0.60	B4	67 (23)kPa		196.84		0.70	
0.50	HSV						
0.80	J5						
0.80-1.00	B6	76 (25)kPa				(1.10)	
0.80	HSV						Firm grey with orange mottling slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded and includes sandstone, limestone and metamorphic lithologies. at c.0.80m BGL .. clay is of intermediate plasticity.
1.20	ES7						Stiff to very stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and limestone. Cobbles are subangular and include sandstone.
1.80	J8			195.74		1.80	
2.00-2.20	B9						
2.40	ES10						
2.80	J11						Complete at 4.50m BGL.
3.00-3.20	B12					(2.70)	
3.80	J13	120 kPa					
3.80	HSV						
4.00-4.20	B14			193.04		4.50	



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**  
 (1) Soakaway testing undertaken at 2.00m BGL. Refer to *In-situ Testing Enclosure 6 for details.*

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405333.447 N:513721.978		TP CLR006
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.544	Start Date: 15/02/2021	Sheet: 2 of 5

Figure TP CLR006.1  
TP CRL006



Figure TP CLR006.2  
TP CRL006







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR006</b>
Client: AMEY OW Limited	Location: E:405333.447 N:513721.978		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.544	Start Date: 15/02/2021	Sheet: 3 of 5

Figure TP CLR006.3  
TP CRL006



Figure TP CLR006.4  
TP CRL006







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR006	
Client: AMEY OW Limited	Location: E:405333.447 N:513721.978		Sheet: 4 of 5
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.544	Start Date: 15/02/2021	

Figure TP CLR006.5  
TP CRL006



Figure TP CLR006.6  
TP CRL006







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405333.447 N:513721.978		TP CLR006
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.544	Start Date: 15/02/2021	Sheet: 5 of 5

Figure TP CLR006.7  
TP CRL006





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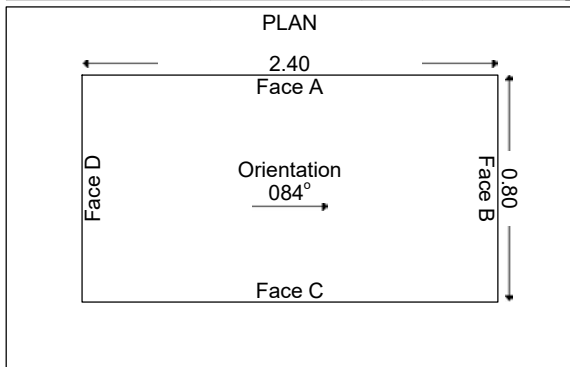
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR007</b>	
Client: AMEY OW Limited		Location: E:405404.090 N:513820.862	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 201.430	Start Date: 11/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1	73 (28)kPa		201.08		0.35	TOPSOIL (Dark grey brown slightly sandy slightly gravelly organic clay with frequent rootlets. Gravel is fine to coarse subangular to subrounded and includes sandstone and mudstone).
0.30	J2			(0.45)		0.80	Firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded and includes sandstone and mudstone. at c.0.50m BGL ... clay is of low to intermediate plasticity.
0.40	ES3						
0.50	J4						Firm grey mottled orangey brown slightly sandy slightly gravelly CLAY with medium to high cobble content. Gravel is fine to coarse angular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are angular to subangular and includes sandstone and metamorphic lithologies. at c.1.80m BGL ... slightly sandy gravelly clay. below c.1.90m BGL ... boulders (up to 600mm x 650mm x 700mm) of sandstone and limestone.
0.80-1.00	HSV B5						
1.20	ES6						
1.50	J7						
1.80-2.00	B8						
2.50	J9						
2.50	ES10			198.63		2.80	Stiff to very stiff slightly sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include sandstone and limestone.
2.80	J11						
2.80-3.00	B12						
3.80	J13						
4.00-4.20	B14			197.03		4.40	Terminated at 4.40m BGL - due to slow progress (hard ground).



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**  
 (1) Material unsuitable for HSV testing between 0.80-2.80m BGL (too gravelly).

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets	Checked by: <i>K.W.</i>	Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405404.090 N:513820.862		TP CLR007
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 201.430	Start Date: 11/02/2021	Sheet: 2 of 4

Figure TP CLR007.1  
TP CLR007



Figure TP CLR007.2  
TP CLR007







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405404.090 N:513820.862		TP CLR007
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 201.430	Start Date: 11/02/2021	Sheet: 3 of 4

Figure TP CLR007.3  
TP CLR007



Figure TP CLR007.4  
TP CLR007







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR007</b>
Client: AMEY OW Limited	Location: E:405404.090 N:513820.862		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 201.430	Start Date: 11/02/2021	Sheet: 4 of 4

Figure TP CLR007.5  
TP CLR007





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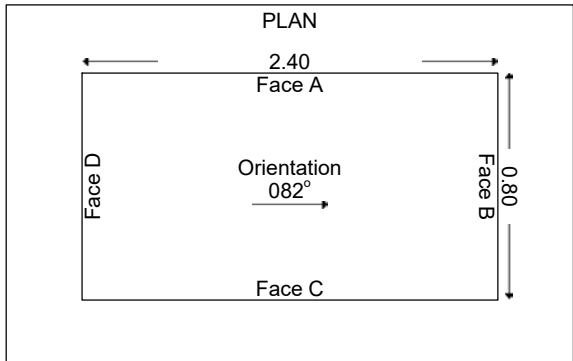
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR008</b>	
Client: AMEY OW Limited		Location: E:405573.231 N:513779.043	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.858	Start Date: 16/02/2021	Sheet: 1 of 4

SAMPLES & TESTS			STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1	70 (24)kPa	↓	197.66		0.20	TOPSOIL (Brown slightly sandy slightly organic clay with rootlets and roots. Sand is fine to medium).	
0.30	J2			197.46		0.40	Friable brown organic sandy slightly gravelly CLAY with occasional rootlets between 2-4mm diameter. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies.	
0.30	ES3			196.56		(0.90)	1.30	Soft to firm brown to yellowish brown slightly sandy slightly gravelly CLAY with traces of rootlets. Sand is fine to medium. Gravel is fine angular to subangular and includes sandstone, mudstone and metamorphic lithologies.
0.45	J4							
0.60	J5			196.16		(0.40)	1.70	Firm brown with grey mottling slightly sandy gravelly CLAY with low to medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and limestone. Cobbles are angular subrounded and includes sandstone, limestone and metamorphic lithologies.
0.80	HSV							
1.00-1.20	B6			195.16		(1.00)	2.70	Stiff to very stiff grey slightly sandy slightly gravelly CLAY with medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include limestone and sandstone.
1.20	ES7							
1.40	J8							
1.50-1.70	B9			194.86			3.00	Grey slightly clayey to clayey sandy GRAVEL with medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone and mudstone. Cobbles are subangular and include limestone and metamorphic lithologies.
1.70	J10							
2.00-2.20	B11							Terminated at 3.00m BGL - unable to progress (hard ground).
2.40	ES12							
2.80	J13							
2.80-3.00	B14							



**GROUNDWATER**  
 Water strike at 2.70m BGL.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**





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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR008	
Client: AMEY OW Limited	Location: E:405573.231 N:513779.043		Sheet: 2 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.858	Start Date: 16/02/2021	

Figure TP CLR008.1  
TP CLR008



Figure TP CLR008.2  
TP CLR008







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR008</b>
Client: AMEY OW Limited	Location: E:405573.231 N:513779.043		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.858	Start Date: 16/02/2021	Sheet: 3 of 4

**Figure TP CLR008.3  
TP CLR008**



**Figure TP CLR008.4  
TP CLR008**







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405573.231 N:513779.043		TP CLR008
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 197.858	Start Date: 16/02/2021	Sheet: 4 of 4

Figure TP CLR008.5  
TP CLR008



Figure TP CLR008.6  
TP CLR008





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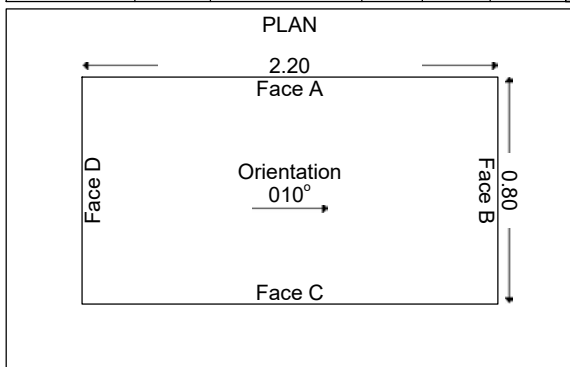
Tel: 0191 387 4700 Fax: 0191 387 4710  
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR009	
Client: AMEY OW Limited		Location: E:405701.789 N:513717.535	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 193.117	Start Date: 16/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10	J1			192.87		0.25	TOPSOIL (Dark greyish brown slightly sandy organic clay with frequent rootlets up to 3mm. Sand is fine).
0.30	J2					(0.55)	Firm yellow brown mottled grey slightly gravelly sandy CLAY with medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone and mudstone.
0.30	ES3						
0.40-0.60	B4			192.32		0.80	
0.90	J5					(0.80)	Firm brown mottled grey slightly sandy slightly gravelly CLAY with medium cobble content. Sand is fine. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are angular to subangular and include limestone and sandstone.
1.00-1.20	B6						
1.20	ES7						
1.60	J8			191.52		1.60	at c.0.90m BGL ... clay is of intermediate plasticity. at c.1.20m BGL ... clay drainage pipe damaged. Water filled trial pit. Pipe repaired. <i>Terminated at 1.60m BGL - due to damaged clay field drain.</i>



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405701.789 N:513717.535		TP CLR009
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.117	Start Date: 16/02/2021	Sheet: 2 of 4

Figure TP CLR009.1  
TP CLR009



Figure TP CLR009.2  
TP CLR009







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR009	
Client: AMEY OW Limited	Location: E:405701.789 N:513717.535		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.117	Start Date: 16/02/2021	Sheet: 3 of 4

Figure TP CLR009.3  
TP CLR009



Figure TP CLR009.4  
TP CLR009







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR009</b>
Client: AMEY OW Limited	Location: E:405701.789 N:513717.535		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.117	Start Date: 16/02/2021	Sheet: 4 of 4

Figure TP CLR009.5  
TP CLR009





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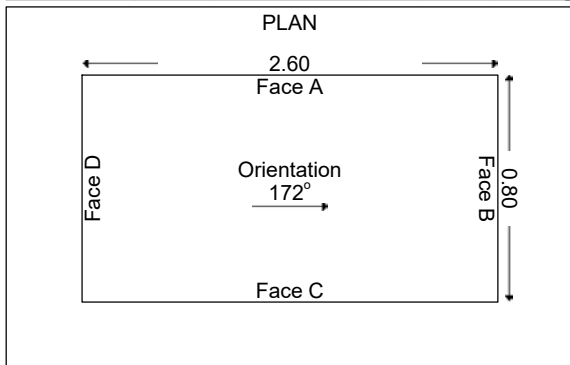
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR009A	
Client: AMEY OW Limited		Location: E:405701.914 N:513720.844	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 193.344	Start Date: 17/02/2021
		Sheet: 1 of 5	

SAMPLES & TESTS			STRATA			
Depth	Type No	Test Result	Water	Reduced Level	Legend	Description
0.60	HSV	60 (19)kPa		193.09		TOPSOIL (Dark grey brown slightly sandy organic clay with frequent rootlets. Sand is fine).
				192.54		Firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include sandstone.
1.90 2.00-2.20	J1 B2			191.44		Firm brown mottled grey slightly sandy to sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse angular to subrounded and includes mudstone, sandstone and limestone. Cobbles are angular to subrounded and include sandstone, limestone and metamorphic lithologies.
				190.64		Firm brown and brownish grey sandy gravelly CLAY with medium cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and coal. Cobbles are angular to subrounded and includes sandstone, mudstone and metamorphic lithologies.
2.80 2.80	J3 ES4					at c.1.90m BGL ... clay is of low plasticity.
				188.84		Grey very clayey SAND and GRAVEL with low cobble content. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular and include sandstone and limestone.
3.40-3.60	B5					Complete at 4.50m BGL.



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation. Some collapse during soakaway test.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**  
 (1) Soakaway testing undertaken at 2.00m BGL. Refer to *In-situ* Testing Enclosure 6 for details.  
 (2) Recovered material unsuitable for HSV testing between 0.80-2.00m BGL.

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. 4322D
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405701.914 N:513720.844		TP CLR009A
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.344	Start Date: 17/02/2021	Sheet: 2 of 5

Figure TP CLR009A.1  
TP CLR009A



Figure TP CLR009A.2  
TP CLR009A







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405701.914 N:513720.844		TP CLR009A
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.344	Start Date: 17/02/2021	Sheet: 3 of 5

Figure TP CLR009A.3  
TP CLR009A



Figure TP CLR009A.4  
TP CLR009A







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405701.914 N:513720.844		TP CLR009A
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.344	Start Date: 17/02/2021	Sheet: 4 of 5

Figure TP CLR009A.5  
TP CLR009A



Figure TP CLR009A.6  
TP CLR009A







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR009A	
Client: AMEY OW Limited	Location: E:405701.914 N:513720.844		Sheet: 5 of 5
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.344	Start Date: 17/02/2021	

Figure TP CLR009A.7  
TP CLR009A



Figure TP CLR009A.8  
TP CLR009A







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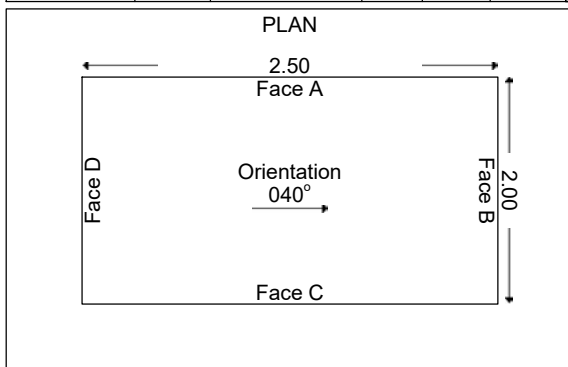
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR010</b>	
Client: AMEY OW Limited		Location: E:405935.007 N:513769.806	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 191.889	Start Date: 10/03/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10 0.20	J1 ES2		Water	191.59		0.30	Grass over brown clayey/silty TOPSOIL with occasional rootlets. between c.0.15-0.30m BGL ... light brown.
0.50	J3			(0.90)			Soft mottled bluish grey orangish brown very sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes limestone, mudstone and sandstone. Cobbles are angular to subrounded and includes sandstone and limestone.
1.00 1.00	B4 ES5			190.69		1.20	Soft to firm mottled blue dark brown brown very sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes limestone, mudstone and sandstone. Cobbles are angular to rounded and include limestone and sandstone.
1.50	J6			(1.20)			at c.1.50m BGL ... clay is of low plasticity.
2.00	B7			189.49		2.40	Brownish blue grey clayey sandy slightly gravelly SILT. Gravel is fine to coarse angular to subrounded and include sandstone and mudstone.
2.50 2.50	ES8 J9			(2.10)			
3.00	B10						
3.50	J11						
4.00	B12						
4.50	J13				187.39		4.50



**GROUNDWATER**  
 Moderate groundwater seepage at 1.60m BGL.

**STABILITY**  
 Pit sides and base unstable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: M. Bell	Contract No. <b>4322D</b>
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Tel: 01772 735 300 Fax: 01772 735 999

## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR010</b>
Client: AMEY OW Limited	Location: E:405935.007 N:513769.806		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 191.889	Start Date: 10/03/2021	Sheet: 2 of 4

**Figure TP CLR010.1  
TP CLR010**



**Figure TP CLR010.2  
TP CLR010**







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:405935.007 N:513769.806	TP CLR010	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 191.889	Start Date: 10/03/2021	Sheet: 3 of 4

Figure TP CLR010.3  
TP CLR010



Figure TP CLR010.4  
TP CLR010







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR010</b>
Client: AMEY OW Limited	Location: E:405935.007 N:513769.806		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 191.889	Start Date: 10/03/2021	Sheet: 4 of 4

Figure TP CLR010.5  
TP CLR010







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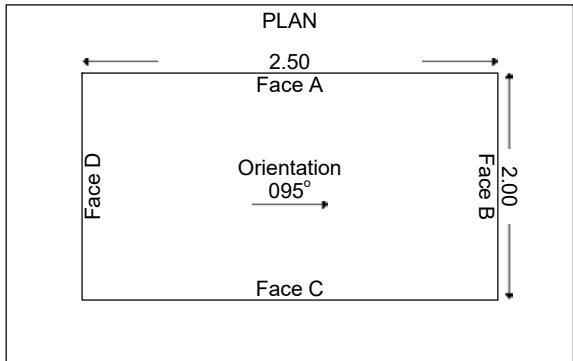
Tel: 0191 387 4700 Fax: 0191 387 4710  
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR011</b>	
Client: AMEY OW Limited		Location: E:406170.525 N:513758.499	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 191.438	Start Date: 10/03/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10 0.20	J1 ES2			191.09		0.35	Grass over brown slightly sandy clayey/silty TOPSOIL with occasional rootlets. between c.0.20-0.35m BGL ... light brown.
0.50	J3					(0.65)	Soft mottled bluish grey orangish brown very sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes limestone, mudstone and sandstone. Cobbles are angular to subrounded and include sandstone and limestone.
1.00 1.00	B4 ES5			190.44		1.00	
1.50	J6					(1.50)	Firm mottled blue dark brown very sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes limestone, mudstone and sandstone. Cobbles are angular to rounded and include limestone and sandstone.
2.00	B7						
2.50 2.60	ES8 J9			188.94		2.50	Stiff to very stiff blue slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes limestone, mudstone and sandstone. Cobbles are angular to rounded and include sandstone and limestone. at c.2.60m BGL ... clay is of low plasticity.
3.00	B10						
3.50	J11					(2.00)	between c.4.10-4.50m BGL ... low boulder content. Boulders are rounded and of limestone.
4.00	B12						
4.50	J13			186.94		4.50	Complete at 4.50m BGL.



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base moderately unstable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: M. Bell	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:406170.525 N:513758.499		TP CLR011
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 191.438	Start Date: 10/03/2021	Sheet: 2 of 4

Figure TP CLR011.1  
TP CLR011



Figure TP CLR011.2  
TP CLR011







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR011	
Client: AMEY OW Limited	Location: E:406170.525 N:513758.499		Sheet: 3 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 191.438	Start Date: 10/03/2021	

Figure TP CLR011.3  
TP CLR011



Figure TP CLR011.4  
TP CLR011







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR011</b>
Client: AMEY OW Limited	Location: E:406170.525 N:513758.499		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 191.438	Start Date: 10/03/2021	Sheet: 4 of 4

Figure TP CLR011.5  
TP CLR011







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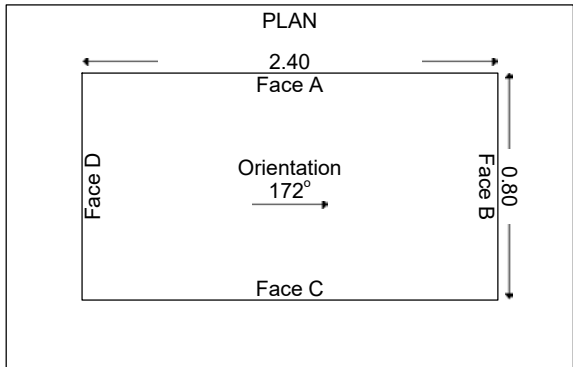
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR012	
Client: AMEY OW Limited		Location: E:406359.838 N:513791.434	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 193.931	Start Date: 11/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.20	J1	60 (19)kPa		193.58		0.35	TOPSOIL (Dark grey brown slightly sandy slightly gravelly organic clay with frequent rootlets. Sand is fine. Gravel is fine to coarse subangular to subrounded and includes sandstone and mudstone). below c.0.20m BGL ... sandy.	
0.40	J2			193.03		(0.55)		Firm orange brown mottled grey sandy slightly gravelly CLAY with medium cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include metamorphic lithologies. at c.0.40m BGL ... clay is of low to intermediate plasticity.
0.40	ES3							
0.50-0.70	B4							
0.50	HSV							
1.00	J5	120 kPa		190.23		3.70	Firm brown and greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is fine to coarse subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and includes sandstone, mudstone and metamorphic lithologies. between c.2.00-2.80m BGL ... large boulders (up to 700mm x 600mm x 450mm).	
1.20	ES6							
1.50-1.70	B7							
2.00	J8							
2.40	ES9							
2.50	J10			189.73		(0.50)	Stiff to very stiff grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include metamorphic lithologies. Terminated at 4.20m BGL - due to slow progress.	
2.50-2.70	B11							
3.00	J12							
3.50-3.70	B13							
3.80	J14							
4.00-4.20	B15							
4.00	HSV							



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**  
 (1) Recovered material unsuitable for HSV testing between 0.90-3.80m BGL.



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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:406359.838 N:513791.434		TP CLR012
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.931	Start Date: 11/02/2021	Sheet: 2 of 4

Figure TP CLR012.1  
TP CLR012



Figure TP CLR012.2  
TP CLR012







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:406359.838 N:513791.434		TP CLR012
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.931	Start Date: 11/02/2021	Sheet: 3 of 4

Figure TP CLR012.3  
TP CLR012



Figure TP CLR012.4  
TP CLR012







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR012</b>
Client: AMEY OW Limited	Location: E:406359.838 N:513791.434		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 193.931	Start Date: 11/02/2021	Sheet: 4 of 4

Figure TP CLR012.5  
TP CLR012



Figure TP CLR012.6  
TP CLR012





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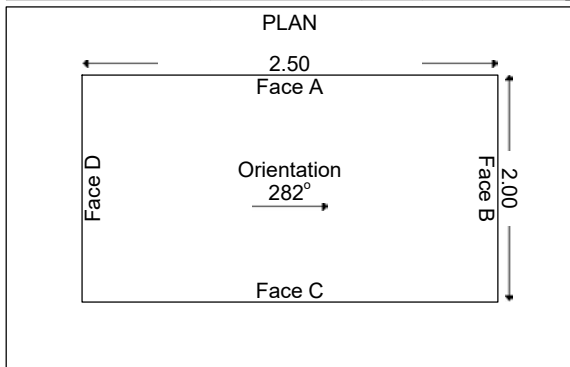
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. <b>TP CLR013</b>	
Client: AMEY OW Limited		Location: E:406547.606 N:513754.632	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 190.808	Start Date: 10/03/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.10 0.20	J1 ES2			190.51		0.30	Grass over brown slightly sandy clayey/silty TOPSOIL with occasional rootlets. between c.0.15-0.30m BGL ... light brown.
0.50	J3					(0.80)	Soft mottled bluish grey orangish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes limestone, mudstone and sandstone. Cobbles are angular to subrounded and include sandstone and limestone.
1.00 1.00	B4 ES5			189.71		1.10	Soft brownish blue very sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes limestone, mudstone and sandstone. Cobbles are angular to rounded and include limestone and sandstone.
1.50	J6					(1.50)	Soft brownish blue very sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes limestone, mudstone and sandstone. Cobbles are angular to rounded and include limestone and sandstone. at c.1.50m BGL .. clay is of low plasticity.
2.00	B7						
2.50 2.70	ES8 J9			188.21		2.60	Stiff blue slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes limestone, mudstone and sandstone. Cobbles are angular to rounded and include sandstone and limestone.
3.00	B10						
3.50	J11					(1.90)	at c.3.50m BGL ... clay is of low plasticity.
4.00 4.00	B12 ES13						between c.4.00-4.50m BGL ... low boulder content. Boulders are rounded and include limestone.
4.50	J14			186.31		4.50	Complete at 4.50m BGL.



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base moderately unstable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: M. Bell	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:406547.606 N:513754.632	TP CLR013	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 190.808	Start Date: 10/03/2021	Sheet: 2 of 4

Figure TP CLR013.1  
TP CLR013



Figure TP CLR013.2  
TP CLR013







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Tel: 01772 735 300 Fax: 01772 735 999

## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:406547.606 N:513754.632		<b>TP CLR013</b>
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 190.808	Start Date: 10/03/2021	Sheet: 3 of 4

**Figure TP CLR013.3  
TP CLR013**



**Figure TP CLR013.4  
TP CLR013**







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR013</b>
Client: AMEY OW Limited	Location: E:406547.606 N:513754.632		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 190.808	Start Date: 10/03/2021	Sheet: 4 of 4

Figure TP CLR013.5  
TP CLR013





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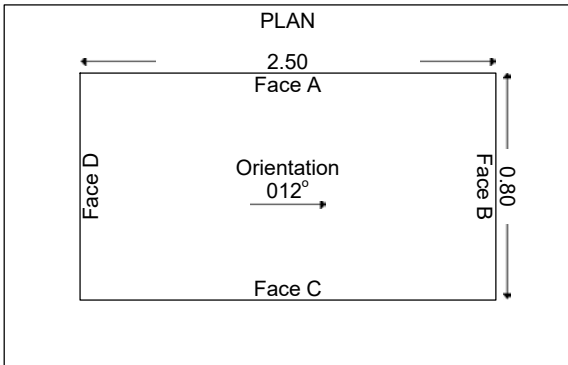
Tel: 0191 387 4700 Fax: 0191 387 4710  
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR015	
Client: AMEY OW Limited		Location: E:406829.960 N:513564.681	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 178.425	Start Date: 19/02/2021	Sheet: 1 of 4

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description		
0.20	J1	53 (19)kPa	☞	178.08		0.35	TOPSOIL (Greyish brown slightly sandy slightly gravelly slightly peaty organic clay with frequent rootlets. Gravel is fine to coarse angular to subangular and include sandstone and mudstone).		
0.40	J2			177.43		(0.65)	Yellowish brown very clayey very sandy GRAVEL with high cobble content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include sandstone and metamorphic lithologies.		
0.40	ES3					1.00		Firm greyish brown to brown slightly sandy gravelly CLAY with medium cobble and low boulder content. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and metamorphic lithologies. Cobbles and boulders are subangular and include metamorphic lithologies.	
0.50-0.70	B4							(1.90)	
0.60	HSV					175.53			
1.00	J5	173.93		4.50	Complete at 4.50m BGL.				
1.00-1.20	B6							173.93	
1.20	ES7	173.93		4.50	Complete at 4.50m BGL.				
1.50	J8					173.93		4.50	Complete at 4.50m BGL.
2.00-2.20	B9	173.93		4.50	Complete at 4.50m BGL.				
2.40	ES10					173.93		4.50	Complete at 4.50m BGL.
3.00	J11	173.93		4.50	Complete at 4.50m BGL.				
3.00-3.20	B12					173.93		4.50	Complete at 4.50m BGL.
3.50	J13	173.93		4.50	Complete at 4.50m BGL.				
3.50	HSV					173.93		4.50	Complete at 4.50m BGL.
4.00-4.20	B14	173.93		4.50	Complete at 4.50m BGL.				



**GROUNDWATER**  
 Seepage between 1.60-1.90m BGL.

**STABILITY**  
 Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR015	
Client: AMEY OW Limited	Location: E:406829.960 N:513564.681		Sheet: 2 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 178.425	Start Date: 19/02/2021	

Figure TP CLR015.1  
TP CLR015



Figure TP CLR015.2  
TP CLR015







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR015	
Client: AMEY OW Limited	Location: E:406829.960 N:513564.681		Sheet: 3 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 178.425	Start Date: 19/02/2021	

Figure TP CLR015.3  
TP CLR015



Figure TP CLR015.4  
TP CLR015







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:406829.960 N:513564.681		TP CLR015
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 178.425	Start Date: 19/02/2021	Sheet: 4 of 4

Figure TP CLR015.5  
TP CLR015







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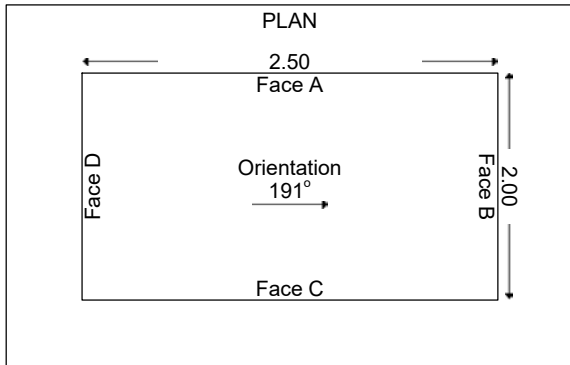
Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR020	
Client: AMEY OW Limited		Location: E:408244.182 N:513502.174	
Method (Equipment): Machine Excavated (JCB 3CX)		Ground Level (m): 149.198	Start Date: 22/02/2021
		Sheet: 1 of 4	

SAMPLES & TESTS			STRATA				
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description
0.20 0.30 0.45 0.45	ES1 J2 J3 HSV	65 (34)kPa		148.80		(0.40) 0.40	Dark brown sandy clayey/silty TOPSOIL with occasional rootlets.
1.00 1.00 1.00 1.50	ES4 B5 HSV J6	77 (33)kPa		147.30		(1.50) 1.90	Soft orangish brown very sandy slightly gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded and includes limestone, mudstone and sandstone. Cobbles and boulders are rounded to subangular and include sandstone and limestone. at c.0.45m BGL ... clay is of low plasticity.
2.00 2.50	B7 J8			146.40		(0.90) 2.80	Bluish brown clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular to subangular and includes limestone, mudstone and sandstone. at c.2.00m BGL ... slightly sandy slightly gravelly clay.
3.00 3.50 4.00 4.50	B9 J10 B11 J12			144.70		(1.70) 4.50	Blue very clayey very gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse angular and include mudstone.
							Complete at 4.50m BGL.



**GROUNDWATER**  
 No groundwater inflow observed.

**STABILITY**  
 Pit sides and base unstable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: M. Bell	Contract No. 4322D
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# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

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Tel: 01772 735 300 Fax: 01772 735 999

## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR020</b>
Client: AMEY OW Limited	Location: E:408244.182 N:513502.174		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 149.198	Start Date: 22/02/2021	Sheet: 2 of 4

Figure TP CLR020.1  
TP CLR020



Figure TP CLR020.2  
TP CLR020







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR020	
Client: AMEY OW Limited	Location: E:408244.182 N:513502.174		Sheet: 3 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 149.198	Start Date: 22/02/2021	

Figure TP CLR020.3  
TP CLR020



Figure TP CLR020.4  
TP CLR020







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Tel: 01772 735 300 Fax: 01772 735 999

## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR020	
Client: AMEY OW Limited	Location: E:408244.182 N:513502.174		Sheet: 4 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 149.198	Start Date: 22/02/2021	

Figure TP CLR020.5  
TP CLR020



Figure TP CLR020.6  
TP CLR020





# ALLIED EXPLORATION & GEOTECHNICS LIMITED

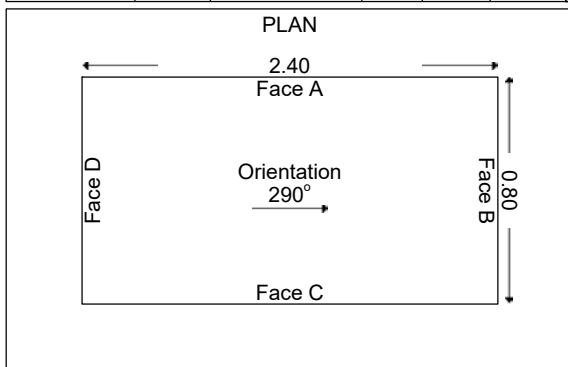
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## TRIAL PIT RECORD

Status:-  
**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR023	
Client: AMEY OW Limited		Location: E:408247.116 N:513567.769	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 150.336	Start Date: 19/02/2021	Sheet: 1 of 4

SAMPLES & TESTS			STRATA					
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1			150.14		0.20	TOPSOIL (Greyish brown slightly gravelly sandy organic clay with frequent rootlets up to 2mm. Gravel is fine to coarse angular to subangular and includes sandstone, metamorphic lithologies and mudstone).	
0.40	J2							Firm greyish brown sandy gravelly CLAY with low cobble and boulder content. Gravel is fine to coarse angular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles and boulders (up to 450mm x 450mm x 450mm) are subangular to subrounded and includes sandstone, limestone and metamorphic lithologies. at c.0.40m BGL ... very clayey very sandy gravel. at c.0.60m BGL ... clay is of low plasticity.
0.40	ES3							
0.40-0.60	B4						(1.30)	
0.60	J5							
0.80-1.00	B6							
1.20	ES7				148.84		1.50	
1.60	J8							Firm to stiff brown grey and grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is fine to coarse angular to subrounded and includes sandstone and mudstone. Cobbles are subangular to subrounded and includes sandstone and limestone.
1.80-2.00	B9						(0.90)	
2.50	J10				147.94		2.40	
2.60	ES11							Stiff grey slightly sandy slightly gravelly CLAY with medium cobble content. Gravel is fine to coarse angular to subrounded and includes sandstone, mudstone and metamorphic lithologies. Cobbles are subangular to subrounded and include sandstone and metamorphic lithologies.
2.80-3.00	B12						(1.60)	
3.50	J13							Terminated at 4.00m BGL - due to boulder obstruction.
3.80-4.00	B14				146.34		4.00	



**GROUNDWATER**  
Seepage at 3.00m BGL.

**STABILITY**  
Collapse of sides between 0.00-1.50m BGL.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

**GENERAL REMARKS**  
(1) Material unsuitable for HSV testing between 0.20-1.50m BGL (too gravelly).

All dimensions in metres Scale 1:50.00	For explanation of symbols and abbreviations see Key Sheets		Logged by: J. Beckett	Contract No. <b>4322D</b>
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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No. TP CLR023	
Client: AMEY OW Limited	Location: E:408247.116 N:513567.769		Sheet: 2 of 4
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 150.336	Start Date: 19/02/2021	

Figure TP CLR023.1  
TP CLR023



Figure TP CLR023.2  
TP CLR023







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8		Exploratory Hole No.	
Client: AMEY OW Limited	Location: E:408247.116 N:513567.769	TP CLR023	
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 150.336	Start Date: 19/02/2021	Sheet: 3 of 4

Figure TP CLR023.3  
TP CLR023



Figure TP CLR023.4  
TP CLR023







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## TRIAL PIT RECORD

Status:-

**FINAL**

Project: A66 North Trans Pennine Scheme D Section 8			Exploratory Hole No. <b>TP CLR023</b>
Client: AMEY OW Limited	Location: E:408247.116 N:513567.769		
Method (Equipment): Machine Excavated (JCB 3CX)	Ground Level (m): 150.336	Start Date: 19/02/2021	Sheet: 4 of 4

**Figure TP CLR023.5  
TP CLR023**



**Groundwater Observations Made at the Time of Site Works**





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## GROUNDWATER OBSERVATIONS MADE AT THE TIME OF SITE WORKS (WATER STRIKES)

Exploratory Hole No.	Date	Depth of Water (m)	Depth of Casing (m)	Depth Sealed (m)	Final Depth (m)	Total Time (mins)	Depth After 5 mins	Depth After 10 mins	Depth After 15 mins	Depth After 20 mins	Remarks
BH CLR001A	08/03/2021	14.70	3.00								Water strike (moderate inflow).
BH CLR003	16/02/2021	5.10			2.35	20	3.10	2.80	2.50	2.35	Water strike.
BH CLR003	01/03/2021	15.00									Artesian water strike on pulling casing at approximately 15.00m BGL.
BH CLR003A	02/03/2021	14.00	7.50								Water strike (heavy inflow).
BH CLR004A	04/03/2021	9.70	5.00								Water strike (moderate inflow).
TP CLR008	16/02/2021	2.70									Water strike.



Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited

AEG Contract No :-

4322D

Date of Issue :-

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Certificate No. :-

GWOWS/4322D/1

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## GROUNDWATER OBSERVATIONS MADE AT THE TIME OF SITE WORKS (GROUNDWATER SEEPAGES)

Monitoring Point	Date	Depth (m)	Remarks
TP CLR004	17/02/2021	4.50	Water seepage.
TP CLR010	10/03/2021	1.60	Moderate water seepage.
TP CLR015	19/02/2021	1.60	Seepages between 1.60-1.90m BGL.
TP CLR023	22/02/2021	3.00	Water seepage.

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited



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## Groundwater Monitoring Results





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## GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
BH CLR001A	31/03/2021 14:46	15.50m 19mm SPIE	206.25	9.57	196.68	
BH CLR001A	08/04/2021 10:43	15.50m 19mm SPIE	206.25	7.96	198.29	
BH CLR001A	23/04/2021 14:22	15.50m 19mm SPIE	206.25	8.16	198.09	
BH CLR001A	29/04/2021 15:01	15.50m 19mm SPIE	206.25	6.45	199.80	
BH CLR001A	06/05/2021 15:57	15.50m 19mm SPIE	206.25	6.37	199.88	
BH CLR003A	29/03/2021 15:21	6.00m 19mm SPIE	200.24	-0.22	200.46	Possibly Artesian Water.
BH CLR003A	31/03/2021 14:24	6.00m 19mm SPIE	200.24	-0.22	200.46	Possibly Artesian Water.
BH CLR003A	08/04/2021 10:23	6.00m 19mm SPIE	200.24	-0.20	200.44	Possibly Artesian Water.
BH CLR003A	23/04/2021 14:01	6.00m 19mm SPIE	200.24	-0.20	200.44	Possibly Artesian Water.
BH CLR003A	29/04/2021 14:39	6.00m 19mm SPIE	200.24	-0.20	200.44	Possibly Artesian Water.
BH CLR003A	06/05/2021 15:18	6.00m 19mm SPIE	200.24	-0.20	200.44	Possibly Artesian Water.
BH CLR003A	27/08/2021 10:43	6.00m 19mm SPIE	200.24	-0.32	200.56	Possibly Artesian Water.
BH CLR004A	31/03/2021 14:19	4.00m 19mm SPIE	198.39	0.89	197.50	
BH CLR004A	08/04/2021 10:30	4.00m 19mm SPIE	198.39	-0.16	198.55	Possibly Artesian Water.
BH CLR004A	23/04/2021 14:07	4.00m 19mm SPIE	198.39	0.88	197.51	
BH CLR004A	29/04/2021 14:46	4.00m 19mm SPIE	198.39	0.84	197.55	
BH CLR004A	06/05/2021 15:28	4.00m 19mm SPIE	198.39	0.81	197.58	
BH CLR004A	27/08/2021 10:46	4.00m 19mm SPIE	198.39	0.90	197.49	
WS CLR001	29/03/2021 14:32	2.00m 19mm SPIE	166.92	0.76	166.16	
WS CLR003	31/03/2021 14:30	2.50m 19mm SPIE	201.28	0.79	200.49	

SP = Standpipe - SPIE = Standpipe Piezometer.

Contract Title :- A66 North Trans Pennine Scheme D Section 8	Client :- AMEY OW Limited
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	Checked By: <span style="background-color: black; color: black;">[REDACTED]</span>		AEG Contract No. :- 4322D	

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## GROUNDWATER MONITORING RESULTS

Monitoring Point	Date and Time	Depth and Type of Well	Ground Level (mAOD)	Water Depth (mBGL)	Reduced Water Level (mAOD)	Remarks
WS CLR003	08/04/2021 10:18	2.50m 19mm SPIE	201.28	0.80	200.48	
WS CLR003	23/04/2021 13:55	2.50m 19mm SPIE	201.28	0.95	200.33	
WS CLR003	29/04/2021 14:34	2.50m 19mm SPIE	201.28	0.90	200.38	
WS CLR003	06/05/2021 15:10	2.50m 19mm SPIE	201.28	0.91	200.37	
WS CLR003	27/08/2021 10:40	2.50m 19mm SPIE	201.28	1.21	200.07	

SP = Standpipe - SPIE = Standpipe Piezometer.

Contract Title :- A66 North Trans Pennine Scheme D Section 8	Client :- AMEY OW Limited
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*In-situ* Test Report Certificate





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## IN-SITU TESTING REPORT CERTIFICATE



**Contract Title:** A66 North Trans Pennine Scheme D Section 8    **AEG Reference:** 4322D

**Client Address:** AMEY OW Limited  
Chancery Exchange  
10 Furnival Street  
London  
EC4A 1AB

I certify that *In-situ* testing was carried out on the above contract in accordance with techniques outlined in BS 1377: 1990: Part 9 or other appropriate standards as quoted, and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

- Nick Vater (Managing Director)  
 Kerry Wade (Technical Manager)

Signed

A large black rectangular box redacting the signature of the Technical Manager.

Date: 07 September 2021

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation

# ***IN-SITU* TESTING REPORT CERTIFICATE**

## **ENCLOSURES**

<b>Enclosure Number</b>	<b>Description</b>	<b>UKAS Accredited</b>	<b>Reference</b>	<b>No. of Pages</b>
0	Test Report Certificate	N/A		2
1	Standard Penetration Test Results (SPT)	Yes	BS 1377 Part 9 1990	19
2	Hand Shear Vane Test Results	No		3
3	Variable Head Permeability Test Results	No	BS 5930 1999:Section 4	4
4	<i>In-situ</i> Water Quality Parameter Test Results	No		1
5	Photo-ionisation Test Results	No		2
6	Determination of the Soil Infiltration Rate for Soakaway Design	No	BRE Digest 365:1991	4
7	Plate Loading Test Results	No	BS 1377 Part 9 1990	7
-	Density by Core Cutter Method	Yes	BS 1377 Part 9 1990	-
-	Determination of the Vane Shear Strength (Down the Hole)	Yes	BS 1377 Part 9 1990	-
-	Shallow Pad (skip) Load Test Results	No	BS 1377 Part 9 1990	-
-	Determination of the California Bearing Ratio	Yes	BS 1377 Part 9 1990	-
-	Apparent Resistivity of Soil	No	BS 1377 Part 9 1990	-
-	Redox Potential of Soil	No	BS 1377 Part 9 1990	-

**Standard Penetration Test Results**





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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	SPT Hammer Ref.	Energy Ratio E <sub>s</sub> %	SEATING DRIVE										TEST DRIVE										Rod Length Corr. C <sub>R</sub>	Energy Ratio Corr. C <sub>e</sub>	Pen (mm)/Blow	SPTN Value	SPTN Value (Corr.) N <sub>60</sub>	Shoe or Cone	Remarks		
						Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows									Total Pen	Total Blows
						mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.									
BH CLR001	2.00 (204.14)	Dry (2.00)	2.00	ATH06	51	60	25	7	75	8	150	15	75	9	75	50	74	74	50	74	50	74	50	0.68	0.85	1.48	-	-	S					
BH CLR001A	2.00 (204.25)	Dry (2.00)	2.00	ATH09	55	75	7	75	8	150	15	75	9	75	9	75	75	75	38	300	38	300	38	0.68	0.92	7.89	38	24	C					
BH CLR001A	3.00 (203.25)	Dry (3.00)	3.00	ATH09	55	75	6	75	8	150	14	75	10	75	10	75	75	75	40	300	40	300	40	0.72	0.92	7.50	40	26	C					
BH CLR001A	4.00 (202.25)	Damp (3.00)	4.00	ATH09	55	75	5	75	9	150	14	75	9	75	8	75	75	75	38	300	38	300	38	0.76	0.92	7.89	38	27	S					
BH CLR001A	5.00 (201.25)	Damp (3.00)	5.00	ATH09	55	12	25	12	75	10	150	12	75	50	10	75	10	10	50	10	50	10	50	0.80	0.92	0.20	-	-	C					
BH CLR001A	6.00 (200.25)	Damp (3.00)	6.00	ATH09	55	75	9	75	10	150	19	75	12	75	12	75	75	75	49	300	49	300	49	0.84	0.92	6.12	49	38	C					
BH CLR001A	7.00 (199.25)	Damp (3.00)	7.00	ATH09	55	75	10	75	9	150	19	75	9	75	8	75	75	75	51	161	51	161	51	0.88	0.92	3.16	-	-	C					
BH CLR001A	8.00 (198.25)	Damp (3.00)	8.00	ATH09	55	7	25	7	75	7	7	25	9	75	50	9	9	9	50	9	50	9	50	0.92	0.92	0.18	-	-	S					
BH CLR001A	9.00 (197.25)	Damp (3.00)	9.00	ATH09	55	75	6	75	7	150	13	75	9	75	10	75	75	75	40	300	40	300	40	0.96	0.92	7.50	40	35	C					
BH CLR001A	10.00 (196.25)	9.07 (3.00)	10.00	ATH09	55	75	6	75	7	150	13	75	7	75	8	75	75	75	34	300	34	300	34	1.00	0.92	8.82	34	31	C					

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPTN values are presented on the attached graphical plot relative to each Exploratory Hole.

	Contract Title :-	A66 North Trans Pennine Scheme D Section 8	Client :-	AMEY OW Limited	AEG Contract No. :-	4322D
	Date of Issue :-	03/09/2021	Check	Page No. :-	1 of 6	Certificate No. :-



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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	SPT Hammer Ref.	Energy Ratio %	SEATING DRIVE												TEST DRIVE												Energy Ratio Corr. $C_e$	Pen (mm)/Blow	SPT'N Value	SPT'N Value (Corr.) No.	Shoe or Cone	Remarks
						Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows		Total Pen mm	Total Blows No.	Rod Length Corr. $C_R$							
						mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	S/C											
BH CLR001A	11.00 (195.25)	Damp (3.00)	11.00	ATH09	55	75	7	75	8	150	8	150	15	75	8	75	9	75	9	75	7	75	10	300	33	1.00	9.09	33	30	C					
BH CLR001A	12.00 (194.25)	Damp (3.00)	12.00	ATH09	55	75	5	75	8	150	8	150	13	75	10	75	9	75	10	75	10	75	10	300	39	1.00	7.69	39	36	C					
BH CLR001A	13.00 (193.25)	Damp (3.00)	13.00	ATH09	55	75	12	17	13	92	13	92	25	75	31	10	18						85	50	1.00	1.70	-	-	C						
BH CLR001A	14.00 (192.25)	Damp (3.00)	14.00	ATH09	55	75	6	75	7	150	7	150	13	75	7	75	8	75	8	75	8	75	9	300	32	1.00	9.38	32	29	S					
BH CLR001A	15.00 (191.25)	13.10 (3.00)	15.00	ATH09	55	75	3	75	4	150	4	150	7	75	4	75	5	75	5	75	5	75	6	300	20	1.00	15.00	20	18	S					
BH CLR001A	16.00 (190.25)	14.26 (3.00)	16.00	ATH09	55	75	4	75	4	150	4	150	8	75	5	75	6	75	6	75	6	75	9	300	26	1.00	11.54	26	24	S					
BH CLR001A	17.00 (189.25)	15.07 (3.00)	17.00	ATH09	55	75	5	75	7	150	7	150	12	75	7	75	8	75	8	75	8	75	9	300	32	1.00	9.38	32	29	C					
BH CLR001A	18.00 (188.25)	13.96 (3.00)	18.00	ATH06	55	75	4	75	6	150	6	150	10	75	8	75	9	75	10	75	10	75	10	300	37	1.00	8.11	37	34	C					
BH CLR001A	19.00 (187.25)	15.10 (3.00)	19.00	ATH09	55	75	5	75	7	150	7	150	12	75	7	75	8	75	9	75	9	75	9	300	33	1.00	9.09	33	30	C					
BH CLR003	2.20 (197.77)	Dry (1.80)	2.20	TQ2	53	10	25			10		25	32	32	50								32	50	0.69	0.64	-	-	S						

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N values are presented on the attached graphical plot relative to each Exploratory Hole.

<b>Contract Title :-</b>	A66 North Trans Pennine Scheme D Section 8	<b>Client :-</b>	AMEY OW Limited
<b>Contract No. :-</b>	4322D	<b>AEG Contract No. :-</b>	4322D
<b>Date of Issue :-</b>	03/09/2021	<b>Certificate No. :-</b>	SPT/4322D/2
<b>Checked By</b>	[REDACTED]	<b>Checked By</b>	[REDACTED]
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	SPT Hammer Ref.	Energy Ratio E <sub>s</sub> %	SEATING DRIVE										TEST DRIVE										Rod Length Corr. C <sub>r</sub>	Energy Ratio Corr. C <sub>e</sub>	Pen (mm)/Blow	SPT'N Value	SPT'N Value (Corr.) N <sub>60</sub>	Shoe or Cone	Remarks		
						Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows									Total Pen mm	Total Blows No.
						mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.											
BH CLR003	2.80 (197.17)	Dry (2.70)	2.80	T02	53	75	15	75	7	150	22	75	6	75	6	75	6	75	7	75	9	300	28	10.71	28	17	S							
BH CLR003	5.10 (194.87)	Dry (4.10)	5.10	T02	53	75	6	75	6	150	12	75	10	75	10	75	15	34	15	75	15	259	50	5.18	-	-	S							
BH CLR003	6.60 (193.37)	3.80 (4.50)	6.60	T02	53	75	14	25	11	100	25	75	19	75	25	4	6					154	50	3.08	-	-	S							
BH CLR003	8.20 (191.77)	5.30 (7.60)	8.20	T02	53	75	14	75	10	150	24	75	15	75	23	21	12					171	50	3.42	-	-	S							
BH CLR003	11.60 (188.37)	6.00 (10.60)	11.60	T02	53	75	6	75	8	150	14	75	8	75	11	75	13	75	12	75	12	300	44	6.82	44	39	S							
BH CLR003	13.20 (186.77)	6.30 (13.10)	13.20	T02	53	5	25			5	25	15	50									15	50	0.30	-	-	S							
BH CLR003	14.20 (185.77)	5.60 (14.20)	14.20	ATH09	55	75	9	75	9	150	18	75	10	75	10	75	12	75	12	75	12	300	44	6.82	44	40	C							
BH CLR003	15.70 (184.27)	7.42 (15.70)	15.70	ATH09	55	75	7	75	8	150	15	75	8	75	10	75	17	16	15	75	15	241	50	4.82	-	-	C							
BH CLR003A	16.45 (183.79)	10.90 (15.20)	16.45	ATH09	55	75	9	75	12	150	21	75	11	75	15	75	19	4	5	75	5	229	50	4.58	-	-	C							
BH CLR004	1.50 (196.89)	Wet (1.50)	1.50	ATH06	51	75	3	75	5	150	8	75	5	75	6	75	7	75	7	75	7	300	25	12.00	25	14	C							

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N values are presented on the attached graphical plot relative to each Exploratory Hole.

<b>Contract Title :-</b>	A66 North Trans Pennine Scheme D Section 8	<b>Client :-</b>	
<b>Date of Issue :-</b>	03/09/2021	<b>Checked By :-</b>	
<b>Page No. :-</b>	3 of 6	<b>Contract No. :-</b>	AEG Contract No :- 4322D
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	SPT Hammer Ref.	Energy Ratio %	TEST DRIVE												Rod Length Corr. $C_R$	Energy Ratio Corr. $C_E$	Pen (mm)/Blow	SPTN Value	SPTN Value (Corr.) $N_{60}$	Shoe or Cone	Remarks			
						SEATING DRIVE						TEST DRIVE													Total Blows	Total Pen mm	No.
						Pen mm	Blows	Pen mm	Blows	Total Blows	Total Pen mm	Pen mm	Blows	Pen mm	Blows	Pen mm	Blows										
BH CLR004	2.50 (195.89)	Wet (2.80)	2.50	ATH06	51	75	3	75	4	150	7	75	7	75	7	75	7	75	8	300	28	28	17	C			
BH CLR004	3.20 (195.19)	Wet (3.20)	3.20	ATH06	51	75	7	75		7	50	75	50	75	50	75	50	75		12	50	-	-	S			
BH CLR004A	3.20 (195.19)	1.90 (3.20)	3.20	ATH09	55	75	7	75		7	50	75	50	75	50	75	50	75		5	50	-	-	C			
BH CLR004A	4.20 (194.19)	Damp (3.20)	4.20	ATH09	55	75	7	75	5	150	12	75	7	75	8	75	8	75	9	300	33	33	23	C			
BH CLR004A	5.00 (193.39)	Damp (5.00)	5.00	ATH09	55	75	10	75	7	150	17	75	8	75	9	75	9	75	9	300	35	35	26	C			
BH CLR004A	6.00 (192.39)	Damp (5.00)	6.00	ATH09	55	75	6	75	7	150	13	75	8	75	8	75	8	75	8	300	34	34	26	C			
BH CLR004A	7.00 (191.39)	Damp (5.00)	7.00	ATH09	55	75	9	75	9	150	18	75	11	75	12	75	10	75	10	300	43	43	35	C			
BH CLR004A	8.00 (190.39)	Damp (5.00)	8.00	ATH09	55	75	17	10	8	85	25	75	28	14	22	75	28	14	22	89	50	-	-	C			
BH CLR004A	9.00 (189.39)	Damp (5.00)	9.00	ATH09	55	4	25			4	25	6	50			6	50			6	50	-	-	C			
BH CLR004A	10.00 (188.39)	Damp (5.00)	10.00	ATH09	55	3	25			3	25	5	50			5	50			5	50	-	-	C			

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPTN values are presented on the attached graphical plot relative to each Exploratory Hole.

	Contract Title :-	Client :-	AMEY OW Limited
	A66 North Trans Pennine Scheme D Section 8		AEG Contract No :- 4322D
Date of Issue :- 03/09/2021	Page No. :- 4 of 6	Checked By :-	Certificate No. :- SPT/4322D/4



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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	SPT Hammer Ref.	Energy Ratio E <sub>s</sub> %	SEATING DRIVE										TEST DRIVE										Energy Ratio Corr. C <sub>e</sub>	Pen (mm)/Blow	SPT'N Value	SPT'N Value (Corr.) N <sub>60</sub>	Shoe or Cone	Remarks		
						Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows		Pen		Blows								Total Pen mm	Total Blows No.
						mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.								
BH CLR010	2.20 (169.16)	Damp (2.10)	2.20	T02	53	75	9	75	4	150	13	75	5	75	6	75	10	75	10	75	12	300	33	33	20	S							
BH CLR010	4.20 (167.16)	Dry (4.10)	4.20	T02	53	75	3	75	6	150	9	75	9	60	41							135	50	-	-	S							
BH CLR010	5.40 (165.96)	Damp (5.40)	5.40	T02	53	75	3	75	6	150	9	75	11	75	10	75	9	75	11	75	11	300	41	41	30	S							
BH CLR010	7.50 (163.86)	Damp (6.80)	7.50	T02	53	20	25			20	25	38	50									38	50	-	-	C							
BH CLR011	1.50 (155.41)	Dry (1.50)	1.50	ATH06	51	75	6	75	12	150	18	75	5	75	7	75	18	75	13	75	13	300	43	43	24	C							
BH CLR011	2.50 (154.41)	Dry (2.50)	2.50	ATH06	51	75	6	75	6	150	12	75	6	75	7	75	8	75	10	75	10	300	31	31	18	S							
BH CLR011	3.50 (153.41)	Dry (3.50)	3.50	ATH06	51	75	8	75	8	150	16	75	10	75	12	75	12	75	14	75	14	300	48	48	30	S							
BH CLR011	4.50 (152.41)	Dry (4.50)	4.50	ATH06	51	75	10	75	8	150	18	75	13	75	20	68	17					218	50	-	-	S							
BH CLR011	6.50 (150.41)	Dry (6.50)	6.50	ATH06	51	75	18	11	17	86	35	75	19	75	29	9	11					159	59	-	-	S							
WS CLR001	1.20 (165.72)	1.20	1.20	DF04	73	75	2	75	1	150	3	75	1	75	2	75	2	75	1	75	1	300	6	6	5	S							

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N values are presented on the attached graphical plot relative to each Exploratory Hole.

<b>Contract Title :-</b>	A66 North Trans Pennine Scheme D Section 8	<b>Client :-</b>	AMEY OW Limited
<b>Date of Issue :-</b>	03/09/2021	<b>Checked By</b>	[REDACTED]
<b>Page No. :-</b>	5 of 6	<b>Contract No. :-</b>	AEG Contract No. :- 4322D
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level) m	Water Depth (Casing) m	Rod Length m	SPT Hammer Ref.	Energy Ratio E <sub>m</sub> %	SEATING DRIVE						TEST DRIVE						Rod Length Corr. C <sub>R</sub>	Energy Ratio Corr. C <sub>E</sub>	Pen (mm)/Blow	SPT'N Value	SPT'N Value (Corr.) N <sub>60</sub>	Shoe or Cone S/C	Remarks
						Pen	Blows	Pen	Blows	Pen	Blows	Pen	Blows	Pen	Blows	Pen	Blows							
WS CLR001	2.20 (164.72)	1.20	2.20	DP04	73	75	1	75	0	150	1	75	1	75	0	75	1	75	0	300	3	3	S	
WS CLR001	3.20 (163.72)	1.20	3.20	DP04	73	0	50		0	50													S	
WS CLR003	1.20 (200.08)	Dry	1.20	DP05	64	75	2	75	3	150	5	75	4	75	4	75	4	75	4	300	15	10	S	
WS CLR003	2.20 (199.08)	Dry	2.20	DP05	64	75	9	75	7	150	16	75	7	75	5	75	5	75	5	300	24	18	S	
WS CLR003	3.20 (198.08)	Dry	3.20	DP05	64	75	4	75	4	150	8	75	5	75	5	75	5	75	5	300	21	16	S	
WS CLR003	4.20 (197.08)	Dry	4.20	DP05	64	30	50		30	50		25	100							25	100		S	
WS CLR005	1.20 (178.14)	Dry	1.20	DP04	73	75	2	75	2	150	4	75	2	75	2	75	2	75	2	300	9	7	S	
WS CLR005	2.20 (178.14)	Dry	2.20	DP04	73	75	3	75	4	150	7	47	50							47	50		S	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N values are presented on the attached graphical plot relative to each Exploratory Hole.

	Contract Title : A66 North Trans Pennine Scheme D Section 8	Client : AMEY OW Limited	AEG Contract No. : 4322D
Date of Issue : 03/09/2021	Page No. : 6 of 6	Certificate No. : SPT/4322D/6	





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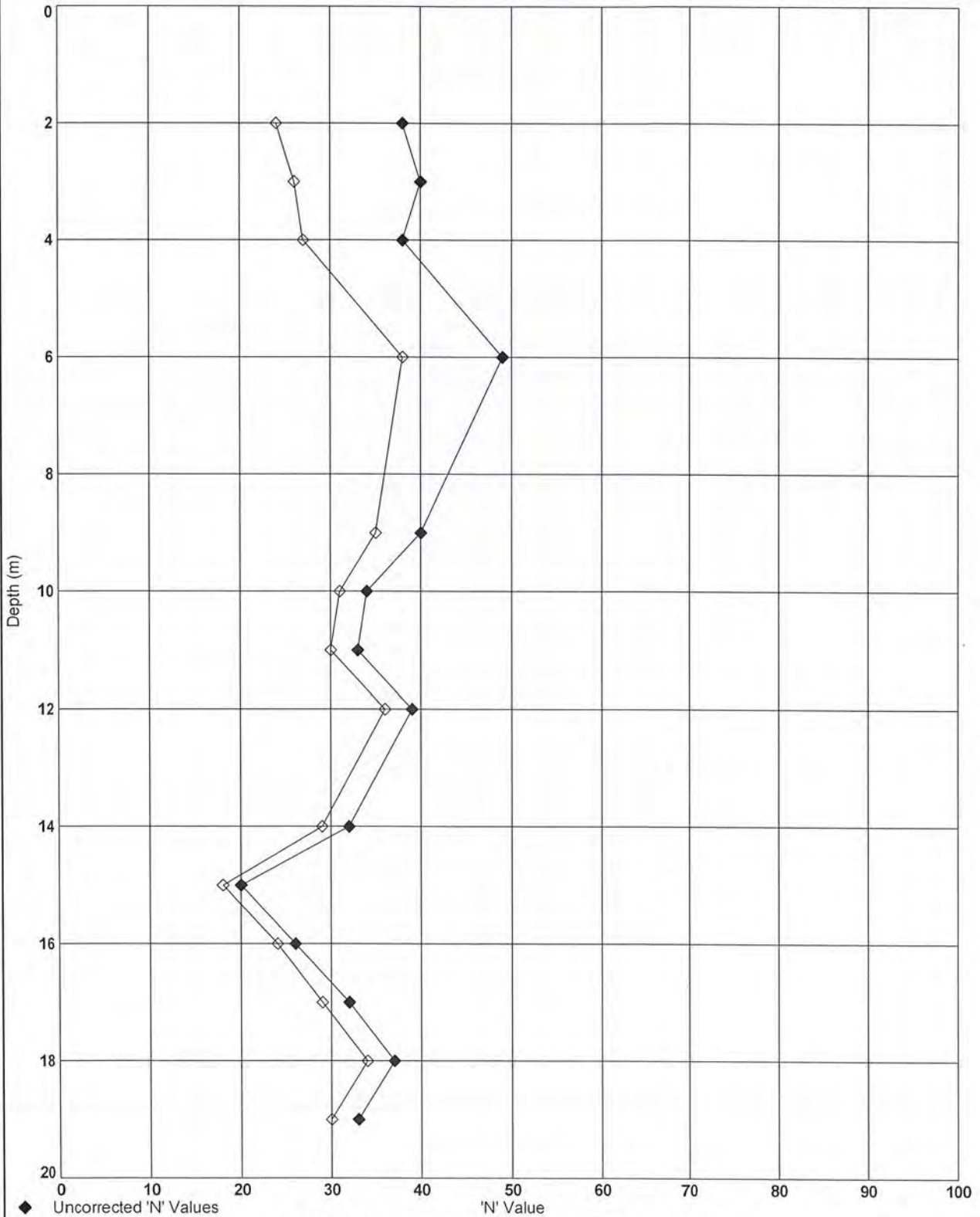
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH CLR001A



◆ Uncorrected 'N' Values  
◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited

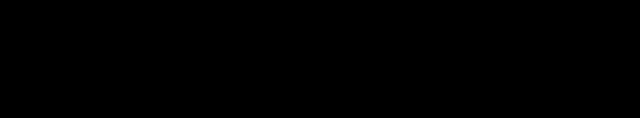


Date of issue :-  
03/09/2021

Certificate No :-  
SPT/4322D/Graph/BH CLR001A

Operator :-  
K.R./L.H.

Checked by



AEG Contract No. :-  
4322D



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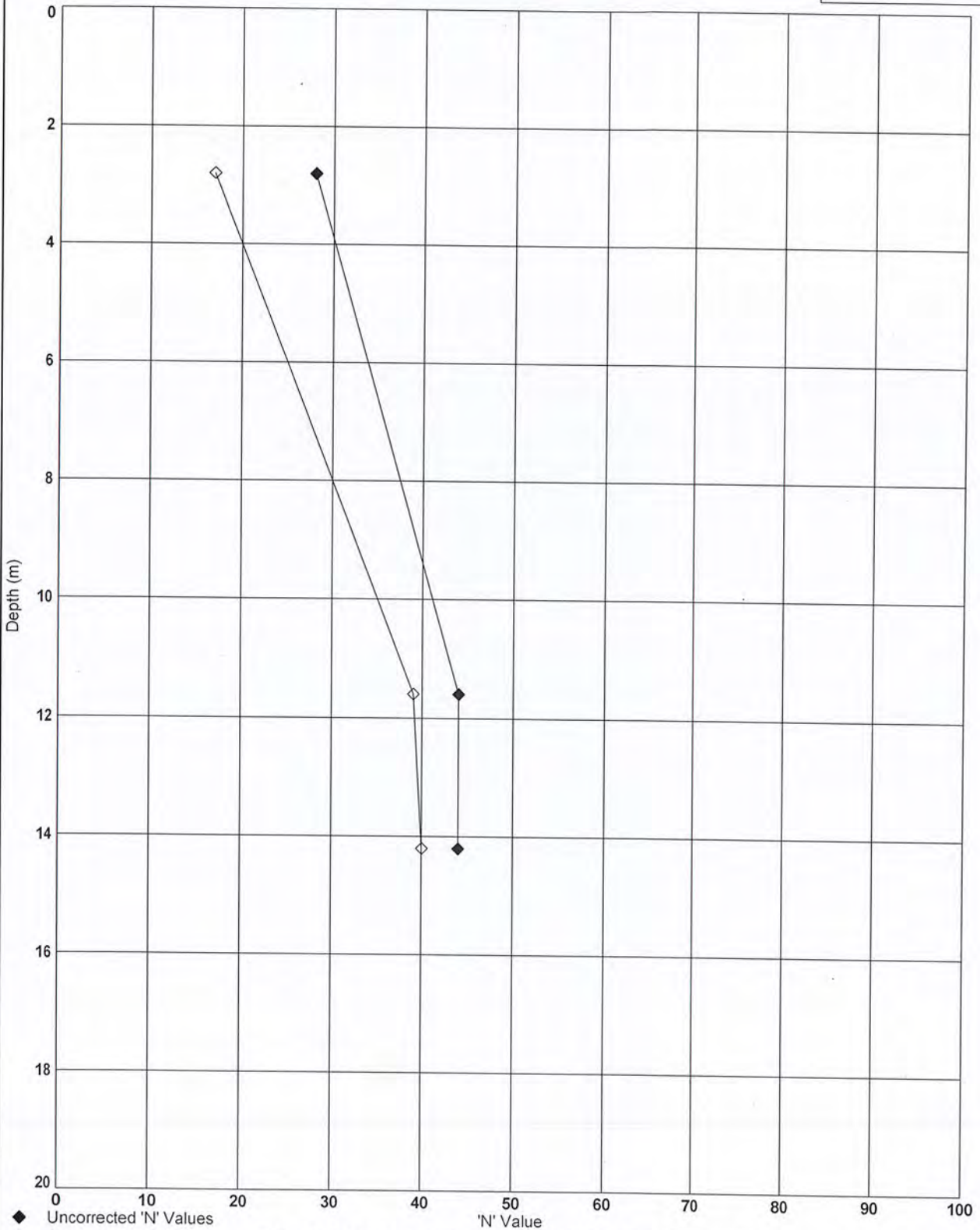
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH CLR003



Contract Title :-  
 A66 North Trans Pennine Scheme D Section 8

Client :-  
 AMEY OW Limited



Date of issue :-  
 03/09/2021

Certificate No :-  
 SPT/4322D/Graph/BH CLR003

Operator :-  
 T.Q./L.H.

Checked By [Redacted]

AEG Contract No. :-  
 4322D



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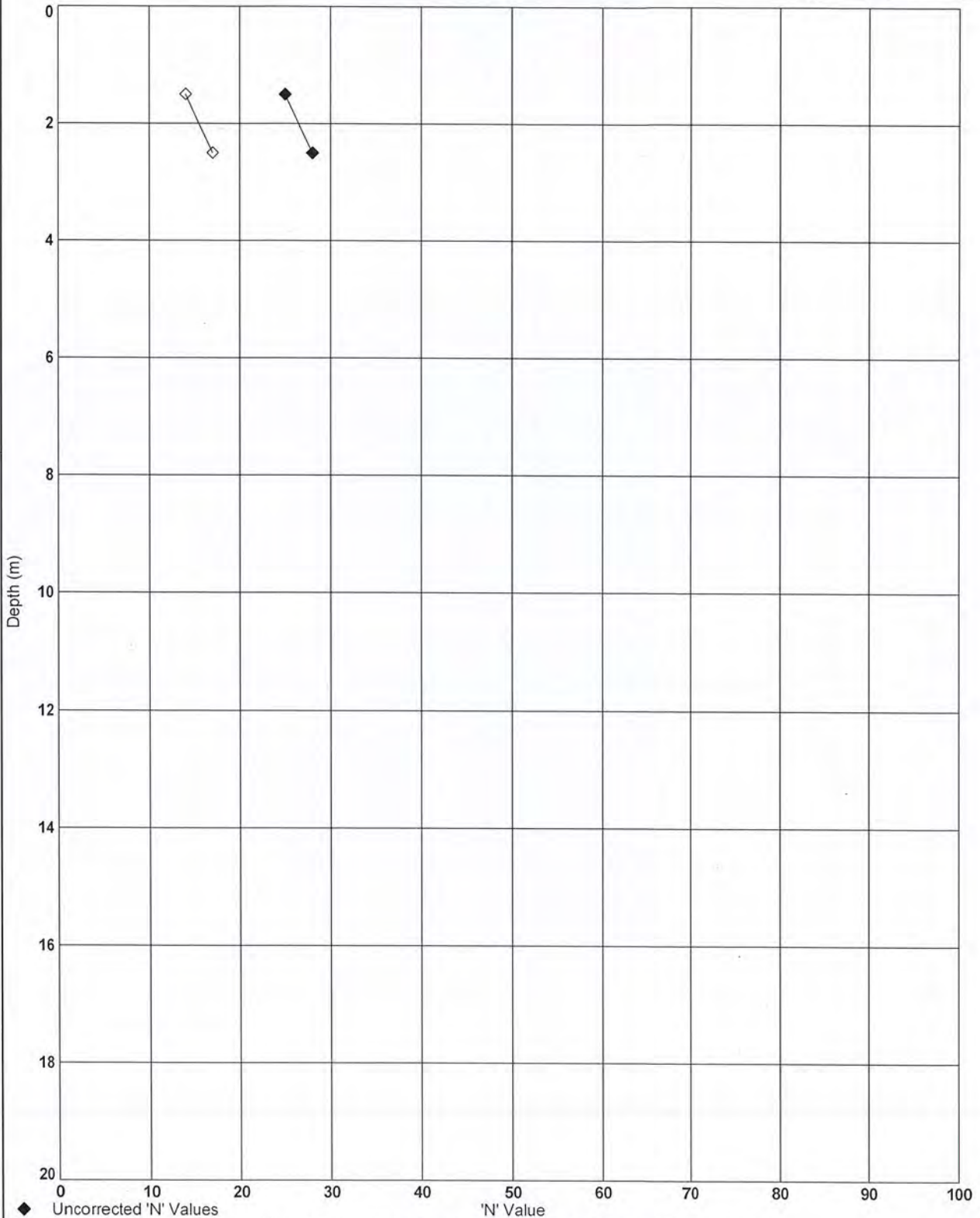
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH CLR004



◆ Uncorrected 'N' Values  
◇ Corrected 'N' Values  
Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited

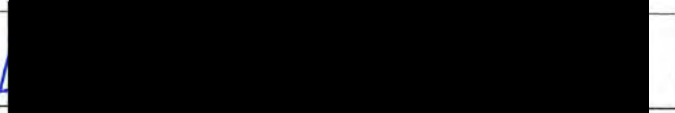


Date of issue :-  
03/09/2021

Certificate No :-  
SPT/4322D/Graph/BH CLR004

Operator :-  
K. Roderson

Checked By :-



AEG Contract No. :-  
4322D





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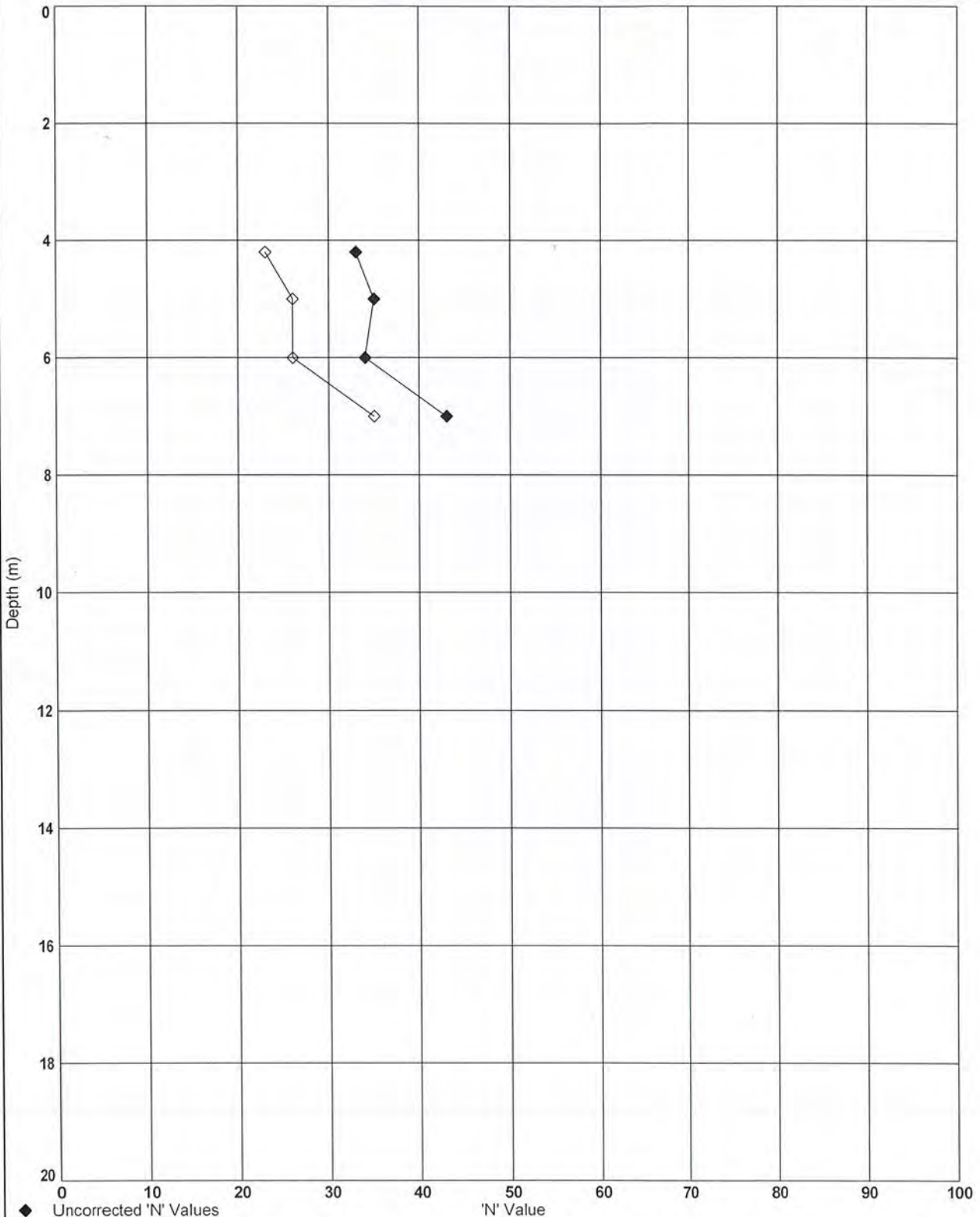
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH CLR004A



◆ Uncorrected 'N' Values

◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited



Date of issue :-  
03/09/2021

Certificate No :-  
SPT/4322D/Graph/BH CLR004A

Operator :-  
K.R./L.H.

Checked By :-



AEG Contract No. :-  
4322D



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

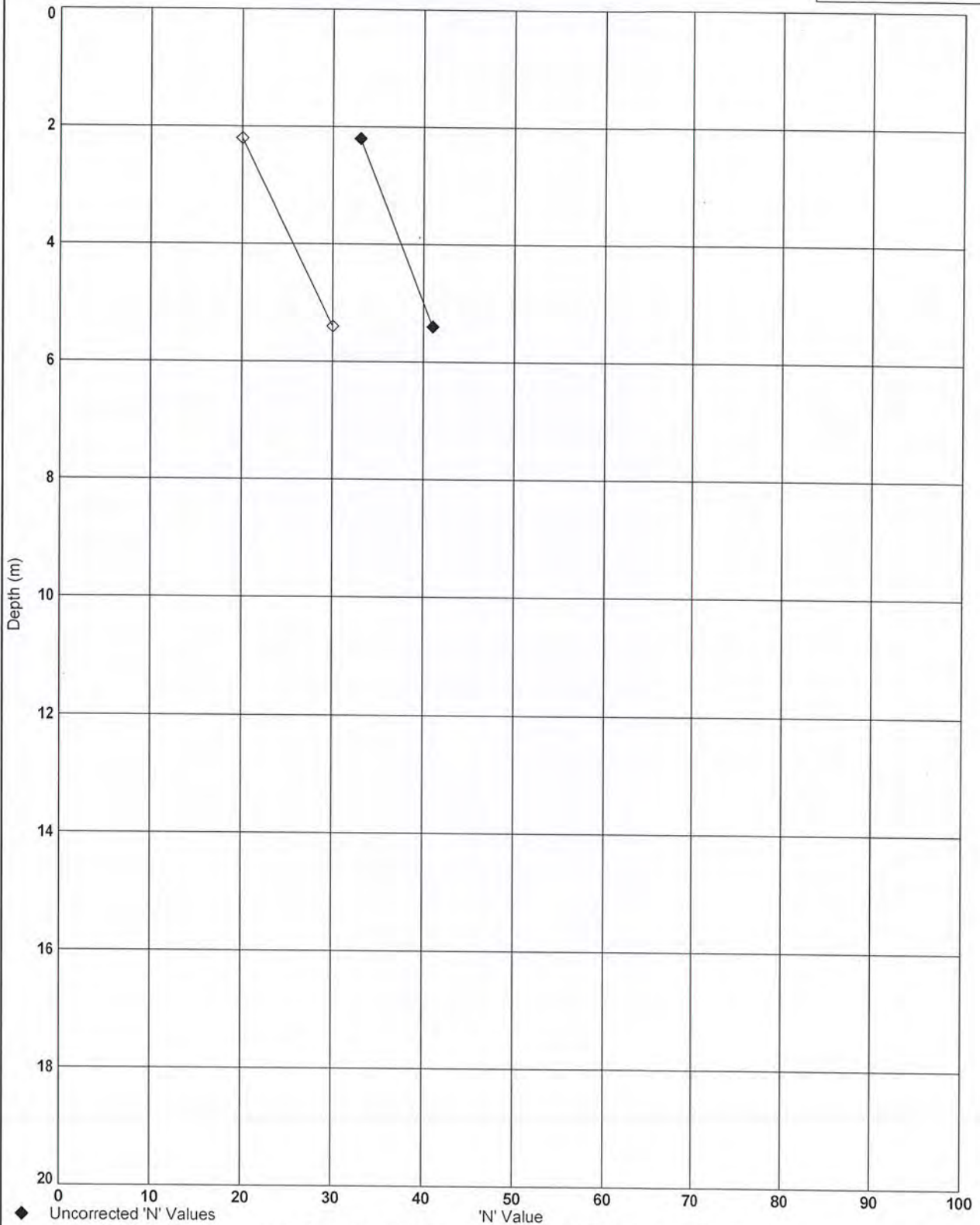
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## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH CLR010



◆ Uncorrected 'N' Values  
 ◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-  
 A66 North Trans Pennine Scheme D Section 8

Client :-  
 AMEY OW Limited



Date of issue :-  
 03/09/2021

Certificate No :-  
 SPT/4322D/Graph/BH CLR010

Operator :-  
 T. Quinn

Checked By [Redacted]

AEG Contract No. :-  
 4322D



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

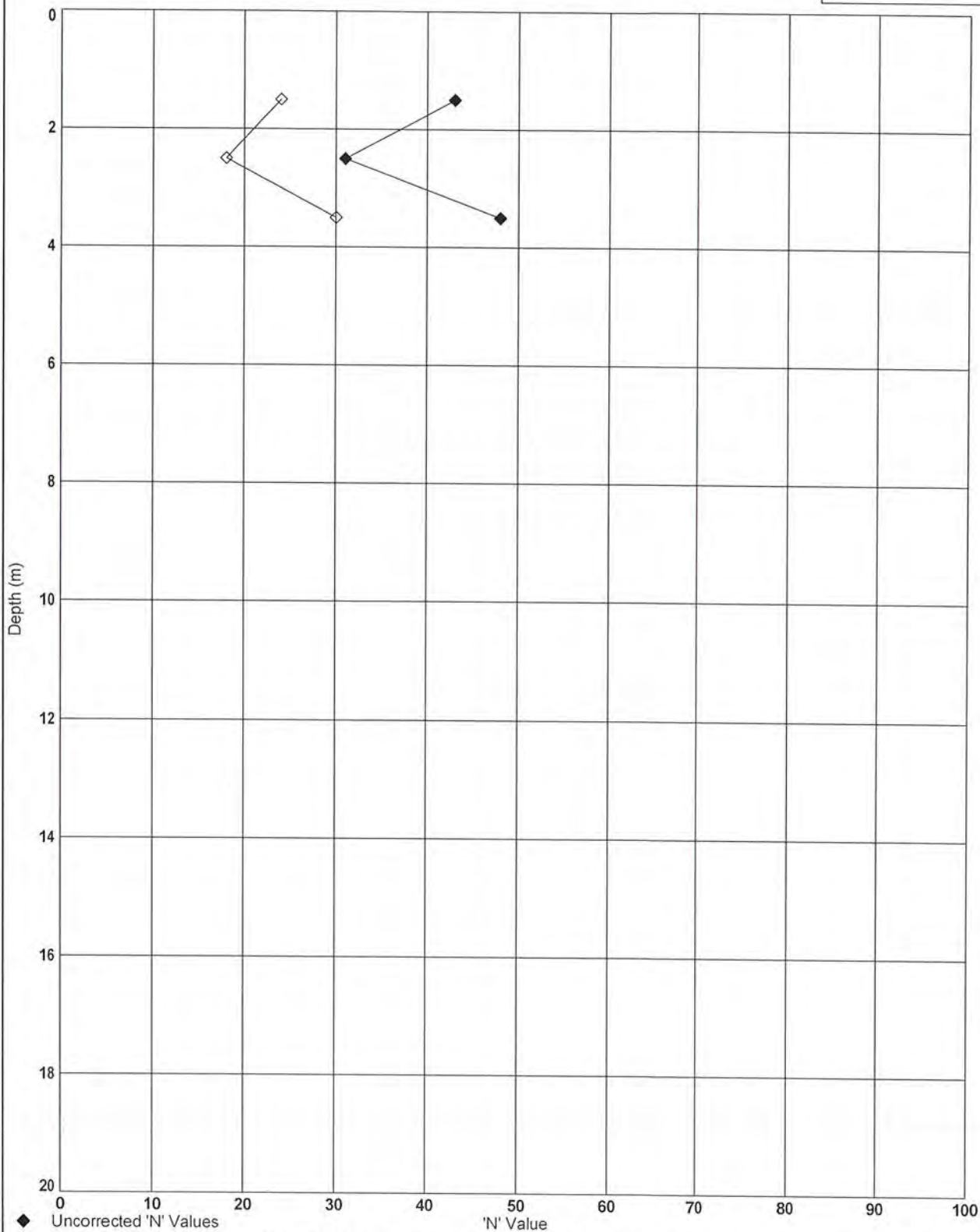
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Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

BH CLR011



Contract Title :-  
 A66 North Trans Pennine Scheme D Section 8

Client :-  
 AMEY OW Limited



Date of issue :-  
 03/09/2021

Certificate No :-  
 SPT/4322D/Graph/BH CLR011

Operator :-  
 K. Roderson

Checked By [Redacted]

AEG Contract No. :-  
 4322D





# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office:  
Regional Office:

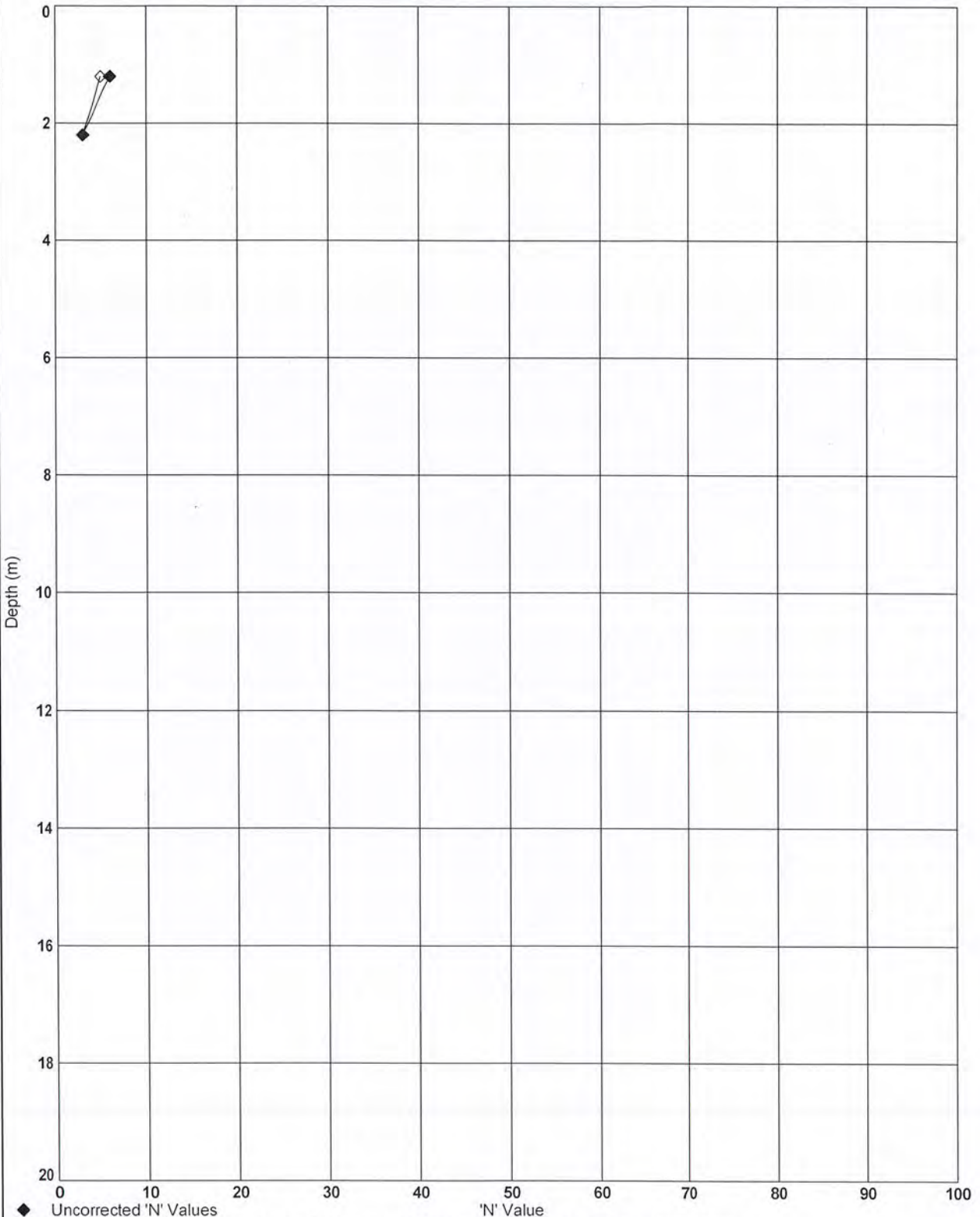
Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co Durham, DH2 2RG  
Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
Tel: 01772 735 300 Fax: 01772 735 999

## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

WS CLR001



◆ Uncorrected 'N' Values

◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited

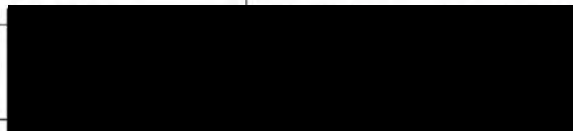


Date of issue :-  
03/09/2021

Certificate No :-  
SPT/4322D/Graph/WS CLR001

Operator :-  
L. Selkirk

Checked By :-



AEG Contract No. :-  
4322D



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

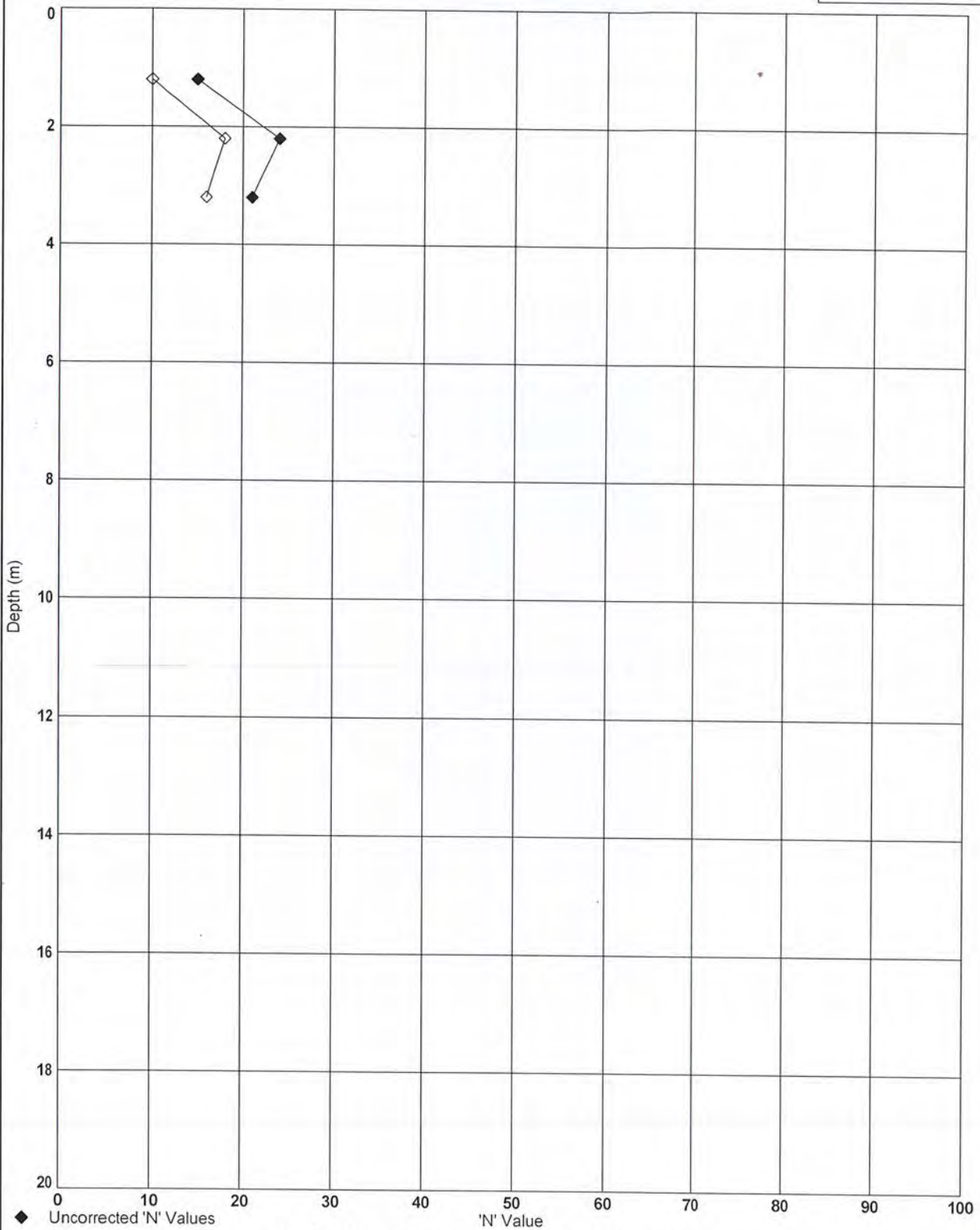
Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL

Tel: 0191 387 4700 Fax: 0191 387 4710  
 Tel: 01772 735 300 Fax: 01772 735 999

## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

WS CLR003



Contract Title :- A66 North Trans Pennine Scheme D Section 8	Client :- AMEY OW Limited
---	------------------------------

	Date of issue :- 03/09/2021	Certificate No :- SPT/4322D/Graph/WS CLR003	Operator :- L. Selkirk
	Checked By :- [Redacted]		AEG Contract No. :- 4322D



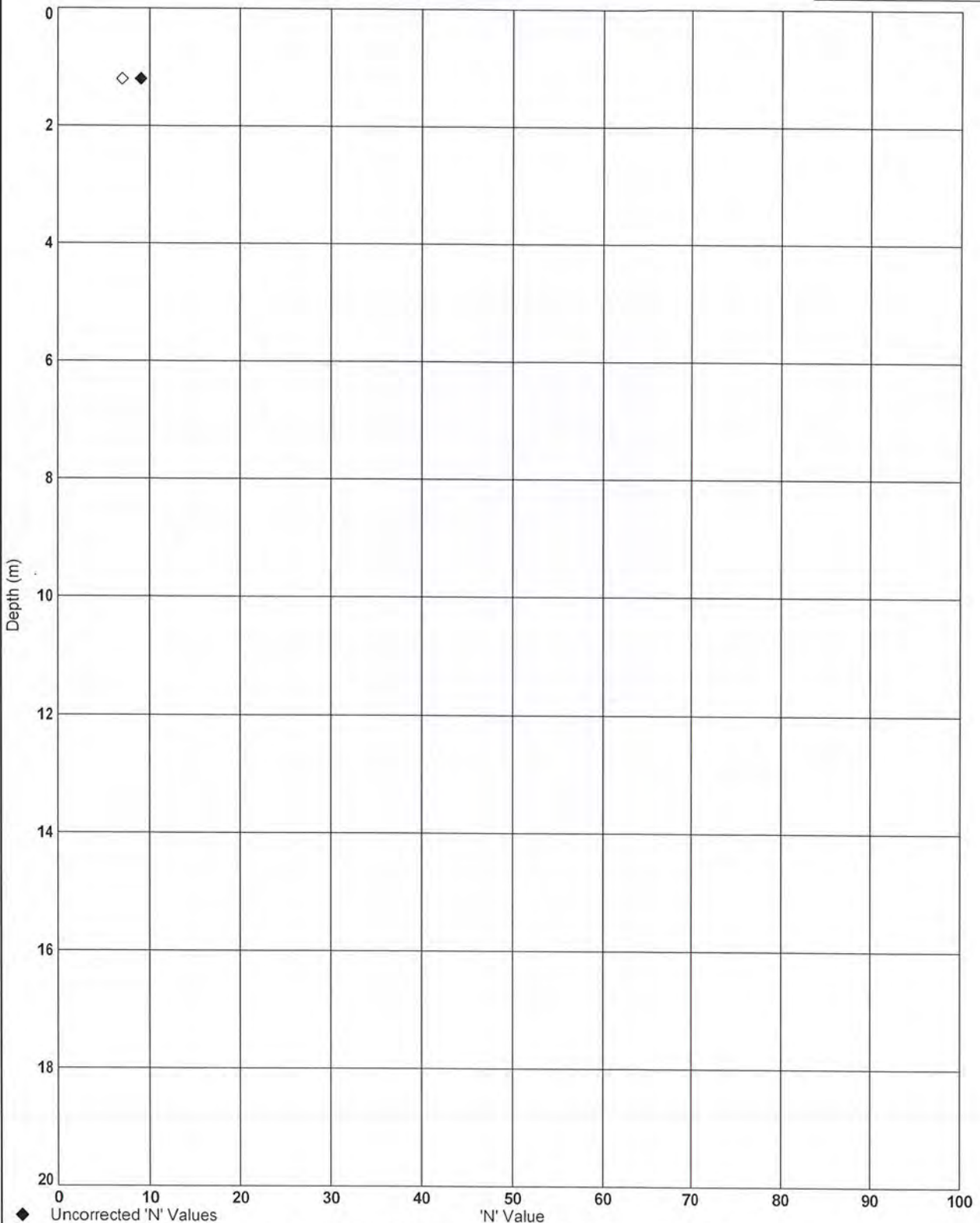
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG    Tel: 0191 387 4700 Fax: 0191 387 4710  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL    Tel: 01772 735 300 Fax: 01772 735 999

## STANDARD PENETRATION TEST RESULTS (BS EN ISO 22476-3: 2005)

Exploratory Hole No

WS CLR005



◆ Uncorrected 'N' Values

◇ Corrected 'N' Values

Note: Graph does not display extrapolated SPT results (e.g. refusals).

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited



Date of issue :-  
03/09/2021

Certificate No :-  
SPT/4322D/Graph/WS CLR005

Operator :-  
L. Selkirk

Checked



AEG Contract No. :-  
4322D





Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
DH2 2RG

SPT Hammer Ref: ATH06  
Test Date: 02/07/2020  
Report Date: 03/07/2020  
File Name: ATH06.spt  
Test Operator: BP

QUALITY CONTROL  
CHECKED  
03 AUG 2020

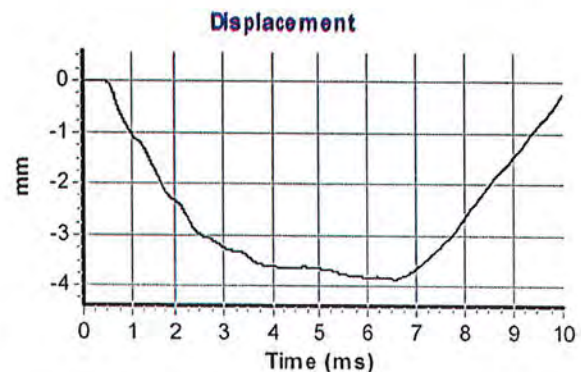
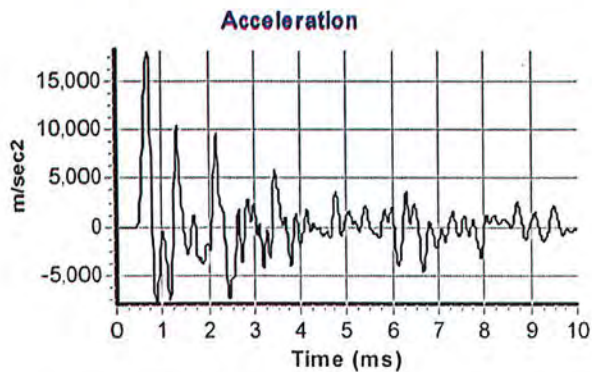
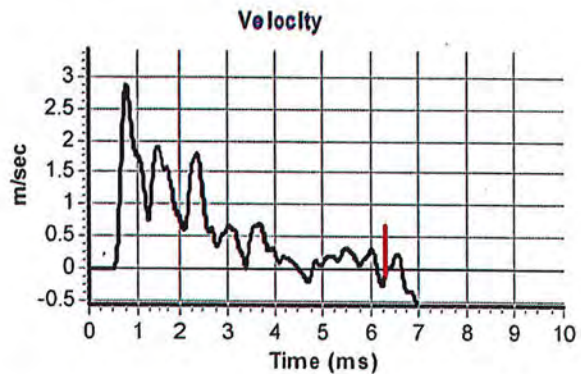
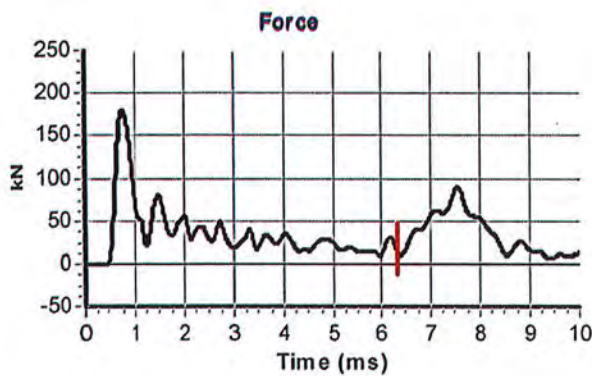
### Instrumented Rod Data

Diameter  $d_r$  (mm): 67  
Wall Thickness  $t_r$  (mm): 8.8  
Assumed Modulus  $E_a$  (GPa): 208  
Accelerometer No.1: 11948  
Accelerometer No.2: 6469

### SPT Hammer Information

Hammer Mass  $m$  (kg): 63.4  
Falling Height  $h$  (mm): 762  
SPT String Length  $L$  (m): 14.1

### Comments / Location



### Calculations

Area of Rod A (mm<sup>2</sup>): 1609  
Theoretical Energy  $E_{theor}$  (J): 473  
Measured Energy  $E_{meas}$  (J): 240

**Energy Ratio  $E_r$  (%):** 51

Signed: Brian Proctor  
Title: Senior Technician

The recommended calibration interval is 12 months

Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
DH2 2RG

SPT Hammer Ref: ATH09  
Test Date: 14/07/2020  
Report Date: 14/07/2020  
File Name: ATH09.spt  
Test Operator: BP

QUALITY CONTROL  
CHECKED  
03 AUG 2020

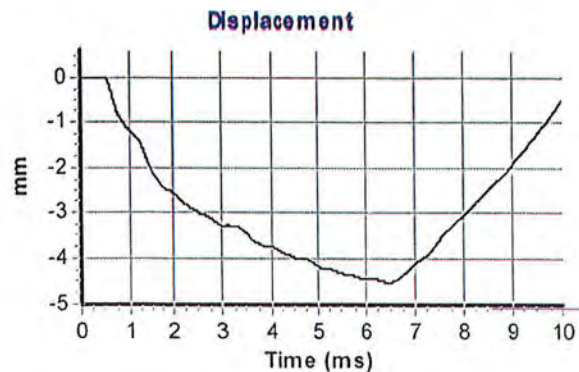
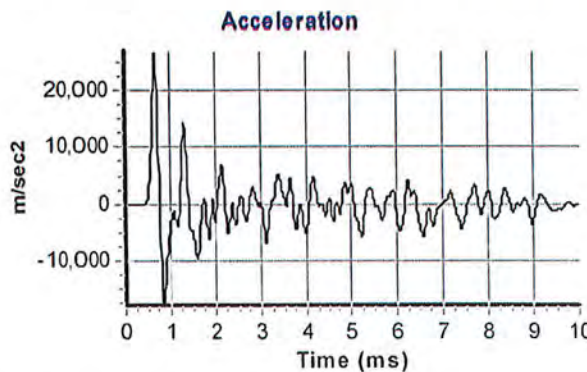
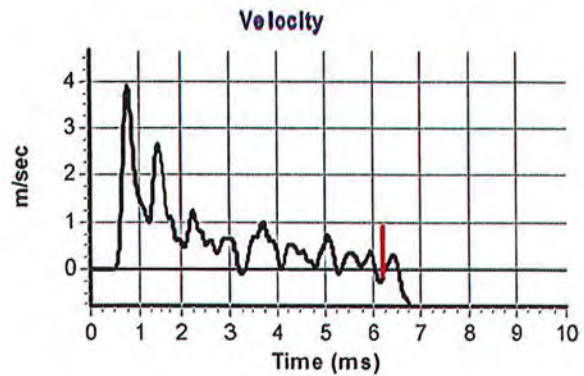
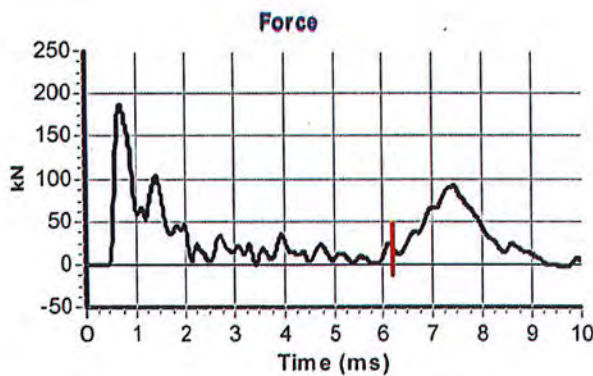
### Instrumented Rod Data

Diameter  $d_r$  (mm): 67  
Wall Thickness  $t_r$  (mm): 8.8  
Assumed Modulus  $E_a$  (GPa): 208  
Accelerometer No.1: 11948  
Accelerometer No.2: 6469

### SPT Hammer Information

Hammer Mass  $m$  (kg): 63.5  
Falling Height  $h$  (mm): 760  
SPT String Length  $L$  (m): 14.1

### Comments / Location



### Calculations

Area of Rod A ( $\text{mm}^2$ ): 1609  
Theoretical Energy  $E_{\text{theor}}$  (J): 473  
Measured Energy  $E_{\text{meas}}$  (J): 259

**Energy Ratio  $E_r$  (%):** 55

Signed: Brian Proctor  
Title: Senior Technician

The recommended calibration interval is 12 months



Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
DH2 2RG

SPT Hammer Ref: DP04  
Test Date: 08/07/2020  
Report Date: 14/07/2020  
File Name: DP04.spt  
Test Operator: BP

QUALITY CONTROL  
CHECKED  
03 AUG 2020

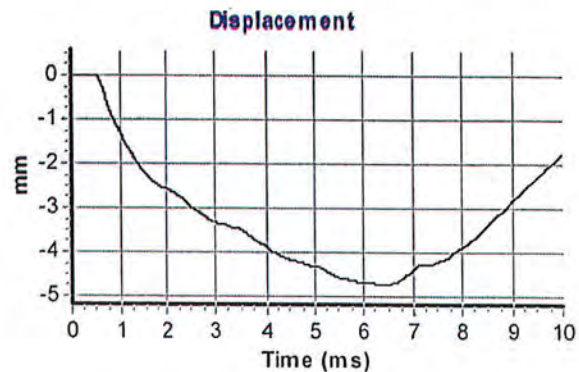
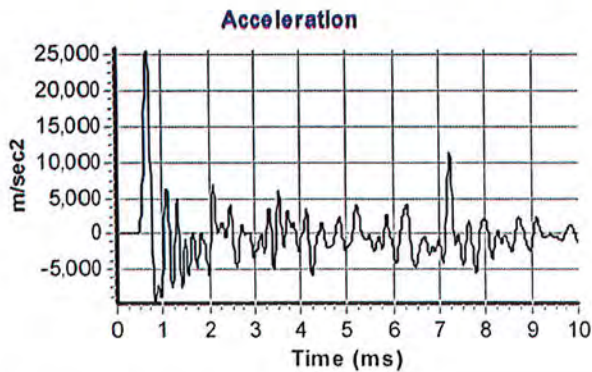
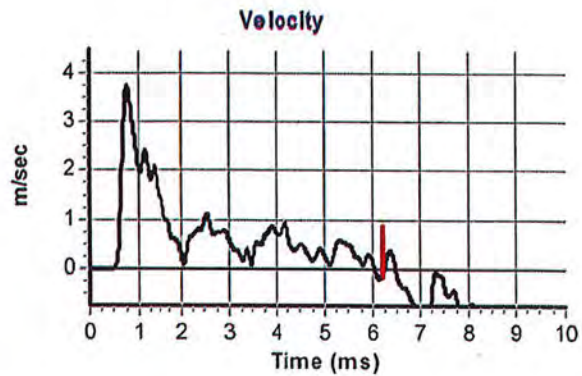
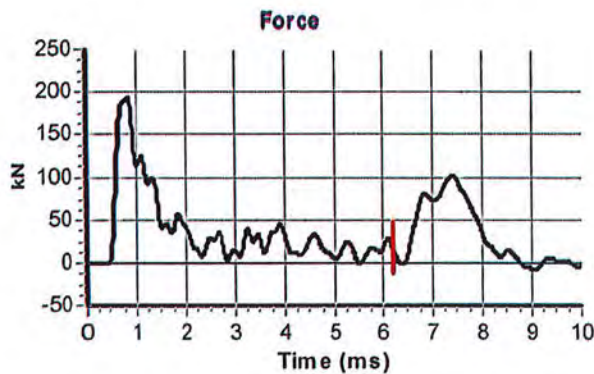
### Instrumented Rod Data

Diameter  $d_r$  (mm): 67  
Wall Thickness  $t_r$  (mm): 8.8  
Assumed Modulus  $E_a$  (GPa): 208  
Accelerometer No.1: 11948  
Accelerometer No.2: 6469

### SPT Hammer Information

Hammer Mass  $m$  (kg): 63.5  
Falling Height  $h$  (mm): 760  
SPT String Length  $L$  (m): 14.1

### Comments / Location



### Calculations

Area of Rod A ( $\text{mm}^2$ ): 1609  
Theoretical Energy  $E_{\text{theor}}$  (J): 473  
Measured Energy  $E_{\text{meas}}$  (J): 346

**Energy Ratio  $E_r$  (%):** 73

Signed: Brian Proctor  
Title: Senior Technician

The recommended calibration interval is 12 months



Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
DH2 2RG

SPT Hammer Ref: TQ2  
Test Date: 22/12/2020  
Report Date: 22/12/2020  
File Name: TQ2.spt  
Test Operator: BP

### Instrumented Rod Data

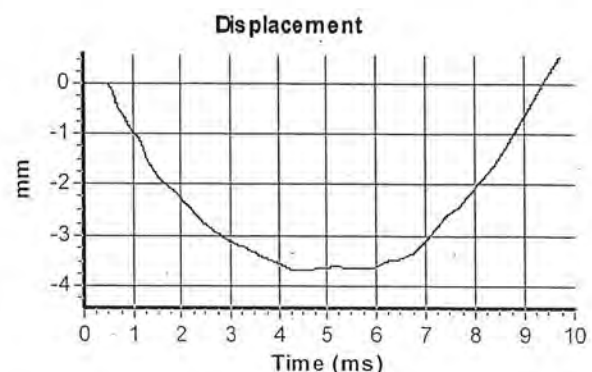
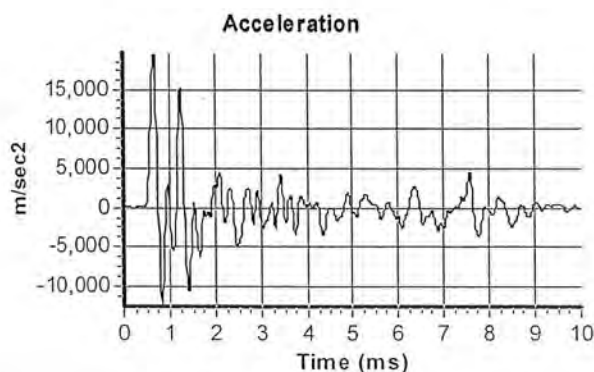
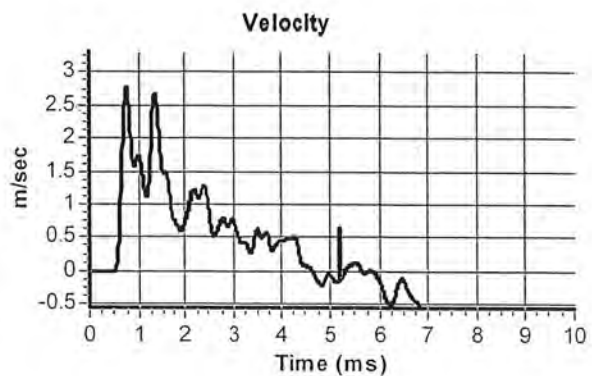
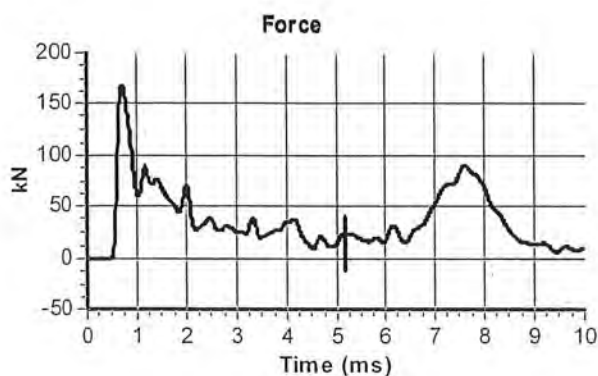
Diameter  $d_r$  (mm): 67  
Wall Thickness  $t_r$  (mm): 8.8  
Assumed Modulus  $E_a$  (GPa): 208  
Accelerometer No.1: 65939  
Accelerometer No.2: 66286

### SPT Hammer Information

Hammer Mass  $m$  (kg): 63.5  
Falling Height  $h$  (mm): 760  
SPT String Length  $L$  (m): 14.1

### Comments / Location

Mass and drop supplied by client



### Calculations

Area of Rod A ( $\text{mm}^2$ ): 1609  
Theoretical Energy  $E_{\text{theor}}$  (J): 473  
Measured Energy  $E_{\text{meas}}$  (J): 250

**Energy Ratio  $E_r$  (%):** 53

Signed: Brian Proctor  
Title: Senior Technician

The recommended calibration interval is 12 months

## Hand Shear Vane Test Results



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Regional Office: Unit 20 Business Development Centre, Eanan Wharf, Blackburn, BB1 5BL Tel: 01772 735 300 Fax: 01772 735 999

## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
BH CLR001	16/02/2021	0.60	34 (20)	36 (22)	38 (20)	36 (21)	
BH CLR001A	16/02/2021	0.60	32 (22)	36 (22)	36 (20)	35 (21)	
TP CLR001	12/02/2021	0.50	64 (18)	58 (15)	50 (12)	57 (15)	
TP CLR001	12/02/2021	3.00	120	120	120	120	Results in excess of 120kPa - exceeds the device measuring range.
TP CLR002A	10/02/2021	0.50	68 (22)	68 (24)	60 (22)	65 (23)	
TP CLR003	10/02/2021	1.20	64 (22)	68 (22)	60 (20)	64 (21)	
TP CLR004	17/02/2021	0.40	56 (24)	58 (20)	66 (22)	60 (22)	
TP CLR004	17/02/2021	3.00	120	120	120	120	Results in excess of 120kPa - exceeds the device measuring range.
TP CLR005	15/02/2021	0.50	68 (30)	70 (30)	64 (26)	67 (29)	
TP CLR006	15/02/2021	0.50	68 (22)	68 (24)	66 (22)	67 (23)	
TP CLR006	15/02/2021	0.80	74 (26)	78 (24)	76 (24)	76 (25)	
TP CLR006	15/02/2021	3.80	120	120	120	120	Results in excess of 120kPa - exceeds the device measuring range.

Residual results given in brackets.

Contract Title :-		AMEY OW Limited		AEG Contract No :- 4322D	
A66 North Trans Pennine Scheme D Section 8		Client :-		Certificate No :- HSV/4322D/1	
Date of Issue :- 03/09/2021	Checked By :-	Assessed By :-		Assessed Date :-	
Page No. :- 1 of 3					





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Regional Office: Unit 20 Business Development Centre, Earning Wharf, Blackburn, BB1 3BL Tel: 01772 735 300 Fax: 01772 735 999

## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
TP CLR007	11/02/2021	0.50	72 (30)	74 (26)	72 (28)	73 (28)	
TP CLR008	16/02/2021	0.80	72 (29)	74 (22)	64 (22)	70 (24)	
TP CLR009A	17/02/2021	0.60	56 (18)	58 (18)	66 (20)	60 (19)	
TP CLR012	11/02/2021	0.50	64 (20)	60 (20)	56 (18)	60 (19)	
TP CLR012	11/02/2021	4.00	120	120	120	120	Results in excess of 120kPa - exceeds the device measuring range.
TP CLR015	19/02/2021	0.60	48 (16)	58 (20)	54 (20)	53 (19)	
TP CLR015	19/02/2021	3.50	120	118 (40)	120	119 (40)	Results in excess of 120kPa - exceeds the device measuring range.
TP CLR020	22/02/2021	0.45	50 (32)	75 (26)	69 (44)	65 (34)	
TP CLR020	22/02/2021	1.00	50 (22)	82 (36)	90 (40)	77 (33)	
WS CLR001	18/02/2021	1.00	45 (23)	46 (23)	51 (27)	47 (24)	
WS CLR003	17/02/2021	0.50	42 (22)	43 (22)	45 (25)	43 (23)	
WS CLR005	17/02/2021	0.50	48 (23)	51 (30)	52 (27)	50 (27)	

Residual results given in brackets.

Contract Title :-		A66 North Trans Pennine Scheme D Section 8		Client :-		AMEY OW Limited		AEG Contract No :-		4322D	
Date of Issue :-		03/09/2021		Checked By		[REDACTED]		Certificate No. :-		HSV/4322D/2	
Page No. :-		2 of 3									



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 Regional Office: Unit 20 Business Development Centre, Earning Wharf, Blackburn, BB1 5BL Tel: 01772 735 300 Fax: 01772 735 999

## HAND SHEAR VANE TEST RESULTS

Exploratory Hole No.	Date	Depth m	1st Result kPa	2nd Result kPa	3rd Result kPa	Average kPa	Remarks
WS CLR005	17/02/2021	1.00	46 (22)	48 (23)	50 (24)	48 (23)	
Residual results given in brackets.							
Contract Title :-			A66 North Trans Pennine Scheme D Section 8			Client :-	
Date of Issue :-			03/09/2021			AMEY OW Limited	
Page No. :-			3 of 3			AEG Contract No :-	
Checked By			[REDACTED]			4322D	
Certificate No. :-			[REDACTED]			HSV/4322D/3	



## Variable Head Permeability Test Results





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Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 8  
Contract : 4322D      Exploratory Hole: BH CLR001A      Depth (mBGL): 15.50

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	15.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	16.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	92.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	7.03	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Sunny/Clear		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	1.00	m	0	0	0	12.020	4.99	1.000	
Diameter, D:	0.09	m	1	0	60	11.980	4.95	0.992	
L/D:	10.87	Ratio	2	0	120	11.960	4.93	0.988	
Response Area, A:	0.0066	m <sup>2</sup>	3	0	180	11.920	4.89	0.980	
Intake Factor, F:	2.3118	Coefficient	4	0	240	11.890	4.86	0.974	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			5	0	300	11.860	4.83	0.968	
<b>Permeability Equations</b>			6	0	360	11.830	4.80	0.962	
General Approach			7	0	420	11.790	4.76	0.954	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			8	0	480	11.760	4.73	0.948	
Lag Time Analysis			9	0	540	11.740	4.71	0.944	
$K = \frac{A}{F \cdot T}$ Eq.(ii)			10	0	600	11.720	4.69	0.940	
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37			15	0	900	11.560	4.53	0.908	
<b>Permeability Variable Determination</b>			20	0	1200	11.410	4.38	0.878	
General Approach			25	0	1500	11.260	4.23	0.848	
Factor, T <sub>1</sub> :	0	Seconds	30	0	1800	11.130	4.10	0.822	
Head, H <sub>1</sub> :	4.99	m	40	0	2400	11.010	3.98	0.798	
Factor, T <sub>2</sub> :	1800	Seconds	50	0	3000	10.890	3.86	0.774	
Head, H <sub>2</sub> :	4.10	m	60	0	3600	10.780	3.75	0.752	

Lag Time Analysis Approach

Lag Time, T : n/a      Seconds

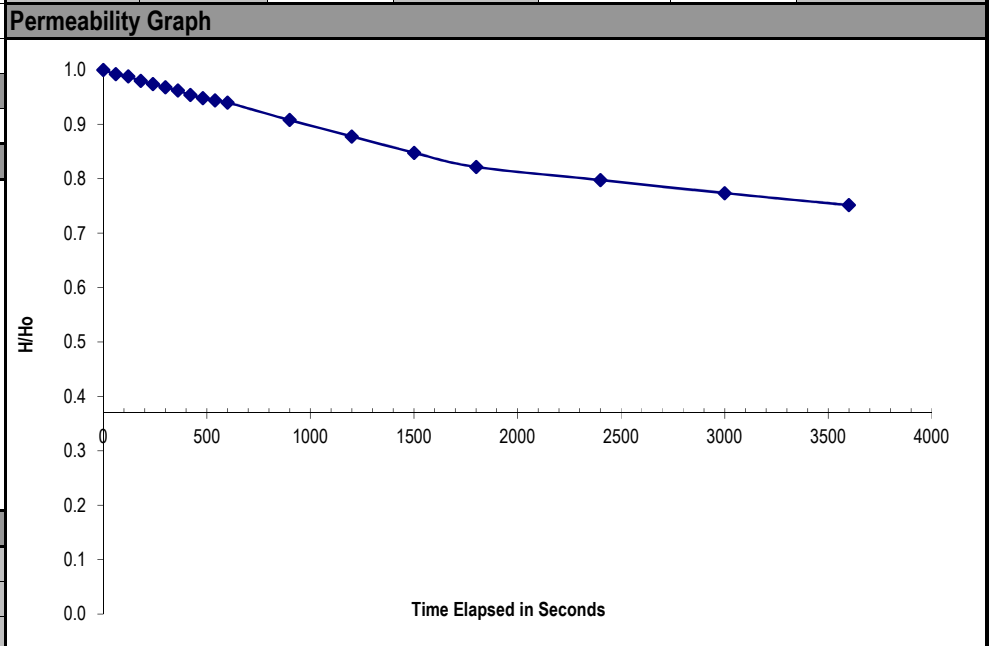
**Permeability Calculation**

General Approach      Eq.(i)  
**K = 3.14E-07**      m/s

Lag Time Analysis      Eq.(ii)  
**K = N/A**      m/s

**Approvals**

Operator: A.M.      24/03/2021  
Calculated: L.C.      07/04/2021  
Checked & Approved: KW      07/04/2021



**ALLIED EXPLORATION & GEOTECHNICS LTD**

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**  
**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

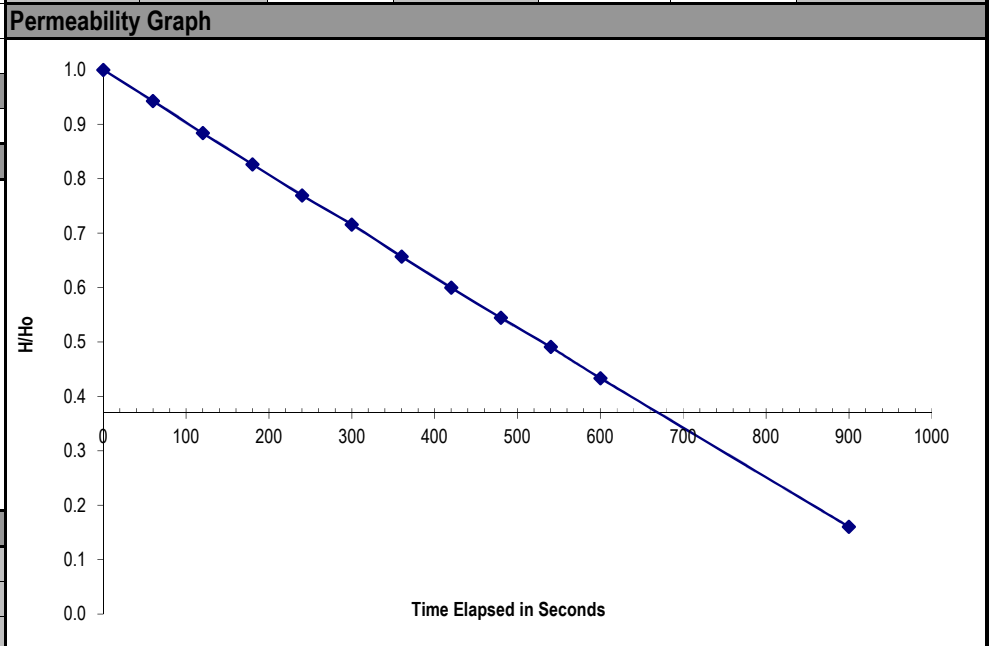
**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 8  
Contract : 4322D      Exploratory Hole: BH CLR003A      Depth (mBGL): 6.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions. (2) Artesian water conditions noted. Water level at 0.22m AGL at start of test.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	5.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	7.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	140.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.22	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	-0.22	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Overcast		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	2.00	m	0	0	0	5.420	5.42	1.000	
Diameter, D:	0.14	m	1	0	60	5.110	5.11	0.943	
L/D:	14.29	Ratio	2	0	120	4.790	4.79	0.884	
Response Area, A:	0.0154	m <sup>2</sup>	3	0	180	4.480	4.48	0.827	
Intake Factor, F:	4.2557	Coefficient	4	0	240	4.170	4.17	0.769	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			5	0	300	3.880	3.88	0.716	
<b>Permeability Equations</b>			6	0	360	3.560	3.56	0.657	
General Approach			7	0	420	3.250	3.25	0.600	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			8	0	480	2.950	2.95	0.544	
Lag Time Analysis			9	0	540	2.660	2.66	0.491	
$K = \frac{A}{F \cdot T}$ Eq.(ii)			10	0	600	2.350	2.35	0.434	
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37			15	0	900	0.870	0.87	0.161	
<b>Permeability Variable Determination</b>									
General Approach									
Factor, T <sub>1</sub> :	n/a	Seconds							
Head, H <sub>1</sub> :	n/a	m							
Factor, T <sub>2</sub> :	n/a	Seconds							
Head, H <sub>2</sub> :	n/a	m							

Permeability Graph		
Lag Time Analysis Approach		
Lag Time, T :	669.85	Seconds
<b>Permeability Calculation</b>		
General Approach      Eq.(i)		
K =	N/A	m/s
Lag Time Analysis      Eq.(ii)		
K =	5.40E-06	m/s
<b>Approvals</b>		
Operator	A.M.	24/03/2021
Calculated	L.C.	07/04/2021
Checked & Approved:	KW	07/04/2021



**ALLIED EXPLORATION & GEOTECHNICS LTD**

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**  
**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 8  
Contract : 4322D      Exploratory Hole: BH CLR004A      Depth (mBGL): 5.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	3.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	5.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	140.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	0.87	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Sunny		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	2.00	m	0	0	0	4.020	3.15	1.000	
Diameter, D:	0.14	m	1	0	60	4.000	3.13	0.994	
L/D:	14.29	Ratio	2	0	120	3.980	3.11	0.987	
Response Area, A:	0.0154	m <sup>2</sup>	3	0	180	3.960	3.09	0.981	
Intake Factor, F:	4.2557	Coefficient	4	0	240	3.940	3.07	0.975	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			5	0	300	3.920	3.05	0.968	
<b>Permeability Equations</b>			6	0	360	3.900	3.03	0.962	
General Approach			7	0	420	3.870	3.00	0.952	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			8	0	480	3.850	2.98	0.946	
Lag Time Analysis			9	0	540	3.830	2.96	0.940	
$K = \frac{A}{F \cdot T}$ Eq.(ii)			10	0	600	3.810	2.94	0.933	
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37			15	0	900	3.710	2.84	0.902	
<b>Permeability Variable Determination</b>			20	0	1200	3.620	2.75	0.873	
General Approach			25	0	1500	3.530	2.66	0.844	
Factor, T <sub>1</sub> :	0	Seconds	30	0	1800	3.440	2.57	0.816	
Head, H <sub>1</sub> :	3.15	m	40	0	2400	3.350	2.48	0.787	
Factor, T <sub>2</sub> :	1800	Seconds	50	0	3000	3.250	2.38	0.756	
Head, H <sub>2</sub> :	2.57	m	60	0	3600	3.160	2.29	0.727	

Lag Time Analysis Approach

Lag Time, T : n/a      Seconds

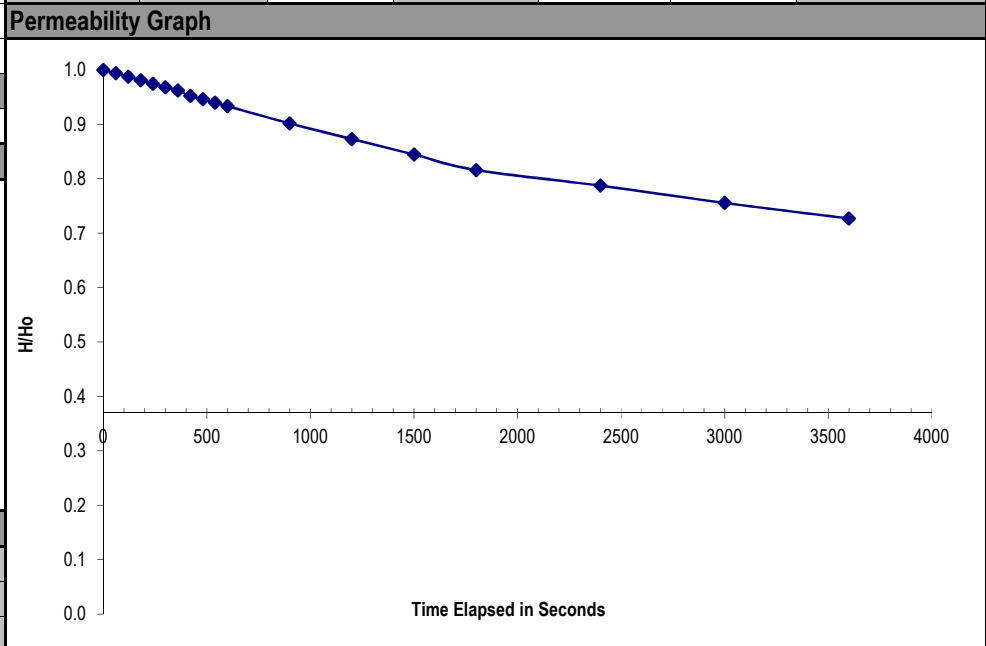
**Permeability Calculation**

General Approach      Eq.(i)  
**K = 4.09E-07**      m/s

Lag Time Analysis      Eq.(ii)  
**K = N/A**      m/s

**Approvals**

Operator	A.M.	24/03/2021
Calculated	L.C.	07/04/2021
Checked & Approved:	KW	07/04/2021





**ALLIED EXPLORATION & GEOTECHNICS LTD**

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Regional Office: Suite 20 Business Development Centre, Eanam Wharf, Eanam Old Road, Blackburn, BB1 5BL

**VARIABLE HEAD PERMEABILITY TEST CALCULATION**

**BS5930: 1999 (Amendment 1): Section 4: Clause 25.4**

Installation Type : 19mm Standpipe Piezometer      Method: Rising Head      Test No: 1 of 1

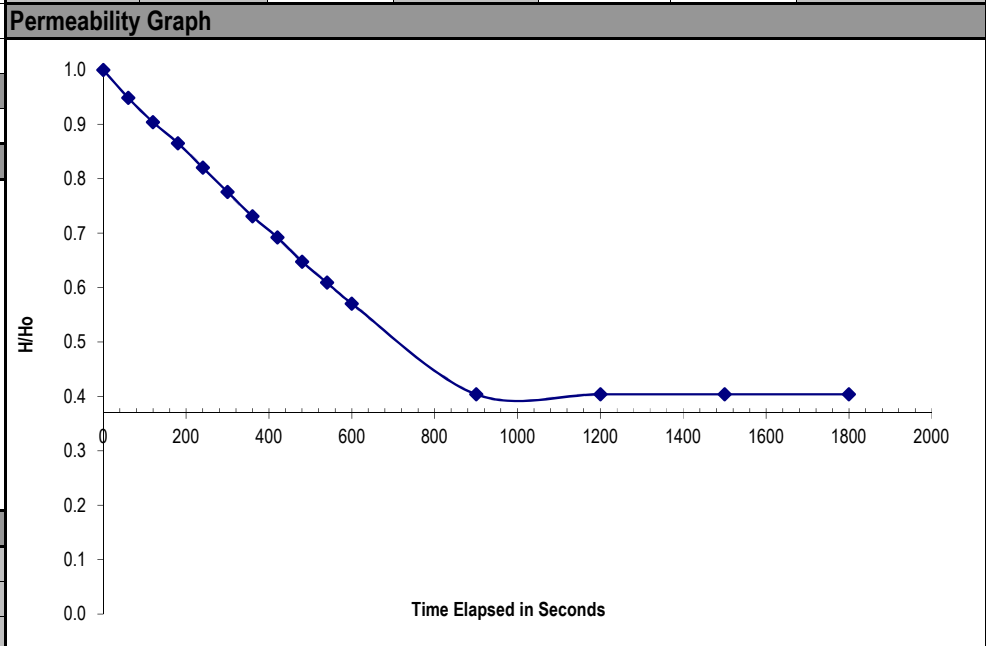
**Contract & Position Details**

Site: A66 North Trans Pennine Scheme D Section 8  
Contract : 4322D      Exploratory Hole: WS CLR003      Depth (mBGL): 2.00

Initial Conditions			Intake Factor Selection		Comments (1) Refer to Exploratory Hole Record for soil conditions.
Parameter	Value	Unit	Option	Criteria	
Top of Section:	1.00	mBGL	<input type="radio"/> A	Soil flush with bottom at impervious boundary	
Base of Section:	3.00	mBGL	<input type="radio"/> B	Soil flush with bottom in uniform soil	
Diameter of Section:	77.00	mm	<input type="radio"/> C	Well point or hole extended at impervious boundary	
Measurement Offset:	0.00	mAGL	<input type="radio"/> D	Well point or hole extended in uniform soil	
Standpipe Diameter:	19.00	mm	<input type="radio"/> E	Soil in casing with bottom at impervious boundary	
Initial Water Level:	0.76	mBGL	<input type="radio"/> F	Soil in casing with bottom in uniform soil	
Weather Conditions:	Overcast		<input checked="" type="radio"/> G	Standpipe or Piezometer	

Initial Response Zone Calculations			Readings						
Parameter	Value	Unit	Minutes	Seconds	Total Seconds	Water Level Depth (m)	Head (m)	H/H <sub>0</sub>	Notes
Length, L:	2.00	m	0	0	0	2.320	1.56	1.000	
Diameter, D:	0.08	m	1	0	60	2.240	1.48	0.949	
L/D:	25.97	Ratio	2	0	120	2.170	1.41	0.904	
Response Area, A:	0.0047	m <sup>2</sup>	3	0	180	2.110	1.35	0.865	
Intake Factor, F:	3.6240	Coefficient	4	0	240	2.040	1.28	0.821	
<i>using</i> $2.32\pi L / \ln\{1.1(L/D)\} + \sqrt{1 + 1.1(L/D)^2}$			5	0	300	1.970	1.21	0.776	
<b>Permeability Equations</b>			6	0	360	1.900	1.14	0.731	
General Approach			7	0	420	1.840	1.08	0.692	
$K = \frac{A}{F \cdot (T_2 - T_1)} \cdot \ln(H_1/H_2)$ Eq.(i)			8	0	480	1.770	1.01	0.647	
Lag Time Analysis			9	0	540	1.710	0.95	0.609	
$K = \frac{A}{F \cdot T}$ Eq.(ii)			10	0	600	1.650	0.89	0.571	
Eq.(ii) where T is the Basic Time Lag Factor coinciding with a H/H <sub>0</sub> of 0.37			15	0	900	1.390	0.63	0.404	
			20	0	1200	1.390	0.63	0.404	
			25	0	1500	1.390	0.63	0.404	
			30	0	1800	1.390	0.63	0.404	
<b>Permeability Variable Determination</b>									
General Approach									
Factor, T <sub>1</sub> :	0	Seconds							
Head, H <sub>1</sub> :	1.56	m							
Factor, T <sub>2</sub> :	900	Seconds							
Head, H <sub>2</sub> :	0.63	m							

Permeability Graph		
Lag Time Analysis Approach		
Lag Time, T:	n/a	Seconds
<b>Permeability Calculation</b>		
General Approach      Eq.(i)		
K=	<b>1.29E-06</b>	m/s
Lag Time Analysis      Eq.(ii)		
K=	<b>N/A</b>	m/s
<b>Approvals</b>		
Operator	A.M.	25/03/2021
Calculated	L.C.	07/04/2021
Checked & Approved:	KW	07/04/2021



*In-situ* Water Quality Parameter Test Results







## Photo-ionisation Detector Test Results



# ALLIED EXPLORATION & GEOTECHNICS LIMITED



Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG    Tel: 0191 387 4700 Fax: 0191 387 4710  
 Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL    Tel: 01772 735 300 Fax: 01772 735 999

## PHOTO-IONISATION DETECTOR

Exploratory Hole No.	Depth (m)	PID (ppm)	Date Tested	Remarks
WS CLR001	0.20	See Remarks	18/02/2021	<0.1ppm
WS CLR001	1.00	See Remarks	18/02/2021	<0.1ppm
WS CLR001	2.20	See Remarks	18/02/2021	<0.1ppm

See attached Calibration Certificate for Model No. and any other details

Contract Title :- A66 North Trans Pennine Scheme D Section 8	Client :- AMEY OW Limited
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	Calibration Compliant :- YES	Date of Issue :- 03/09/2021	Page No. :- 1 of 1	
	Checked by: <span style="background-color: black; color: black;">[REDACTED]</span>		AEG Contract No. :- 4322D	



...everything gas detection

## Certificate of Calibration

Customer: Allied Exploration & Geotechnics Ltd

Instrument: MiniRAE 2000

Job: Service, Test & Calibration

Serial number: 110-900192

Fleet Number: N/A

Certificate no: 900192/140720

Next calibration due date: 14 July 2021

Tested on: 14 July 2020

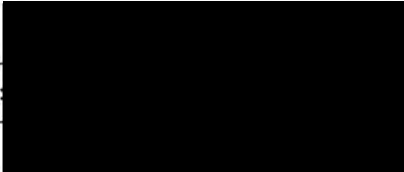
Calibrated for: Isobutylene

<u>Applied Gas Concentration:</u>	<u>Cylinder Reference:</u>	<u>Initial Sensor Reading</u>	<u>Final Sensor Reading</u>	<u>Accuracy Limits</u>
Isobutylene: 100 ppm	AG3607-3-2	94.0 ppm	100.0 ppm	± 2%

The Instrument has been calibrated after Re-Zeroing & Introducing Span Calibration Gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO6145-6:2008

Calibration Engineer: P Lonsdale

Sign: 

Quality Assessed by (Print): C.S.	Sign: 
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**Determination of the Soil infiltration Rate for  
Soakaway Design Test Results**



**ALLIED EXPLORATION & GEOTECHNICS LTD.**  
 Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
 Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

**SITE:** A66 North Trans Pennine Scheme D Section 8

**CONTRACT:** 4322D    **PIT:** TP CLR005    **DEPTH:** 2.00    **mBGL**

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.30	mBGL
Operator:	<b>J. Beckett</b>	
Test Date:	15/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.825	m
Soakaway 75% Full:	1.475	m
Soakaway 50% Full:	1.650	m
Test No.:	<b>1 of 1</b>	
Weather Conditions:	Fair	
Test Zone (m):	1.30	to 2.00

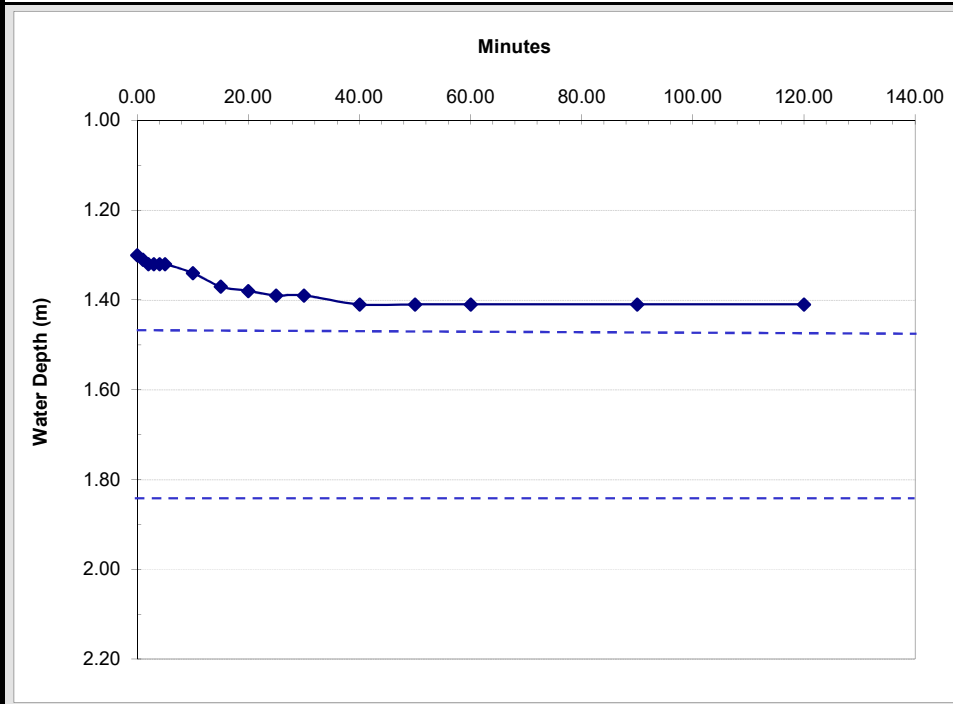
**TEST CALCULATION**

**Soil Infiltration (f)**

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

- $V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.
- $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.30	<b>Test Start</b>
1.00	1.31	
2.00	1.32	
3.00	1.32	
4.00	1.32	
5.00	1.32	
10.00	1.34	
15.00	1.37	
20.00	1.38	
25.00	1.39	
30.00	1.39	
40.00	1.41	
50.00	1.41	
60.00	1.41	
90.00	1.41	
120.00	1.41	<b>Test Finish</b>



Time (from Graph) 75% Full:	n/a	Minutes
Time (from Graph) 25% Full:	n/a	Minutes
$t_{p75-25} =$	n/a	Minutes

**MATERIAL TYPE**  
 0.70-2.40m: Firm to stiff dark grey mottled orange brown slightly sandy gravelly CLAY with medium cobble content.

**REMARKS**

(1) Neither the 75% and 25% effective depth level reached during the test. Test should be considered failed – no infiltration (f) calculated. (2) Soakaway terminated at 120 minutes

**SOIL INFILTRATION RESULTS**

$V_{p75-25} =$	0.700	$m^3$
$a_{p50} =$	4.100	$m^2$
Soil Infiltration Rate (f) =	n/a	m/s
		From (i)

Calculated: KW    Date: 16/03/2021

**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

SITE: A66 North Trans Pennine Scheme D Section 8

CONTRACT: 4322D      PIT: TPCLR006      DEPTH: 2.00      mBGL

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.40	mBGL
Operator:	J. Beckett	
Test Date:	15/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.850	m
Soakaway 75% Full:	1.550	m
Soakaway 50% Full:	1.700	m
Test No.:	1 of 3	
Weather Conditions:	Raining	
Test Zone (m):	1.40	to 2.00

**TEST CALCULATION**

Soil Infiltration (*f*)

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

$V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.

$a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area

$t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.40	Test Start
0.50	1.40	
1.00	1.40	
1.50	1.40	
2.00	1.40	
2.50	1.40	
3.00	1.40	
3.50	1.40	
4.00	1.40	
4.50	1.40	
5.00	1.40	
10.00	1.39	
15.00	1.39	
20.00	1.39	
25.00	1.39	
30.00	1.39	
40.00	1.39	
50.00	1.38	
60.00	1.38	
90.00	1.38	
120.00	1.37	Test Finish



Time (from Graph) 75% Full:	n/a	Minutes
Time (from Graph) 25% Full:	n/a	Minutes
$t_{p75-25} =$ <span style="border: 1px solid black; padding: 2px;">n/a</span> Minutes		

**MATERIAL TYPE**  
0.70-1.80m: Firm grey with orange mottling slightly sandy slightly gravelly CLAY. 1.80-4.50m: Stiff to very stiff grey slightly sandy slightly gravelly CLAY with low cobble content.

**REMARKS**

(1) Some pit side collapse during soakaway procedure causing measured water level to slightly rise. No discernible water movement observed. Test should be considered failed – no infiltration (*f*) calculated. (2) Soakaway terminated at 120 minutes

**SOIL INFILTRATION RESULTS**

$V_{p75-25}$ =	0.600	m <sup>3</sup>	
$a_{p50}$ =	3.800	m <sup>2</sup>	
Soil Infiltration Rate ( <i>f</i> ) =	n/a	m/s	From (i)

Calculated: KW      Date: 16/03/2021



**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

SITE: A66 North Trans Pennine Scheme D Section 8

CONTRACT: 4322D      PIT: TP CLR009      DEPTH: 2.00      mBGL

**SOAKAWAY PIT CONDITIONS**

Soakaway Depth:	2.00	mBGL
Soakaway Length:	2.00	m
Soakaway Width:	1.00	m
Filled Water Level:	1.20	mBGL
Operator:	J. Beckett	
Test Date:	17/02/2021	

**EFFECTIVE DEPTH DETAILS**

Soakaway 25% Full:	1.800	m
Soakaway 75% Full:	1.400	m
Soakaway 50% Full:	1.600	m
Test No.:	1 of 1	
Weather Conditions:	Raining	
Test Zone (m):	1.20	to 2.00

**TEST CALCULATION**

Soil Infiltration (*f*)

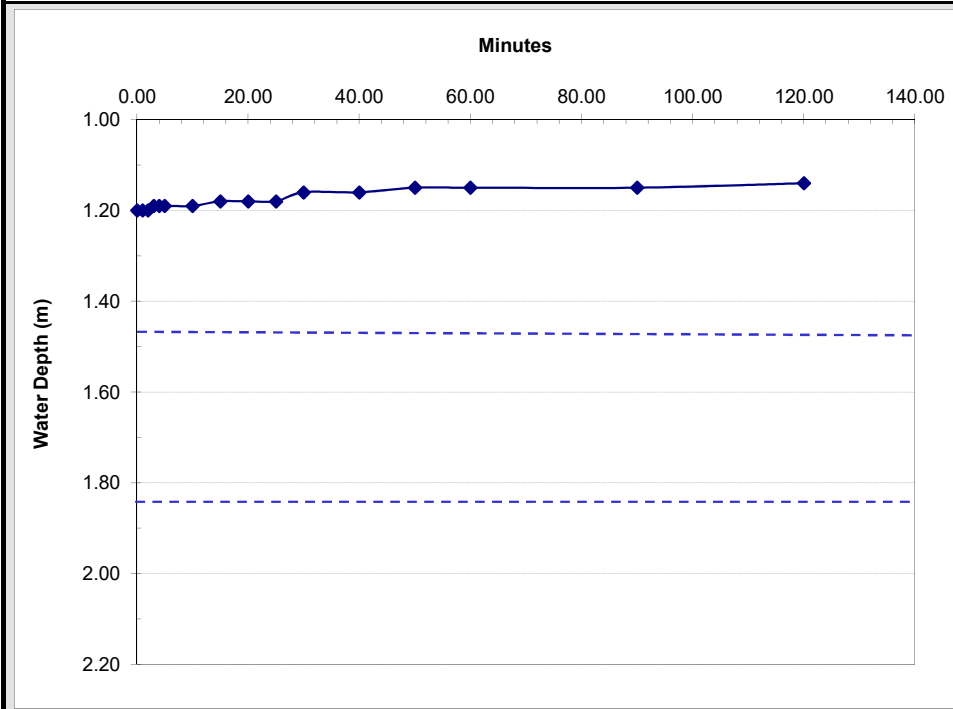
$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

$V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.

$a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area

$t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.20	Test Start
1.00	1.20	
2.00	1.20	
3.00	1.19	
4.00	1.19	
5.00	1.19	
10.00	1.19	
15.00	1.18	
20.00	1.18	
25.00	1.18	
30.00	1.16	
40.00	1.16	
50.00	1.15	
60.00	1.15	
90.00	1.15	
120.00	1.14	Test Finish



Time (from Graph) 75% Full: n/a Minutes  
Time (from Graph) 25% Full: n/a Minutes

$t_{p75-25} =$	n/a	Minutes
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**MATERIAL TYPE**

08.80-1.90m: Firm brown mottled grey slightly sandy to sandy gravelly CLAY with medium cobble content. 1.90-2.70m: Firm brown and brownish grey sandy gravelly CLAY with medium cobble content.

**REMARKS**

(1) Some pit side collapse during soakaway procedure causing measured water level to slightly rise. No discernible water movement observed. Test should be considered failed – no infiltration (*f*) calculated. (2) Soakaway terminated at 120 minutes

**SOIL INFILTRATION RESULTS**

$$V_{p75-25} = 0.800 \quad m^3$$

$$a_{p50} = 4.400 \quad m^2$$

Soil Infiltration Rate (*f*) = n/a      m/s      From (i)

Calculated: KW      Date: 16/03/2021

**ALLIED EXPLORATION & GEOTECHNICS LTD.**  
 Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG  
**SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))**  
 Installation Type: Trial Pit

**CONTRACT & POSITION DETAILS**

**SITE:** A66 North Trans Pennine Scheme D Section 8

**CONTRACT:** 4322D      **PIT:** TP CLR020      **DEPTH:** 2.00      **mBGL**

**SOAKAWAY PIT CONDITIONS**

<b>Soakaway Depth:</b>	2.00	mBGL
<b>Soakaway Length:</b>	2.00	m
<b>Soakaway Width:</b>	1.00	m
<b>Filled Water Level:</b>	1.10	mBGL
<b>Operator:</b>	<b>J. Beckett</b>	
<b>Test Date:</b>	22/02/2021	

**EFFECTIVE DEPTH DETAILS**

<b>Soakaway 25% Full:</b>	1.775	m
<b>Soakaway 75% Full:</b>	1.325	m
<b>Soakaway 50% Full:</b>	1.550	m
<b>Test No.:</b>	<b>1 of 1</b>	
<b>Weather Conditions:</b>	Dry	
<b>Test Zone (m):</b>	1.10	to 2.00

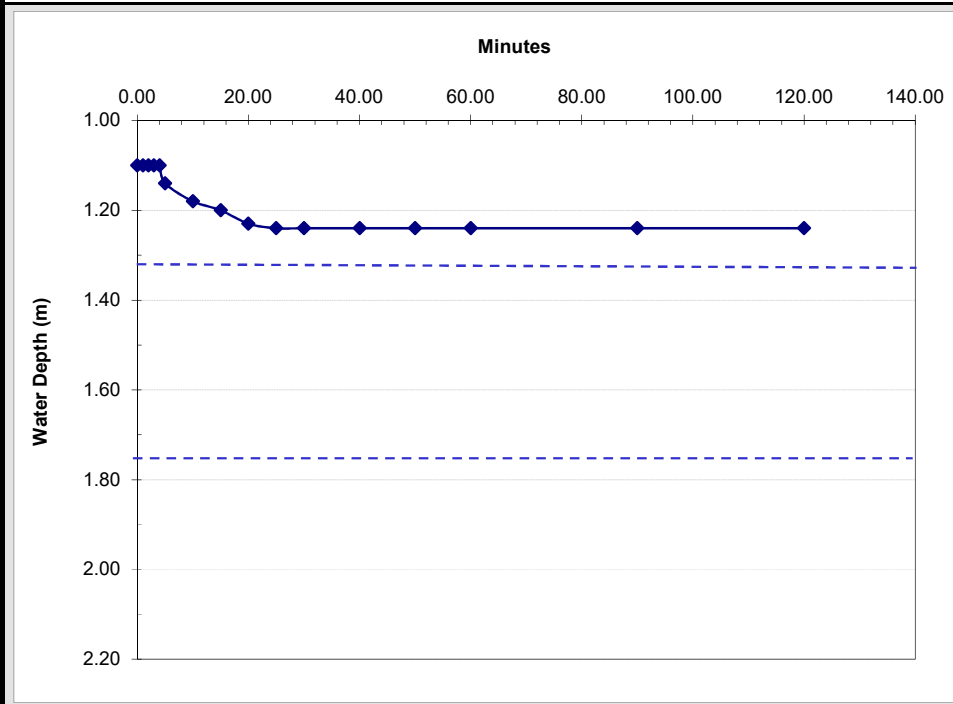
**TEST CALCULATION**

**Soil Infiltration (f)**

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}} \quad \text{Equation (i)}$$

- $V_{p75-25}$  = the effective storage volume of water in the trial pit 75% and 25% effective depth.
- $a_{p50}$  = the internal surface area of the trial pit up to 50% effective depth and including the base area
- $t_{p75-25}$  = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	1.10	<b>Test Start</b>
1.00	1.10	
2.00	1.10	
3.00	1.10	
4.00	1.10	
5.00	1.14	
10.00	1.18	
15.00	1.20	
20.00	1.23	
25.00	1.24	
30.00	1.24	
40.00	1.24	
50.00	1.24	
60.00	1.24	
90.00	1.24	
120.00	1.24	<b>Test Finish</b>



<b>Time (from Graph) 75% Full:</b>	n/a	Minutes
<b>Time (from Graph) 25% Full:</b>	n/a	Minutes
$t_{p75-25} =$	n/a	Minutes

**MATERIAL TYPE**  
 0.40-1.90m: Soft orangish brown very sandy slightly gravelly CLAY with low cobble and boulder content. 1.90-2.80m: Bluish brown clayey SAND and GRAVEL.

**REMARKS**

(1) Neither the 75% and 25% effective depth level reached during the test. Test should be considered failed – no infiltration (f) calculated. (2) Soakaway terminated at 120 minutes

**SOIL INFILTRATION RESULTS**

$V_{p75-25} =$	0.900	$m^3$
$a_{p50} =$	4.700	$m^2$
<b>Soil Infiltration Rate (f) =</b>	n/a	<b>m/s From (i)</b>

**Calculated:** KW      **Date:** 16/03/2021

## Plate Load Test Results





# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

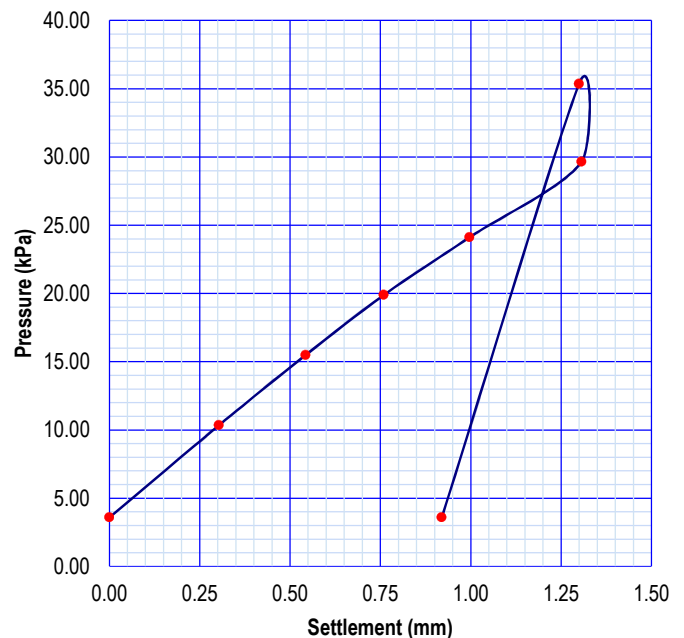
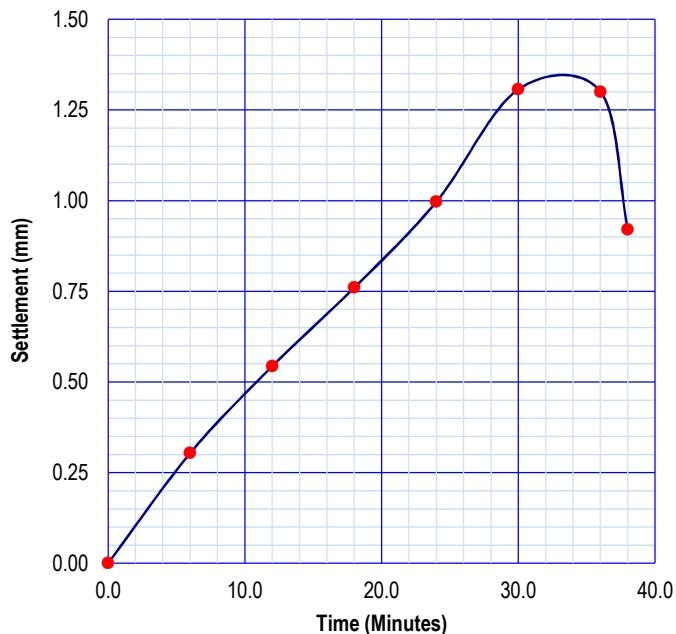
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b> A66 North Trans Pennine Scheme D Section 8	
<b>Client:</b> AMEY	<b>Project No.:</b> 4322D
<b>Test Position:</b> TP CLR001	<b>Depth (mBGL):</b> 0.35
<b>Date of Test:</b> 12/02/2021	<b>Operator:</b> JM
<b>Reaction Load:</b> JCB 3CX (8T)	<b>Plate Area (m<sup>2</sup>):</b> 0.16117
<b>Weather:</b> Overcast	<b>Sample:</b> Yes
<b>Test Type:</b> Incremental - Equivalent CBR	<b>Equipment Mass (Kg):</b> 58.66
<b>Material Type:</b> Soft sandy CLAY	<b>Equipment Force (kN):</b> 0.575
<b>Remarks:</b> Self weight of the equipment calculated at 3.57 kPa (i.e. plate, extension rod, jack piston and load cell).	

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.57	0.00	0.000
1	6.0	1.09	10.33	0.30	0.029
2	12.0	1.92	15.48	0.54	0.035
3	18.0	2.63	19.89	0.76	0.038
4	24.0	3.31	24.11	1.00	0.041
5	30.0	4.20	29.63	1.31	0.044
6	36.0	5.12	35.34	1.30	0.037
7	38.0	0.00	3.57	0.92	0.258

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 16042.9	<b>kN/m<sup>2</sup>/m</b>
<b>Plate Load @1.25mm (kPa):</b> 32.00	<b>Equivalent CBR:</b> 1.18	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 19.60	<b>MN/m<sup>2</sup></b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322D/TP CLR	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 22.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 15/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

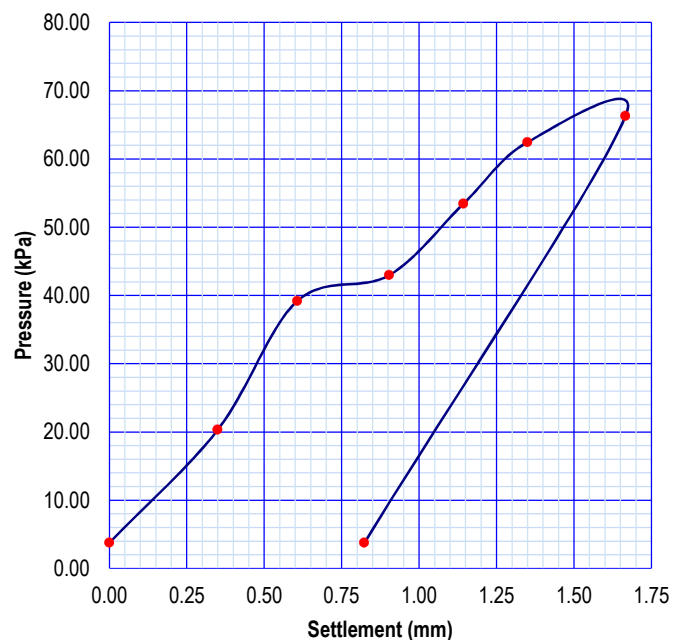
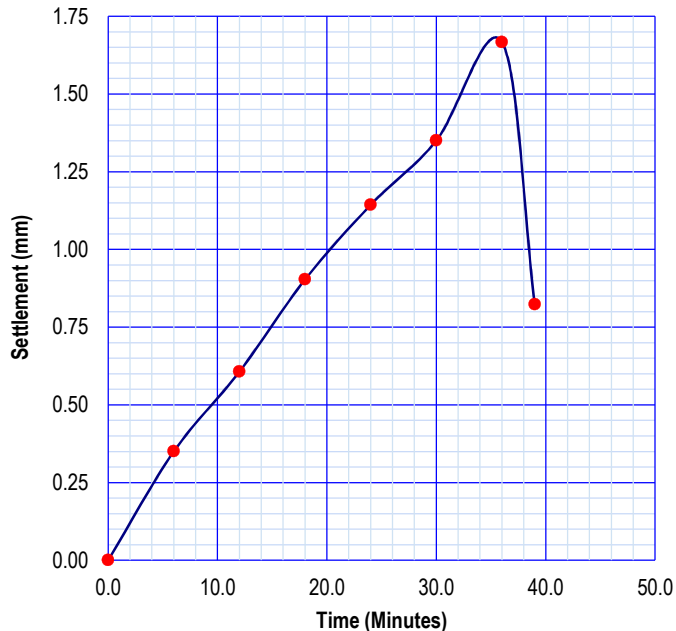
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b> A66 North Trans Pennine Scheme D Section 8	
<b>Client:</b> AMEY	<b>Project No.:</b> 4322D
<b>Test Position:</b> TP CLR002A	<b>Depth (mBGL):</b> 0.50
<b>Date of Test:</b> 10/02/2021	<b>Operator:</b> JM
<b>Reaction Load:</b> JCB 3CX (8T)	<b>Plate Area (m<sup>2</sup>):</b> 0.16117
<b>Weather:</b> Snowing	<b>Sample:</b> Yes
<b>Test Type:</b> Incremental - Equivalent CBR	<b>Equipment Mass (Kg):</b> 61.47
<b>Material Type:</b> Firm slightly sandy slightly gravelly CLAY	<b>Equipment Force (kN):</b> 0.603
<b>Remarks:</b> Self weight of the equipment calculated at 3.74 kPa (i.e. plate, extension rod, jack piston and load cell).	

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.74	0.00	0.000
1	6.0	2.67	20.31	0.35	0.017
2	12.0	5.71	39.17	0.61	0.015
3	18.0	6.32	42.95	0.90	0.021
4	24.0	8.01	53.44	1.14	0.021
5	30.0	9.46	62.44	1.35	0.022
6	36.0	10.08	66.28	1.67	0.025
7	39.0	0.00	3.74	0.82	0.220

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 29077.8	<b>kN/m<sup>2</sup>/m</b>
<b>Plate Load @1.25mm (kPa):</b> 58.00	<b>Equivalent CBR:</b> 3.32	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 37.91	<b>MN/m<sup>2</sup></b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322D/TP CLR002A	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 26.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 15/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

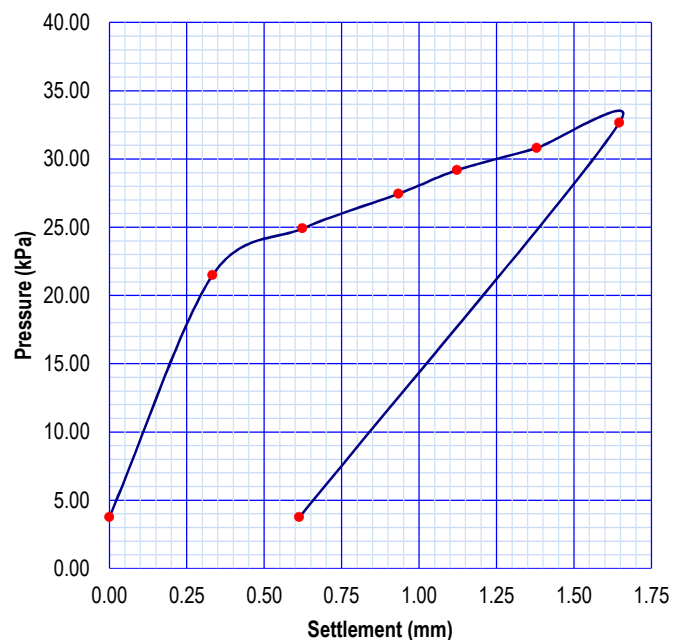
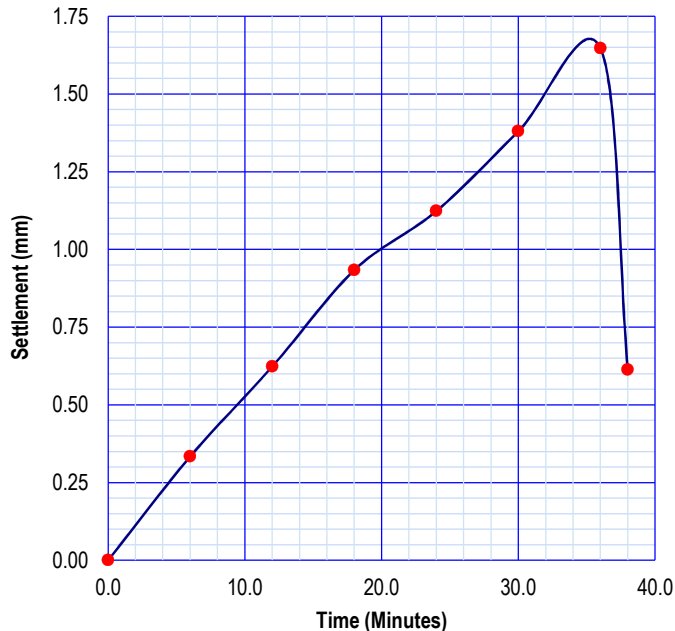
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	A66 North Trans Pennine Scheme D Section 8		
<b>Client:</b>	AMEY	<b>Project No.:</b>	4322D
<b>Test Position:</b>	TP CLR004	<b>Depth (mBGL):</b>	0.45
<b>Date of Test:</b>	17/02/2021	<b>Plate Diameter (mm):</b>	453
<b>Reaction Load:</b>	JCB 3CX (8T)	<b>Sample:</b>	Yes
<b>Weather:</b>	Light rain	<b>Equipment Mass (Kg):</b>	61.47
<b>Test Type:</b>	Incremental - Equivalent CBR	<b>Equipment Force (kN):</b>	0.603
<b>Material Type:</b>	Soft to firm sandy slightly gravelly CLAY		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.74 kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.74	0.00	0.000
1	6.0	2.86	21.49	0.33	0.016
2	12.0	3.41	24.90	0.62	0.025
3	18.0	3.82	27.44	0.93	0.034
4	24.0	4.10	29.18	1.12	0.038
5	30.0	4.36	30.79	1.38	0.045
6	36.0	4.66	32.65	1.65	0.050
7	38.0	0.00	3.74	0.61	0.164

<b>Plate Penetration (mm):</b>	1.25	<b>k762:</b>	15040.2	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b>	30.00	<b>Equivalent CBR:</b>	1.06	<b>%</b>
<b>Plate Factor:</b>	0.6267	<b>Subgrade Mod (E):</b>	18.25	<b>MN/m2</b>
<b>Penetration Comment:</b>	1.25mm achieved at given pressure			



<b>Certificate:</b>	4322D/TP CLR004	<b>End Remark:</b>	Tested in accordance with specification
<b>Calculated:</b>	KW	<b>Moisture Content:</b>	17.00 %
<b>Approved:</b>	N. Vater	<b>Test Certificate:</b>	1 of 1
<b>Signed:</b>	15/09/2021	<b>CBR Reference:</b>	Interim Advice Note 73/06 (2009)



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

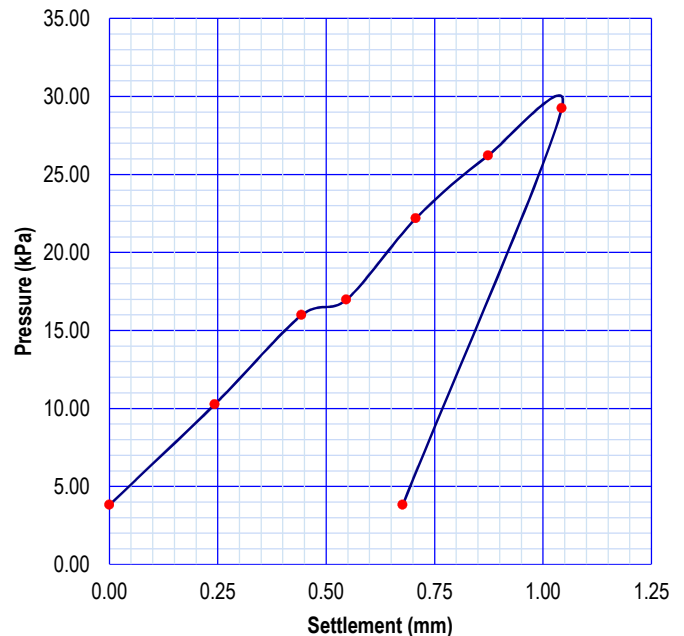
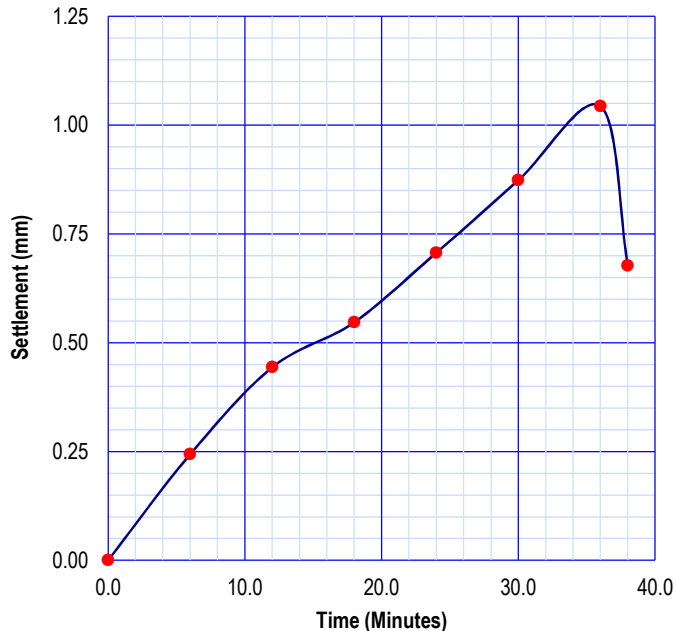
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	A66 North Trans Pennine Scheme D Section 8		
<b>Client:</b>	AMEY	<b>Project No.:</b>	4322D
<b>Test Position:</b>	TP CLR006	<b>Depth (mBGL):</b>	0.45
<b>Date of Test:</b>	15/20/21	<b>Plate Diameter (mm):</b>	453
<b>Reaction Load:</b>	JCB 3CX (8T)	<b>Sample:</b>	Yes
<b>Weather:</b>	Overcast	<b>Equipment Mass (Kg):</b>	62.62
<b>Test Type:</b>	Incremental - Equivalent CBR	<b>Equipment Force (kN):</b>	0.614
<b>Material Type:</b>	Soft slightly sandy slightly gravelly CLAY		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.81 kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.81	0.00	0.000
1	6.0	1.04	10.26	0.24	0.024
2	12.0	1.96	15.97	0.44	0.028
3	18.0	2.12	16.96	0.55	0.032
4	24.0	2.96	22.18	0.71	0.032
5	30.0	3.61	26.21	0.87	0.033
6	36.0	4.10	29.25	1.04	0.036
7	38.0	0.00	3.81	0.68	0.178

<b>Plate Penetration (mm):</b>	1.05	<b>k762:</b>	17308.2	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b>	29.00	<b>Equivalent CBR:</b>	1.35	<b>%</b>
<b>Plate Factor:</b>	0.6267	<b>Subgrade Mod (E):</b>	21.32	<b>MN/m2</b>
<b>Penetration Comment:</b>	1.25mm not achieved at given pressure			



<b>Certificate:</b>	4322D/TP CLR006	<b>End Remark:</b>	Tested in accordance with specification
<b>Calculated:</b>	KW	<b>Moisture Content:</b>	22.00 %
<b>Approved:</b>	N. Vater	<b>Test Certificate:</b>	1 of 1
<b>Signed:</b>	15/09/2021	<b>CBR Reference:</b>	Interim Advice Note 73/06 (2009)

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

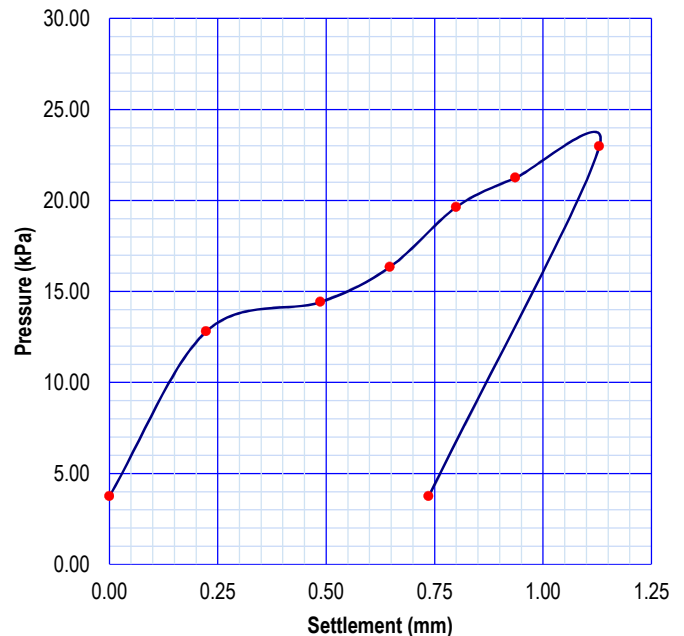
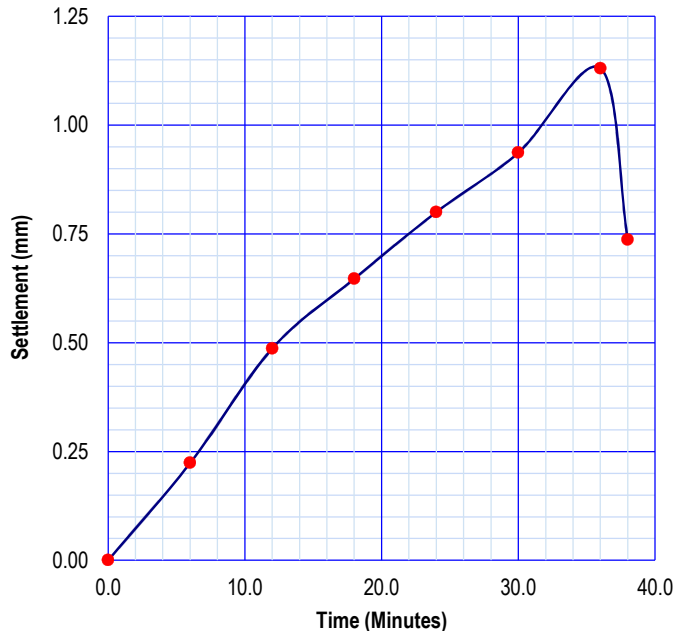
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	A66 North Trans Pennine Scheme D Section 8		
<b>Client:</b>	AMEY		<b>Project No.:</b> 4322D
<b>Test Position:</b>	TP CLR008	<b>Depth (mBGL):</b> 0.50	<b>Operator:</b> JM
<b>Date of Test:</b>	16/02/2021	<b>Plate Diameter (mm):</b> 453	<b>Plate Area (m<sup>2</sup>):</b> 0.16117
<b>Reaction Load:</b>	JCB 3CX (8T)		<b>Sample:</b> Yes
<b>Weather:</b>	Light rain		<b>Equipment Mass (Kg):</b> 61.47
<b>Test Type:</b>	Incremental - Equivalent CBR		<b>Equipment Force (kN):</b> 0.603
<b>Material Type:</b>	Soft slightly sandy slightly gravelly CLAY		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.74 kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.74	0.00	0.000
1	6.0	1.46	12.80	0.22	0.017
2	12.0	1.72	14.41	0.49	0.034
3	18.0	2.03	16.34	0.65	0.040
4	24.0	2.56	19.62	0.80	0.041
5	30.0	2.82	21.24	0.94	0.044
6	36.0	3.10	22.97	1.13	0.049
7	38.0	0.00	3.74	0.74	0.197

<b>Plate Penetration (mm):</b> 1.13	<b>k762:</b> 14419.1	<b>kN/m<sup>2</sup>/m</b>
<b>Plate Load @1.25mm (kPa):</b> 26.00	<b>Equivalent CBR:</b> 0.98	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 17.41	<b>MN/m<sup>2</sup></b>
<b>Penetration Comment:</b> 1.25mm not achieved at given pressure		



<b>Certificate:</b> 4322D/TP CLR008	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 20.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 15/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

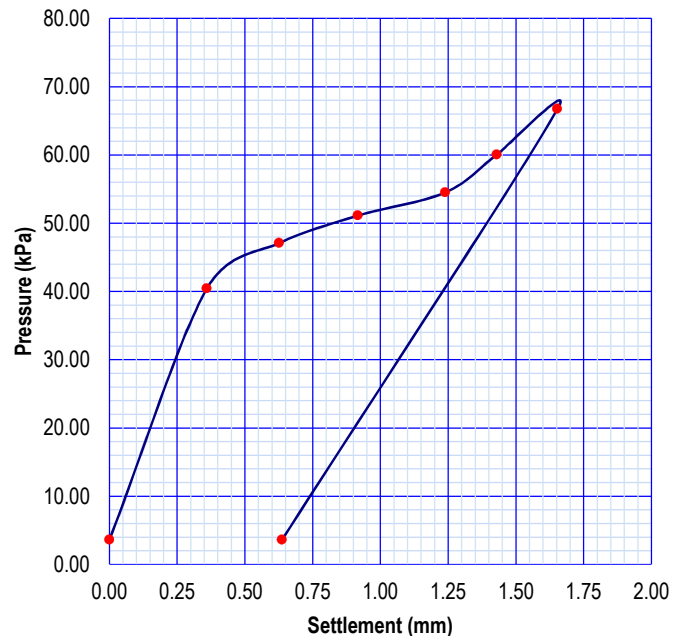
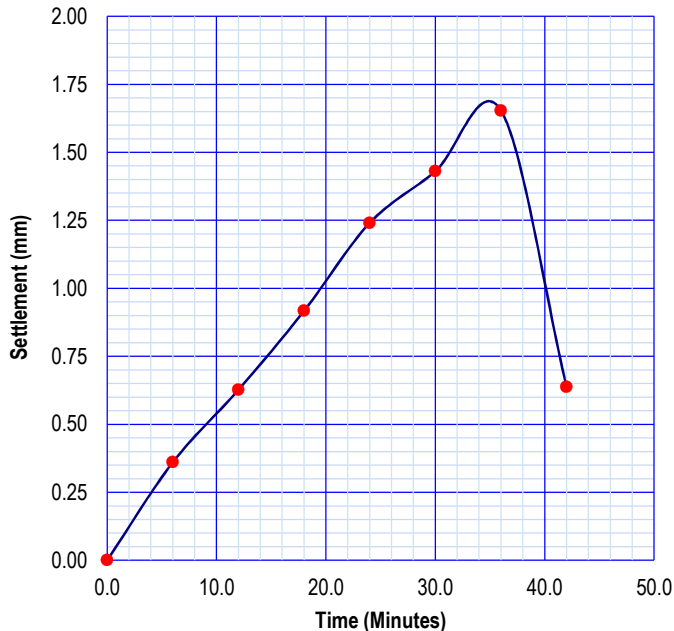
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b> A66 North Trans Pennine Scheme D Section 8	
<b>Client:</b> AMEY	<b>Project No.:</b> 4322D
<b>Test Position:</b> TP CLR010	<b>Depth (mBGL):</b> 0.40
<b>Date of Test:</b> 10/03/2021	<b>Operator:</b> JM
<b>Reaction Load:</b> JCB 3CX (8T)	<b>Plate Area (m<sup>2</sup>):</b> 0.16117
<b>Weather:</b> Light showers	<b>Sample:</b> Yes
<b>Test Type:</b> Incremental - Equivalent CBR	<b>Equipment Mass (Kg):</b> 58.66
<b>Material Type:</b> Soft very sandy very gravelly CLAY	<b>Equipment Force (kN):</b> 0.575
<b>Remarks:</b> Self weight of the equipment calculated at 3.57 kPa (i.e. plate, extension rod, jack piston and load cell).	

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.57	0.00	0.000
1	6.0	5.94	40.42	0.36	0.009
2	12.0	7.01	47.06	0.63	0.013
3	18.0	7.66	51.10	0.92	0.018
4	24.0	8.21	54.51	1.24	0.023
5	30.0	9.10	60.03	1.43	0.024
6	36.0	10.18	66.73	1.65	0.025
7	42.0	0.00	3.57	0.64	0.178

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 27072.4	<b>kN/m<sup>2</sup>/m</b>
<b>Plate Load @1.25mm (kPa):</b> 54.00	<b>Equivalent CBR:</b> 2.93	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 35.02	<b>MN/m<sup>2</sup></b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322D/TP CLR010	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 23.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 15/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

## In-Situ Plate Load Test

BS 1377 : Part 9 : 1990

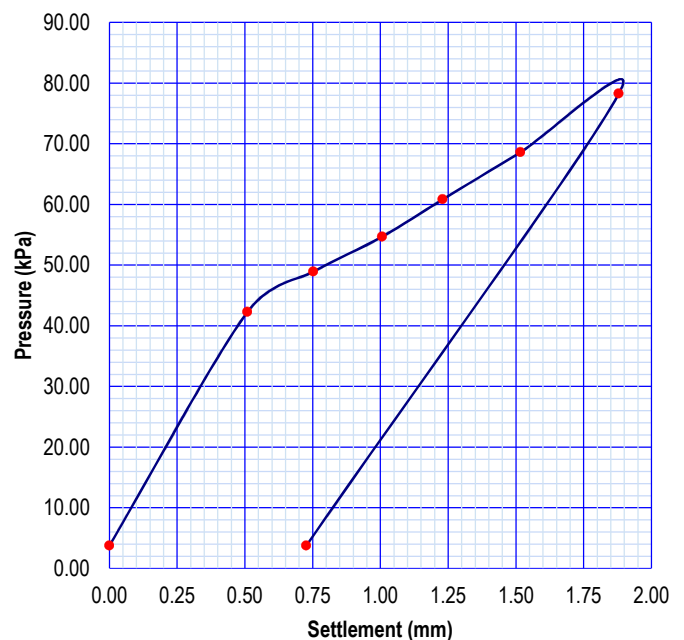
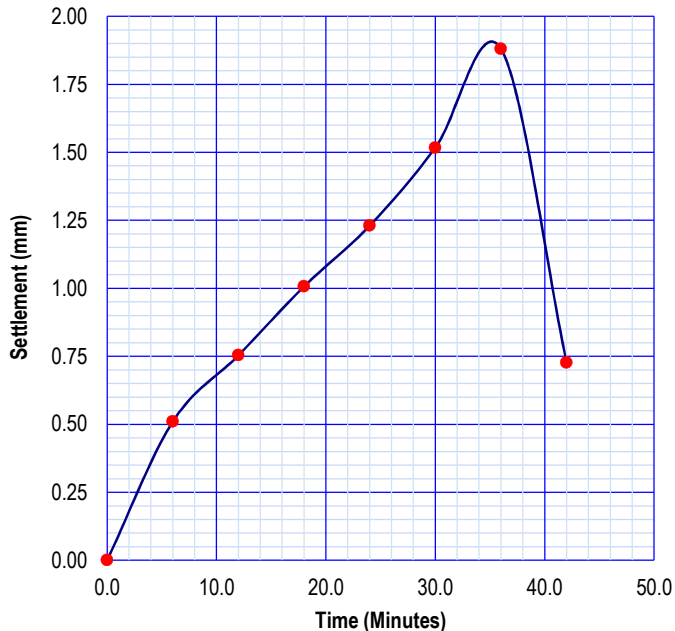
Unit 25 Stella Gill Industrial Estate Pelton Fell Chester-le-Street County Durham DH2 2RG.

Tel: 01913874700 Fax: 01913874710 email: enquiries@aeg.uk.net

<b>Project Title:</b>	A66 North Trans Pennine Scheme D Section 8		
<b>Client:</b>	AMEY		<b>Project No.:</b> 4322D
<b>Test Position:</b>	TP CLR012	<b>Depth (mBGL):</b> 0.45	<b>Operator:</b> JM
<b>Date of Test:</b>	11/02/2021	<b>Plate Diameter (mm):</b> 453	<b>Plate Area (m2):</b> 0.16117
<b>Reaction Load:</b>	JCB 3CX (8T)		<b>Sample:</b> Yes
<b>Weather:</b>	Overcast		<b>Equipment Mass (Kg):</b> 61.47
<b>Test Type:</b>	Incremental - Equivalent CBR		<b>Equipment Force (kN):</b> 0.603
<b>Material Type:</b>	Firm sandy slightly gravelly CLAY		
<b>Remarks:</b>	Self weight of the equipment calculated at 3.74 kPa (i.e. plate, extension rod, jack piston and load cell).		

Load Stage	Time	Force	Pressure	Av. Penetration	Av. Pene
	Minutes	kN	kPa	(mm)	mm/kPa
0	0.0	0.00	3.74	0.00	0.000
1	6.0	6.21	42.27	0.51	0.012
2	12.0	7.28	48.91	0.75	0.015
3	18.0	8.21	54.68	1.01	0.018
4	24.0	9.20	60.82	1.23	0.020
5	30.0	10.45	68.58	1.52	0.022
6	36.0	12.01	78.26	1.88	0.024
7	42.0	0.00	3.74	0.73	0.194

<b>Plate Penetration (mm):</b> 1.25	<b>k762:</b> 31083.2	<b>kN/m2/m</b>
<b>Plate Load @1.25mm (kPa):</b> 62.00	<b>Equivalent CBR:</b> 3.72	<b>%</b>
<b>Plate Factor:</b> 0.6267	<b>Subgrade Mod (E):</b> 40.82	<b>MN/m2</b>
<b>Penetration Comment:</b> 1.25mm achieved at given pressure		



<b>Certificate:</b> 4322D/TP CLR012	<b>End Remark:</b> Tested in accordance with specification
<b>Calculated:</b> KW	<b>Moisture Content:</b> 23.00 %
<b>Approved:</b> N. Vater	<b>Test Certificate:</b> 1 of 1
<b>Signed:</b> 15/09/2021	<b>CBR Reference:</b> Interim Advice Note 73/06 (2009)

## Laboratory Report Certificate



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 3874700 Fax: 0191 3874710  
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01722 735 300 Fax: 01722 735 999



## LABORATORY REPORT CERTIFICATE



**Contract Title:** A66 North Trans Pennine Scheme D  
Section 8

**AEG Reference:** 4322D

**Client Address:** AMEY OW Limited  
Chancery Exchange  
10 Furnival Street  
London  
EC4A 1AB

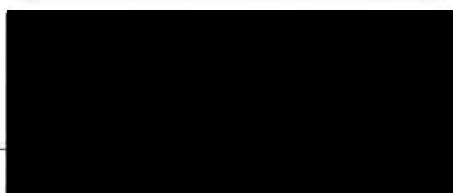
We certify that Laboratory testing was carried out on samples from the above contract in accordance with techniques outlined in BS 1377: 1990, BS EN ISO 17892:2014 or other appropriate standards as quoted. The samples were received from January 2021 and the following results, given on the attached enclosures, were obtained.

The tests carried out are indicated in the attached table showing the enclosure number and the total number of pages.

For and on behalf of Allied Exploration & Geotechnics Limited

- Nick Vater (Managing Director)
- Kevin Warriner (HSE & Quality Director)
- Michelle Selkirk (Laboratory Manager)

Signed



Date: 28 April 2021

Tests marked not UKAS accredited in this certificate are not included in the UKAS accreditation schedule for our laboratory. Any opinions and interpretations expressed herein are outside the scope of the laboratory's UKAS accreditation.

Please note the material was derived from samples taken outside the control of the laboratory.



# LABORATORY REPORT CERTIFICATE

## ENCLOSURES

Enclosure Number	Description	UKAS Accredited	Reference	No. of Pages
0	Laboratory Report Certificate	N/A		3
1	Sample Description Sheets	N/A		5
2	Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	2
2	Plasticity Index and Moisture Content	Yes	BS 1377 Part 2 1990 (BS EN ISO 17892-1:2014)	4
3	Determination of Particle Density	Yes	BS 1377 Part 2 1990	1
4	Particle Size Distribution Sieving	Yes	BS 1377 Part 2 1990	28
4	Particle Size Distribution Sedimentation	No	BS 1377 Part 2 1990	28
5	Determination of Chloride, Total Sulphur, Sulphate and pH (Tested externally)	No	See DETS certificates	5
6	Determination of Dry Density/Moisture Content Relationship	Yes	BS 1377 Part 4 1990	8
7	Determination of MCV / Moisture Relationship	Yes	BS 1377 Part 4 1990	17
8	Determination of California Bearing Ratio	Yes	BS 1377 Part 4 1990	9
9	Determination of One Dimensional Consolidation Properties	Yes	BS 1377 Part 5 1990	2
10	Shear Strength by Hand Vane	No		1
11	Undrained Shear Strength in Triaxial Cell without Pore Water Pressure Measurement	Yes	BS 1377 Part 7 1990	1
12	Moisture Content of Rock	Yes	ISRM 1981	1
13	Determination of Point Load Index	Yes	ISRM 1985	3
14	Determination of Unconfined Compressive Strength (Tested externally)	No	See subcontract lab certs	3

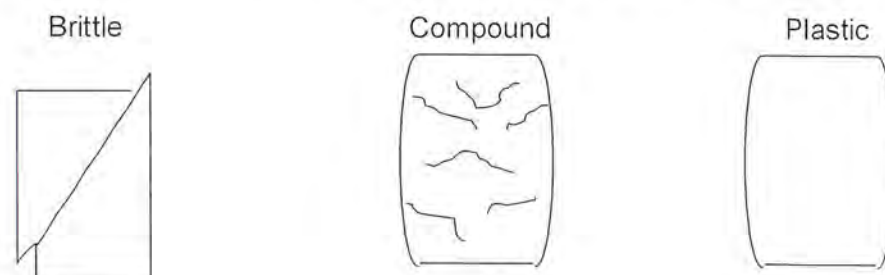
# LABORATORY REPORT CERTIFICATE

## ABBREVIATIONS

All the abbreviations used on the laboratory certificates are given below:

<b>Br</b>	Brittle	<b>PSD</b>	Particle Size Distribution by sieve analysis
<b>C</b>	Compound	<b>SB</b>	Shear Box
<b>CBR</b>	California Bearing Ratio	<b>SED</b>	Sedimentation Analysis
<b>CDT</b>	Consolidated Drained Triaxial	<b>SO4</b>	Sulphate (total, water extract, groundwater)
<b>CL</b>	Chloride content (water or soil)	<b>CP2</b>	Dry Density/Moisture Content 2.5kg rammer
<b>US</b>	Unsuitable sample for test	<b>CP4</b>	As above using 4.5kg rammer
<b>UUT</b>	Undrained Unconsolidated Triaxial	<b>CPV</b>	As above using vibrating hammer
<b>HSV</b>	Vane Test	<b>CUT</b>	Consolidated Undrained Triaxial
<b>IS</b>	Insufficient sample for test	<b>R</b>	Remoulded
<b>LOI</b>	Loss On Ignition	<b>U</b>	Undisturbed
<b>M</b>	Multi-stage testing	<b>MC</b>	Moisture Content
<b>MCV</b>	Moisture Content Value	<b>PL</b>	Point Load
<b>NAT</b>	Natural preparation method	<b>NMC</b>	Natural (or as received) moisture content
<b>P</b>	Plastic	<b>PFH</b>	Permeability Falling Head Method
<b>OED</b>	Oedometer	<b>PTXL</b>	Permeability in Triaxial Cell
<b>OMC</b>	Optimum Moisture Content	<b>ORG</b>	Organic content
<b>B</b>	Large disturbed (bulk) sample	<b>PD</b>	Particle Density (SG)
<b>J</b>	Small disturbed (jar) sample	<b>PI</b>	Liquid limit, plastic limit and plasticity index

### Typical Mode of Failure for Triaxial Testing



## Sample Description Sheets






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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH CLR001	0.40	B2	Brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH CLR001	0.70	J3	Brown sandy slightly gravelly CLAY.	MC PSD SED
BH CLR001	1.50	U5	Brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI US for MUUT and OED
BH CLR001	2.00	J6	Brown slightly sandy gravelly CLAY.	MC
BH CLR003	0.70	B6	Brown slightly sandy slightly gravelly CLAY.	PSD SED
BH CLR003	0.80	J7	Brown slightly sandy slightly gravelly CLAY.	MC
BH CLR003	1.20	U9	High strength brown sandy gravelly CLAY of low plasticity.	MC PI MUUT OED
BH CLR003	2.00	J11	Brown clayey slightly sandy GRAVEL.	BRE
BH CLR003	2.80	J13	Dark grey slightly sandy gravelly CLAY.	BRE
BH CLR003	3.50	J15	Grey slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
BH CLR003	5.10	J17	Light brown SILT.	BRE
BH CLR003	7.70	J23	Brown slightly sandy CLAY.	MC
BH CLR003	8.20	J24	Dark brown sandy CLAY.	BRE
BH CLR003	10.00	U27	Very high strength brown sandy gravelly CLAY of low plasticity.	MC PI HSV MUUT
BH CLR004	0.40	B2	Brown clayey very gravelly SAND.	PSD SED
BH CLR004	0.70	J3	Brown sandy gravelly CLAY of low plasticity/very clayey sandy GRAVEL.	MC PI
BH CLR004	3.10	J10	Grey sandy gravelly CLAY of low plasticity.	MC PI
BH CLR010	0.05	J1	Brown slightly sandy CLAY.	MC
BH CLR010	0.05	B2	Brown sandy slightly gravelly CLAY.	PSD SED
BH CLR010	0.35	J4	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH CLR010	0.60	J6	Brown sandy slightly gravelly CLAY of intermediate plasticity.	MC PI

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH CLR010	1.20	U8	Low strength brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI HSV MUUT
BH CLR011	0.40	B2	Brown sandy gravelly CLAY with a medium cobble content.	PSD SED
BH CLR011	0.70	J3	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
BH CLR011	2.50	J8	Brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
TP CLR001	0.30	J2	Brown sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
TP CLR001	0.50	B5	Brown very clayey gravelly SAND.	PSD SED
TP CLR001	0.80	J6	Brown slightly sandy gravelly CLAY.	MC
TP CLR002	0.10	J1	Brown slightly sandy CLAY with occasional rootlets.	MC
TP CLR002	0.50	B4	Brown sandy slightly gravelly CLAY.	PSD SED PD CP4 CBR MCV
TP CLR002	0.80	J5	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
TP CLR002A	0.40	J2	Light brown with orange mottling sandy CLAY of intermediate plasticity.	MC PI
TP CLR002A	0.80	B5	Brown slightly sandy slightly gravelly CLAY.	PSD SED PD CBR US for CP4 and MCV
TP CLR002A	1.20	J6	Light brown grey slightly sandy slightly gravelly CLAY.	MC
TP CLR003	0.10	J1	Light brown slightly sandy slightly gravelly CLAY.	MC
TP CLR003	0.50	J4	Light brown with orange and grey mottling slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
TP CLR004	0.10	J1	Brown slightly sandy slightly gravelly CLAY with occasional rootlets.	MC
TP CLR004	0.50	B4	Brown sandy slightly gravelly CLAY.	PSD SED CBR
TP CLR004	1.00	J5	Grey sandy gravelly CLAY of low plasticity.	MC PI
TP CLR004	1.40	B7	Brown slightly sandy gravelly CLAY.	PSD SED PD CP4 MCV
TP CLR005	0.40	B3	Brown very clayey SAND and GRAVEL.	PSD SED
TP CLR005	1.00	B6	Light brown with orange and grey mottling slightly sandy gravelly CLAY.	PD CP4 MCV

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m) ID	Description	Laboratory Tests/Remarks
TP CLR005	1.50 J8	Brown slightly sandy gravelly CLAY.	MC
TP CLR005	2.00 B9	Brown slightly sandy slightly gravelly CLAY with a low cobble content.	CBR
TP CLR005	2.50 J11	Grey sandy gravelly CLAY of low plasticity.	MC PI
TP CLR005	3.00 B12	Grey slightly sandy gravelly CLAY.	PSD SED
TP CLR006	0.30 J2	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI PSD SED
TP CLR006	0.80 J5	Brown slightly sandy gravelly CLAY of intermediate plasticity.	MC PI
TP CLR006	2.80 J11	Brown gravelly SAND with clay pockets.	MC
TP CLR007	0.50 J4	Brown sandy gravelly CLAY of low to intermediate plasticity.	MC PI
TP CLR007	0.80 B5	Brown with grey mottling slightly sandy slightly gravelly CLAY.	PSD SED PD CP4 MCV
TP CLR007	1.50 J7	Brown slightly sandy slightly gravelly CLAY.	MC
TP CLR007	1.80 B8	Brown slightly sandy gravelly CLAY.	PSD SED CBR
TP CLR008	0.10 J1	Brown sandy CLAY with rootlets.	MC
TP CLR008	0.60 J5	Brown sandy gravelly CLAY of low plasticity.	MC PI
TP CLR008	1.00 B6	Brown slightly sandy slightly gravelly CLAY.	PSD SED CBR
TP CLR008	1.50 B9	Brown slightly sandy gravelly CLAY.	PD CP4 MCV
TP CLR008	2.00 B11	Brown slightly sandy slightly gravelly CLAY.	PSD SED
TP CLR009	0.40 B4	Brown sandy slightly gravelly CLAY.	CBR
TP CLR009	0.90 J5	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
TP CLR009	1.00 B6	Brown slightly sandy slightly gravelly CLAY.	PSD SED PD CP4 MCV
TP CLR009A	1.90 J1	Brown sandy gravelly CLAY of low plasticity.	MC PI
TP CLR009A	3.40 B5	Brown very clayey SAND and GRAVEL with a low cobble content.	PSD SED

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
TP CLR010	0.50	J3	Light brown with orange and grey mottling sandy CLAY.	MC
TP CLR010	1.50	J6	Light brown sandy gravelly CLAY of low plasticity.	MC PI
TP CLR010	3.00	B10	Brown clayey sandy slightly gravelly SILT.	PSD SED
TP CLR011	0.10	J1	Light brown sandy CLAY with occasional rootlets.	MC
TP CLR011	2.60	J9	Dark grey sandy gravelly CLAY of low plasticity.	MC PI
TP CLR011	3.00	B10	Dark grey slightly sandy slightly gravelly CLAY.	PSD SED
TP CLR012	0.40	J2	Brown sandy gravelly CLAY of low to intermediate plasticity.	MC PI
TP CLR012	1.50	B7	Brown slightly sandy slightly gravelly CLAY.	PSD SED
TP CLR012	2.00	J8	Brown slightly sandy gravelly CLAY.	MC
TP CLR013	0.50	J3	Light brown with orange mottling sandy gravelly CLAY.	MC
TP CLR013	1.00	B4	Light brown with orange and grey mottling slightly sandy slightly gravelly CLAY.	PSD SED PD CP4 MCV
TP CLR013	1.50	J6	Light brown sandy gravelly CLAY of low plasticity.	MC PI
TP CLR013	3.50	J11	Dark grey sandy gravelly CLAY of low plasticity.	MC PI
TP CLR013	4.00	B12	Dark grey slightly sandy slightly gravelly CLAY.	PSD SED
TP CLR015	0.20	J1	Brown slightly sandy slightly gravelly CLAY.	MC
TP CLR015	0.50	B4	Brown very clayey very sandy GRAVEL with a high cobble content.	PSD SED
TP CLR015	1.00	J5	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
TP CLR015	1.50	J8	Light brown sandy gravelly CLAY.	BRE
TP CLR015	3.50	J13	Grey slightly sandy gravelly CLAY.	BRE
TP CLR020	0.30	J2	Brown sandy slightly gravelly CLAY with rootlets.	MC
TP CLR020	0.45	J3	Brown sandy gravelly CLAY of low plasticity.	MC PI

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## LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
TP CLR020	2.00	B7	Brown slightly sandy slightly gravelly CLAY.	PSD SED PD CPV CBR MCV
TP CLR020	3.00	B9	Brown very clayey very gravelly SAND.	PSD SED
TP CLR023	0.40	B4	Brown very clayey very sandy GRAVEL.	PSD SED CBR
TP CLR023	0.60	J5	Brown slightly sandy slightly gravelly CLAY of low plasticity.	MC PI
TP CLR023	0.80	B6	Light brown sandy slightly gravelly CLAY.	CP4 MCV
TP CLR023	2.50	J10	Brown slightly sandy slightly gravelly CLAY.	MC
WS CLR001	1.20	J5	Brown sandy gravelly CLAY.	MC PI(IS for LL)
WS CLR003	0.20	J2	Brown slightly sandy slightly gravelly CLAY/SILT of intermediate plasticity with occasional rootlets.	MC PI
WS CLR003	2.20	J8	Dark grey slightly sandy gravelly CLAY.	BRE
WS CLR005	1.20	J5	Light brown with orange mottling sandy gravelly CLAY.	BRE
WS CLR005	1.20	J8	Brown slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI
WS CLR005	2.20	J7	Light brown slightly sandy gravelly CLAY.	BRE

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## Moisture Content/Plasticity Index and Moisture Content





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## MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH CLR001	0.70	J3	0.70	25	25/03/2021	
BH CLR001	2.00	J6	2.00	7.3	25/03/2021	
BH CLR003	0.80	J7	0.80	21	25/03/2021	
BH CLR003	7.70	J23	7.70	23	25/03/2021	
BH CLR010	0.05	J1	0.05	42	25/03/2021	
TP CLR001	0.80	J6	0.80	18	25/03/2021	
TP CLR002	0.10	J1	0.10	45	25/03/2021	
TP CLR002A	1.20	J6	1.20	22	30/03/2021	
TP CLR003	0.10	J1	0.10	42	30/03/2021	
TP CLR004	0.10	J1	0.10	39	25/03/2021	
TP CLR005	1.50	J8	1.50	12	25/03/2021	
TP CLR006	2.80	J11	2.80	12	25/03/2021	
TP CLR007	1.50	J7	1.50	18	25/03/2021	
TP CLR008	0.10	J1	0.10	44	25/03/2021	
TP CLR010	0.50	J3	0.50	23	06/04/2021	
TP CLR011	0.10	J1	0.10	36	06/04/2021	
TP CLR012	2.00	J8	2.00	16	25/03/2021	
TP CLR013	0.50	J3	0.50	15	06/04/2021	
TP CLR015	0.20	J1	0.20	33	25/03/2021	
TP CLR020	0.30	J2	0.30	29	25/03/2021	

For description of sample please refer to the Laboratory Sample Description Sheet

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## MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
TP CLR023	2.50	J10	2.50	13	25/03/2021	

For description of sample please refer to the Laboratory Sample Description Sheet

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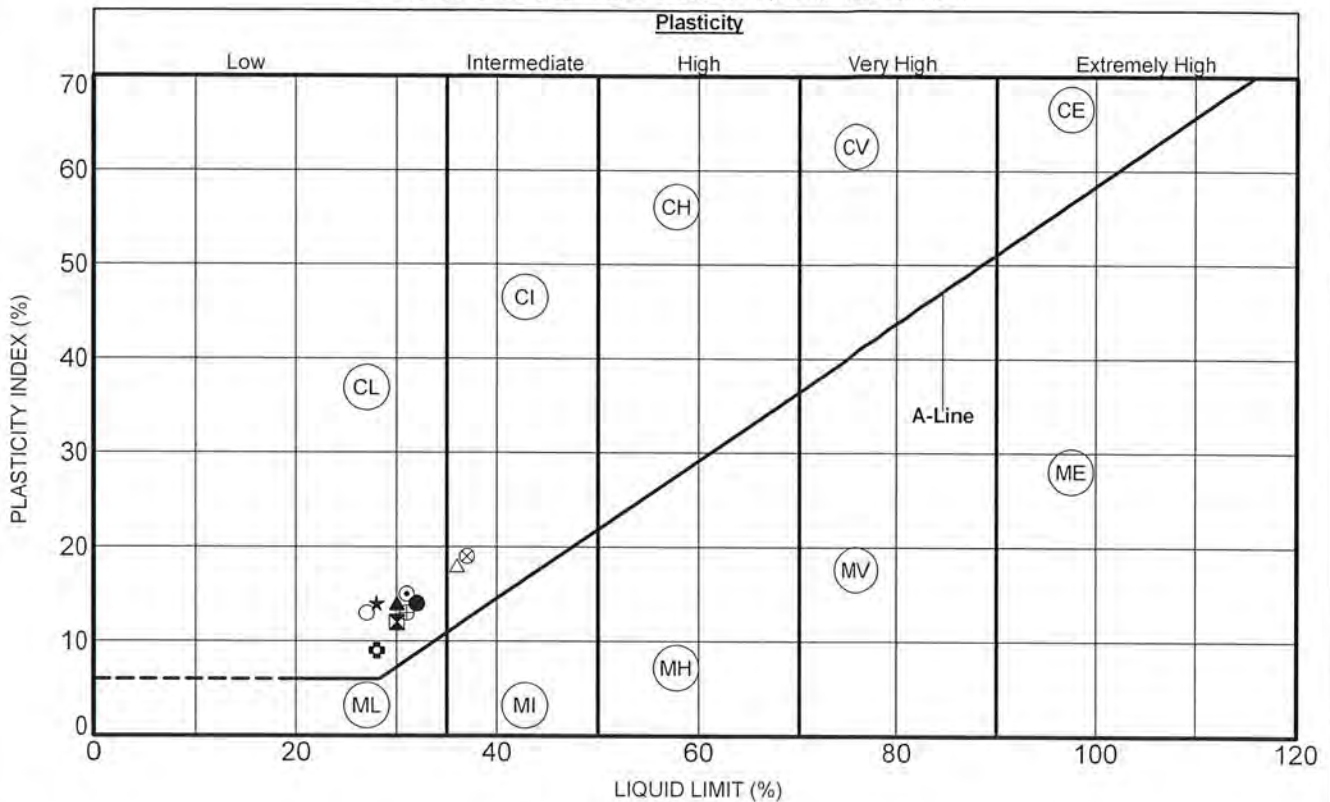
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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	IL	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●BH CLR001	0.40	B2	0.40	32	18	14	0.14	Natural		20	26/03/2021
☒BH CLR001	1.50	U5	1.50	30	18	12	-0.25	Natural		15	25/03/2021
▲BH CLR003	1.20	U9	1.20	30	16	14	-0.07	Natural		15	25/03/2021
★BH CLR003	3.50	J15	3.50	28	14	14	0.36	Natural		19	25/03/2021
⊙BH CLR003	10.00	U27	10.00	31	16	15	-0.20	Natural		13	25/03/2021
⊕BH CLR004	0.70	J3	0.70	28	19	9	0.78	Natural		26	25/03/2021
○BH CLR004	3.10	J10	3.10	27	14	13	0.23	Natural		17	25/03/2021
△BH CLR010	0.35	J4	0.35	36	18	18	0.28	Natural		23	25/03/2021
⊗BH CLR010	0.60	J6	0.60	37	18	19	0.21	Natural		22	25/03/2021
⊕BH CLR010	1.20	U8	1.20	31	18	13	0.15	Natural		20	25/03/2021

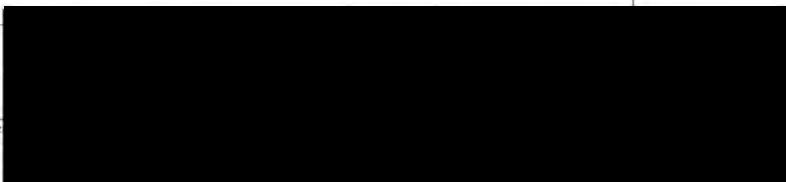
For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

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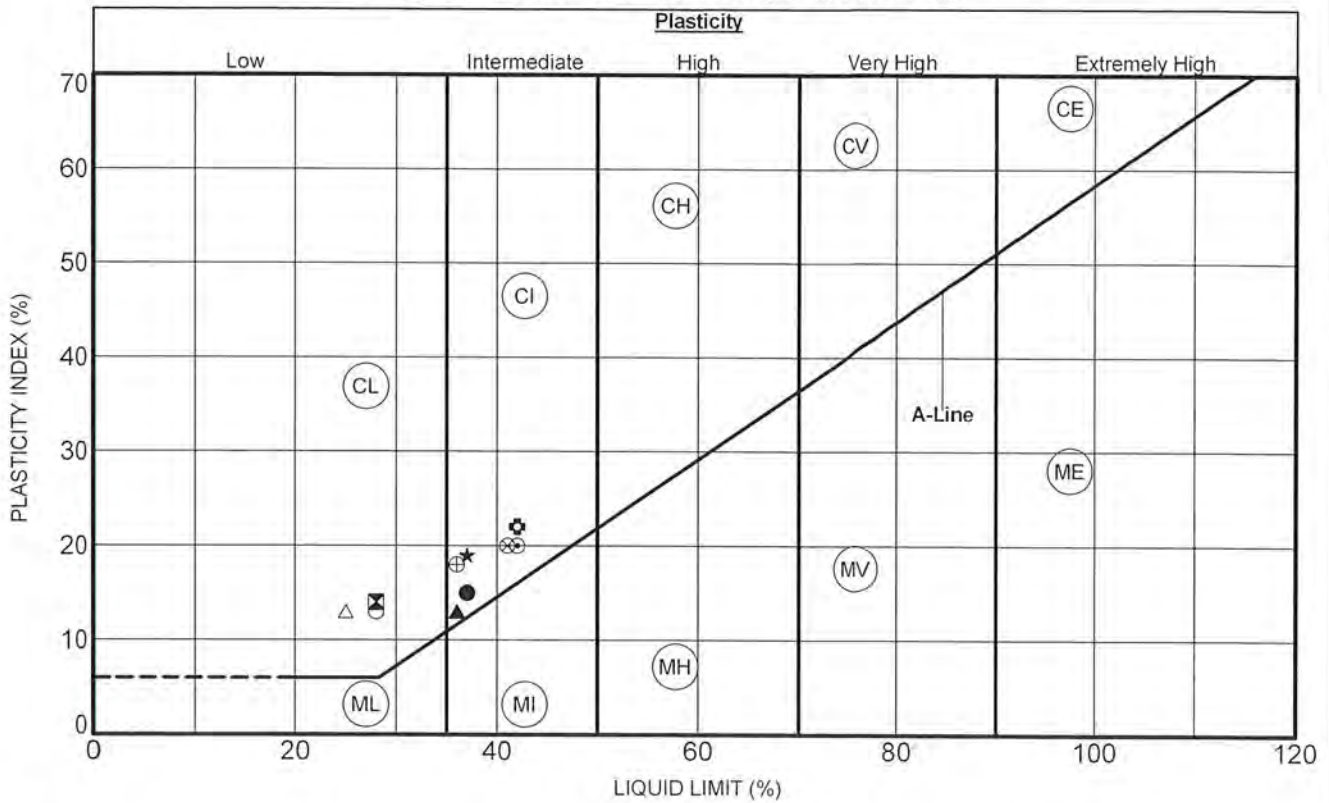


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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I <sub>L</sub>	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●BH CLR011	0.70	J3	0.70	37	22	15	0.00	Natural		22	25/03/2021
▣BH CLR011	2.50	J8	2.50	28	14	14	0.64	Natural		23	25/03/2021
▲TP CLR001	0.30	J2	0.30	36	23	13	-0.08	Natural		22	25/03/2021
★TP CLR002	0.80	J5	0.80	37	18	19	-0.11	Natural		16	25/03/2021
⊙TP CLR002A	0.40	J2	0.40	42	22	20	0.20	Natural		26	30/03/2021
⊕TP CLR003	0.50	J4	0.50	42	20	22	0.09	Natural		22	30/03/2021
○TP CLR004	1.00	J5	1.00	28	15	13	-0.08	Natural		14	25/03/2021
△TP CLR005	2.50	J11	2.50	25	12	13	-0.08	Natural		11	25/03/2021
⊗TP CLR006	0.30	J2	0.30	41	21	20	0.05	Natural	70.0	22	25/03/2021
⊕TP CLR006	0.80	J5	0.80	36	18	18	0.17	Natural		21	25/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

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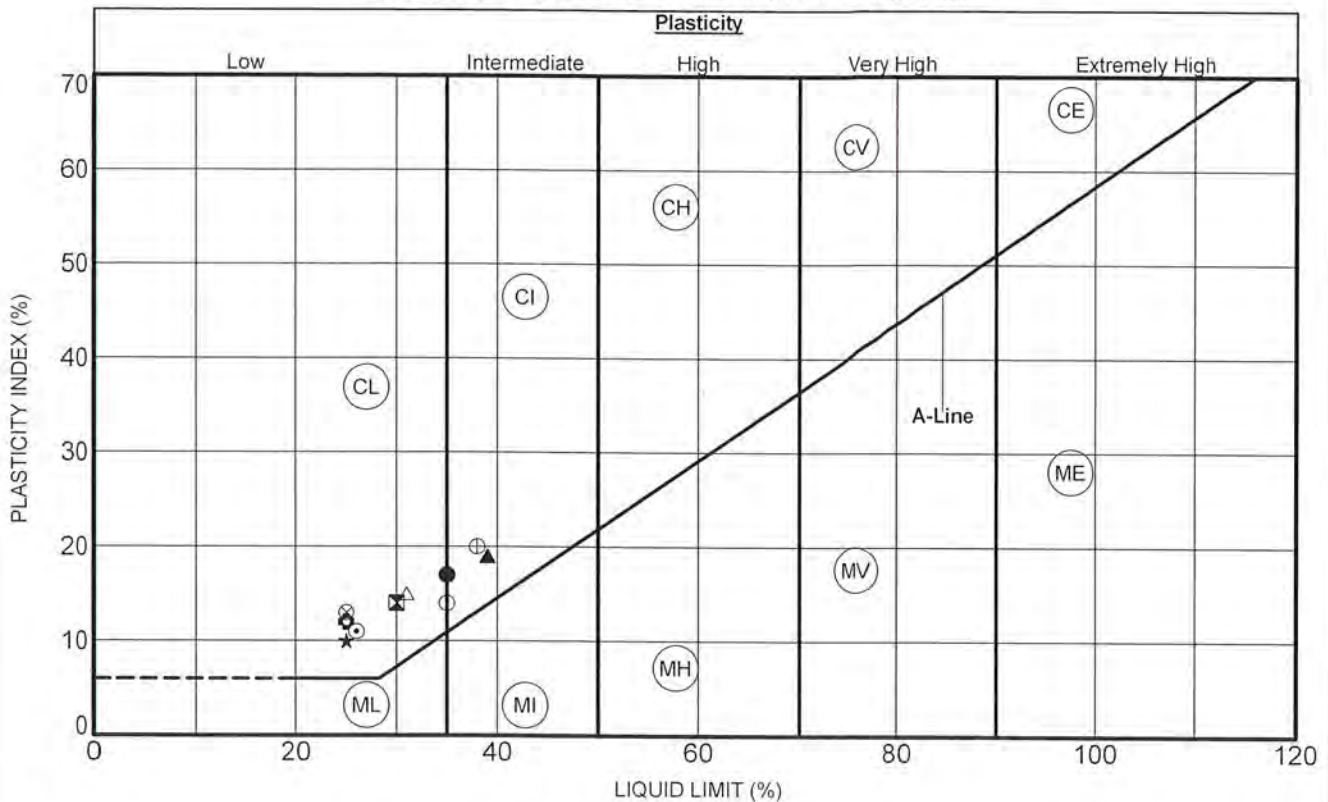


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## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I <sub>L</sub>	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
● TP CLR007	0.50	J4	0.50	35	18	17	0.24	Natural		22	25/03/2021
⊠ TP CLR008	0.60	J5	0.60	30	16	14	0.29	Natural		20	25/03/2021
▲ TP CLR009	0.90	J5	0.90	39	20	19	0.05	Natural		21	25/03/2021
★ TP CLR009A	1.90	J1	1.90	25	15	10	0.70	Natural		22	25/03/2021
⊙ TP CLR010	1.50	J6	1.50	26	15	11	-0.45	Natural		10	06/04/2021
⊕ TP CLR011	2.60	J9	2.60	25	13	12	0.42	Natural		18	06/04/2021
○ TP CLR012	0.40	J2	0.40	35	21	14	0.14	Natural		23	25/03/2021
△ TP CLR013	1.50	J6	1.50	31	16	15	0.13	Natural		18	06/04/2021
⊗ TP CLR013	3.50	J11	3.50	25	12	13	-0.08	Natural		11	06/04/2021
⊕ TP CLR015	1.00	J5	1.00	38	18	20	0.15	Natural		21	25/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Site

Date of Issue :-

27/04/2021

Certificate No. :-

PI/4322D/3

REG Contract No. :-

4322D

Page 3 of 4

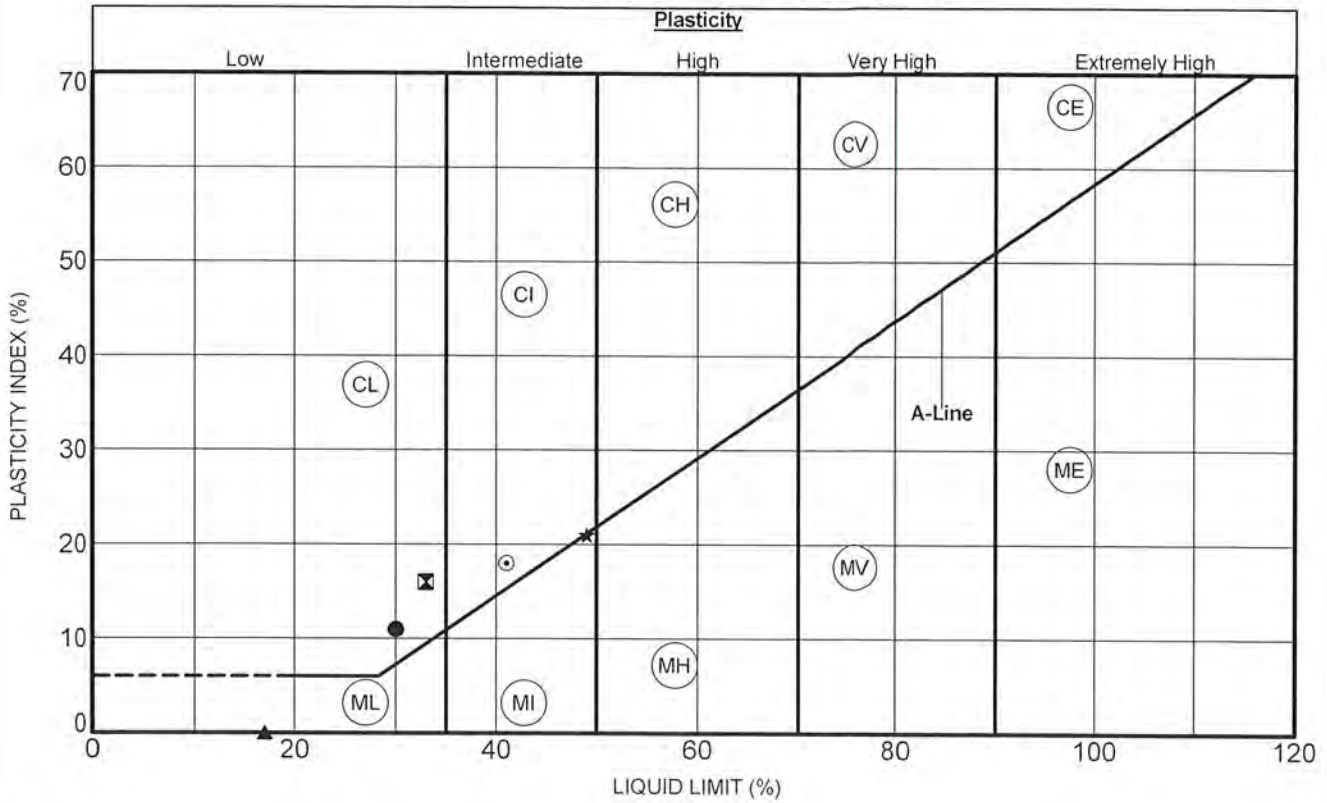


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999




## ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I <sub>L</sub>	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
● TP CLR020	0.45	J3	0.45	30	19	11	0.09	Natural		20	25/03/2021
✕ TP CLR023	0.60	J5	0.60	33	17	16	0.25	Natural	53.0	21	25/03/2021
▲ WS CLR001	1.20	J5	1.20		17			Natural		29	25/03/2021
★ WS CLR003	0.20	J2	0.20	49	28	21	0.05	Natural		29	25/03/2021
⊙ WS CLR005	1.20	J8	1.20	41	23	18	0.33	Natural		29	25/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI  
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :- A66 North Trans Pennine Scheme D Section 8		Client :- AMEY OW Limited	
	Signature		
	Date of Issue :- 28/04/2021		
			



## Determination of Particle Density

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## DETERMINATION OF PARTICLE DENSITY

BS1377 : Part 2 : Clause 8.2 : 1990

Exploratory Hole No.	Depth (m)	Sample Type & No.	Specific Depth (m)	Particle Density (Mg/m <sup>3</sup> )	Date Tested
TP CLR002	0.50	B4	0.50	2.66	14/04/2021
TP CLR002A	0.80	B5	0.80	2.68	12/03/2021
TP CLR004	1.40	B7	1.40	2.64	14/04/2021
TP CLR005	1.00	B6	1.00	2.66	14/04/2021
TP CLR007	0.80	B5	0.80	2.65	14/04/2021
TP CLR008	1.50	B9	1.50	2.66	14/04/2021
TP CLR009	1.00	B6	1.00	2.64	14/04/2021
TP CLR013	1.00	B4	1.00	2.66	14/04/2021
TP CLR020	2.00	B7	2.00	2.67	23/04/2021

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



28/04/2021

PD/4322D/1

Page 1 of 1

Contract No. :-  
4322D



## Particle Size Distribution Sieving and Sedimentation



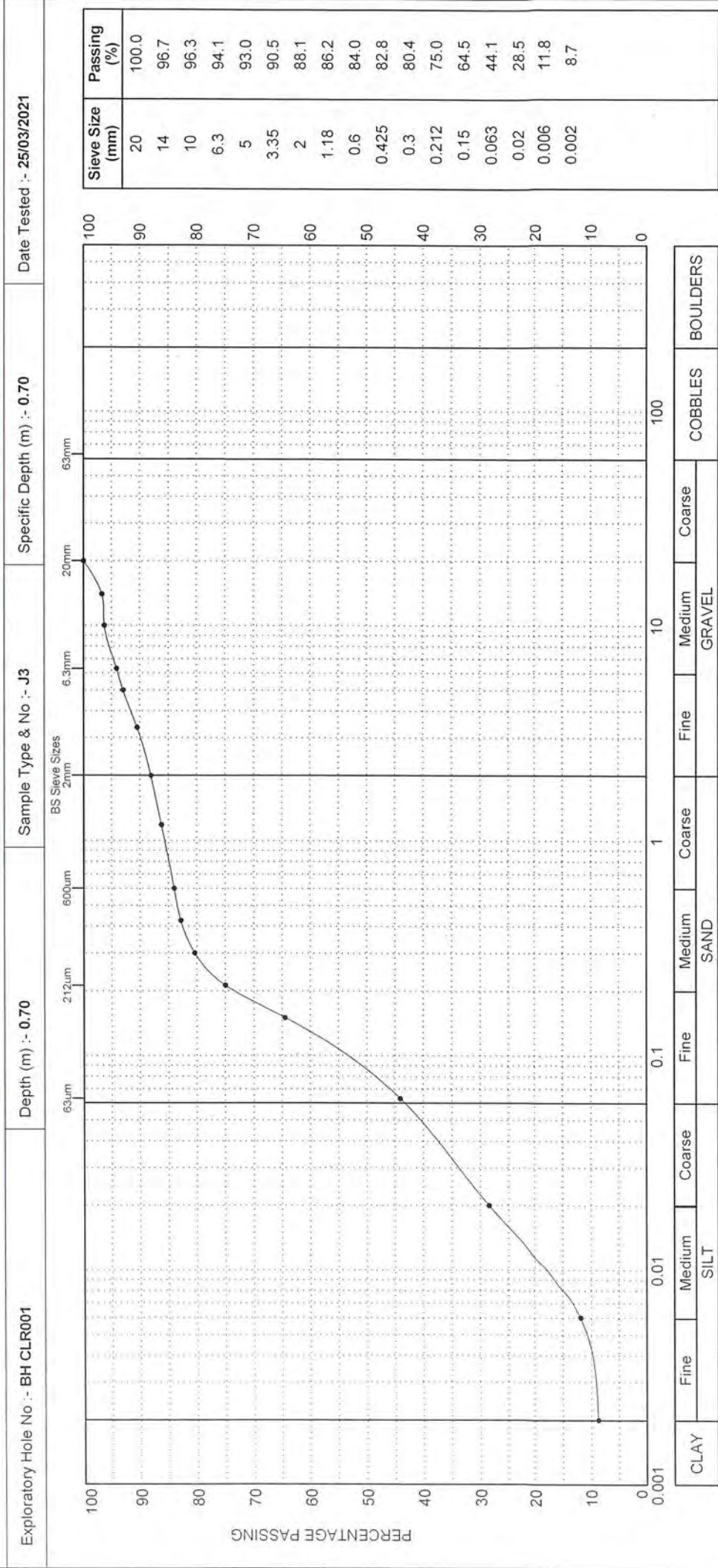


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stalls Hill Industrial Estate, Palfrey Farm, Chesetide Street, Co. Durham, DH2 2BG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Etnam Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



<p>Date of issue :- 27/04/2021</p> <p>Client :- AMEY OW Limited</p>	<p>Certificate No :- PSD/4322D/BH CLR001/J3/0.70</p> <p>Signed</p>	<p>For description of sample please refer to [REDACTED]</p>	<p>Page 1 of 1</p> <p>Contract No :- 4322D</p>
<p>A66 North Trans Pennine Scheme D Section 8</p>			<p>1367</p>

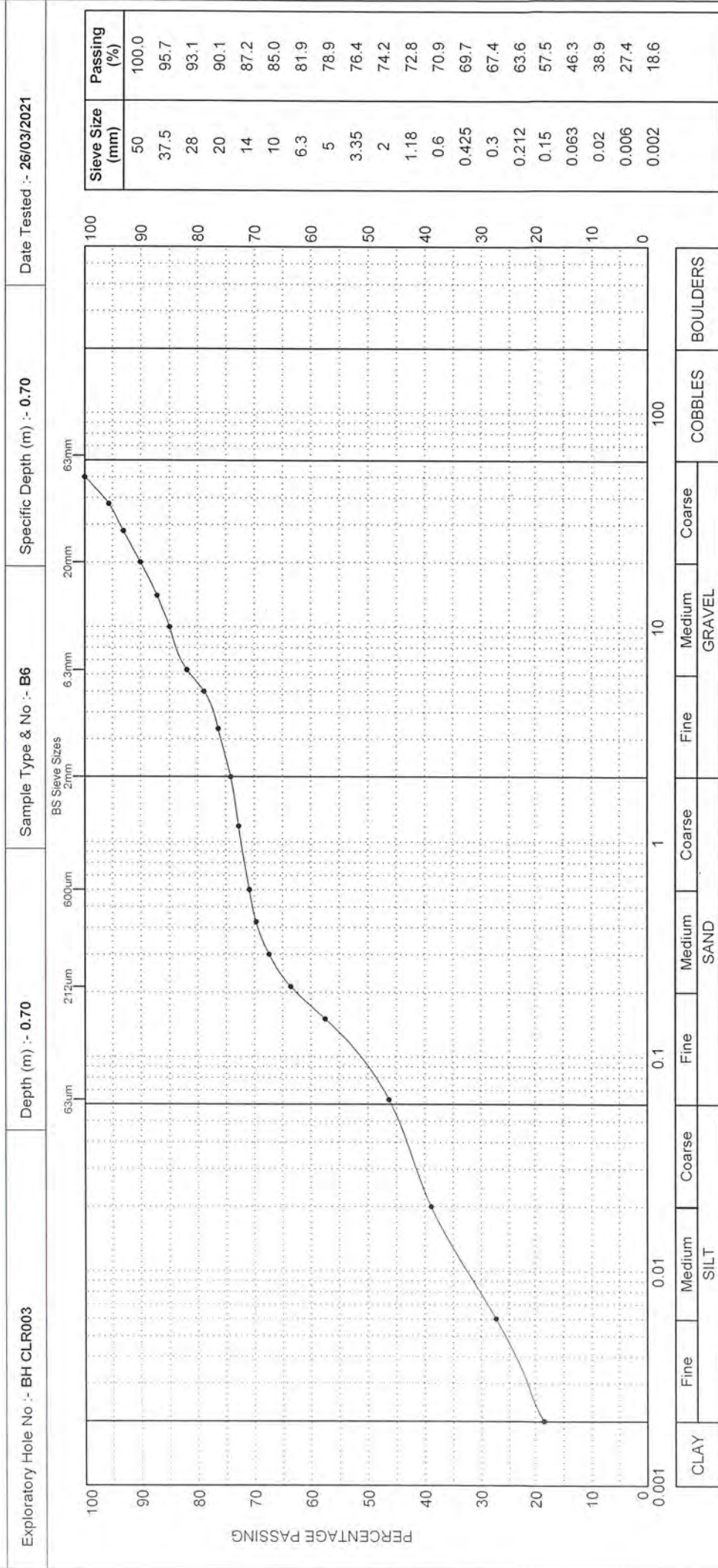


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Off Industrial Estate, Felton Fell, Chester-le-Street, Co. Durham, BH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 23, Business Development Centre, Eram Wharf, Blacoburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



**AMEG**

Date of issue :- 27/04/2021

Certificate No :- PSD/4322D/BH CLR003/B6/0.70

Client :- AMEY OW Limited

For description of sam

Contract Title :- [REDACTED]

Contract No :- 4322D

Page 1 of 1

EG Contract No :- 4322D

UKAS TESTING 1367

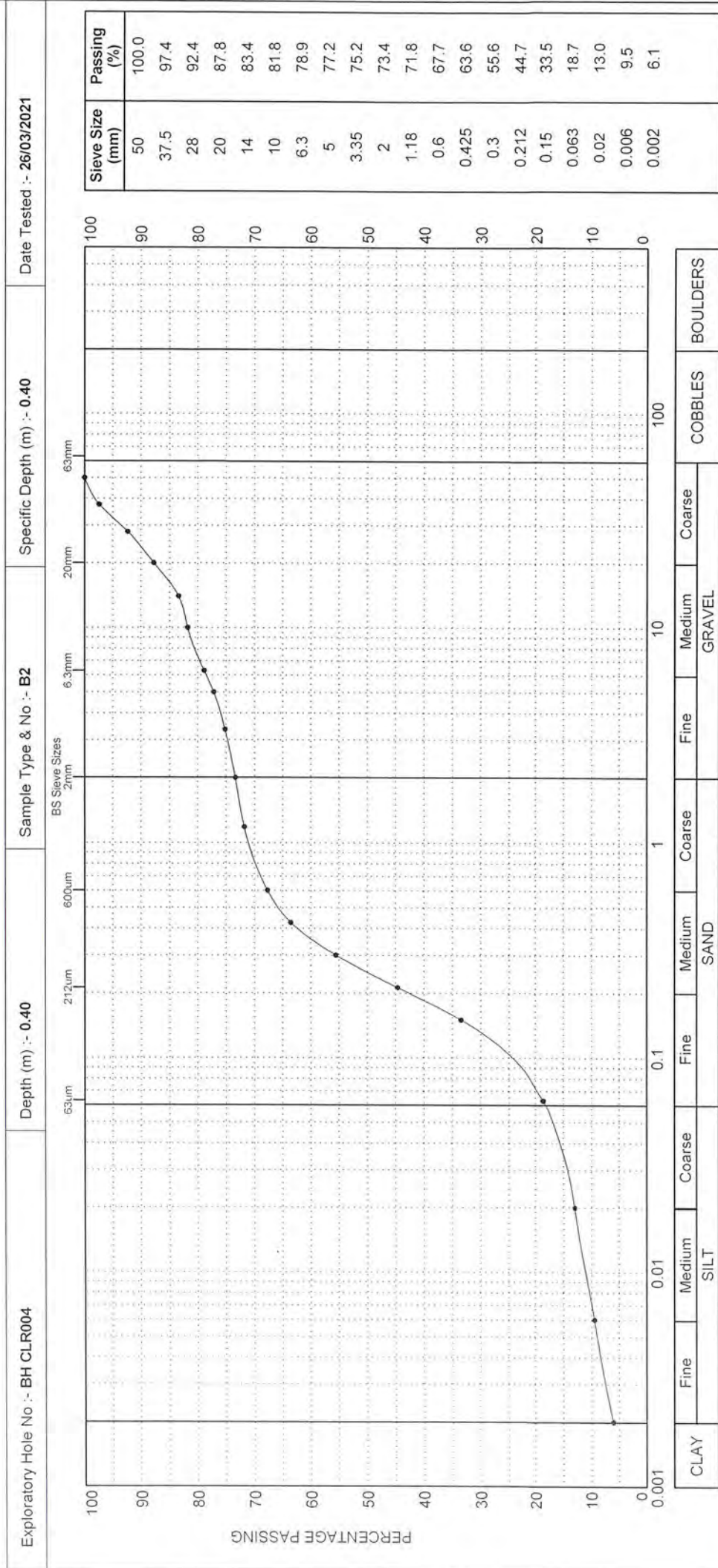


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Stella Gull Industrial Estate, Pelton Fell, Chester-le-Street Co. Durham, BN2 2RQ Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Enham Road, Baccoub, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



**AMEY**

Date of issue :- 27/04/2021

Client :- AMEY OW Limited

Certificate No :- PSD/4322D/BH CLR004/B2/0.40

Signed :- [Redacted]

Contract Title :- A66 North Trans Pennine Scheme D Section 8

Page 1 of 1

EG Contract No :- 4322D

1367

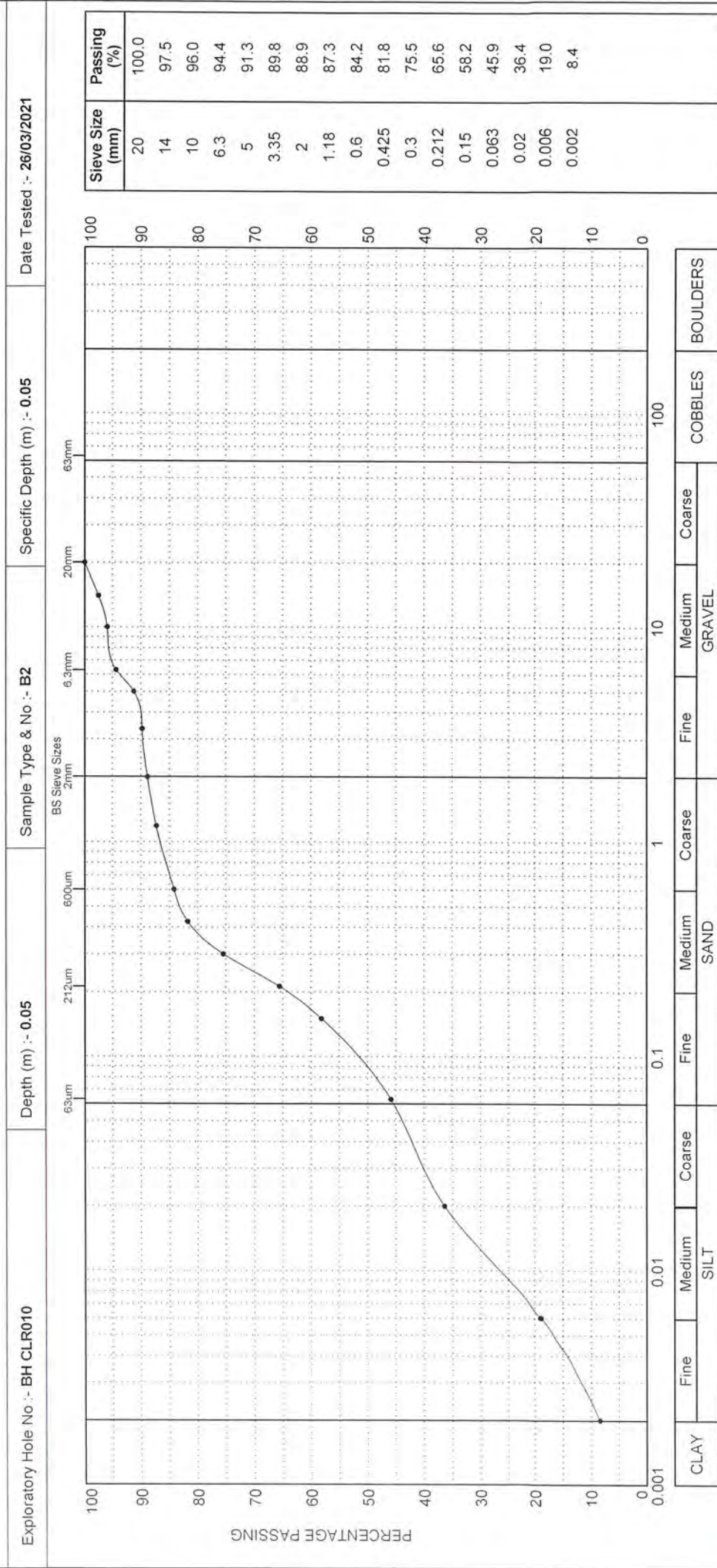


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Patton Fell, Chester-le-Street, Co. Durham, UK. ZR3 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Exham Vnarl, Blaxdown, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



<p>Date of issue :- 27/04/2021</p> <p>Client :- AMEY OW Limited</p>	<p>Certificate No :- PSD/4322D/BH CLR010/B2/0.05</p> <p>Signed</p>	<p>For description of sample please refer to [REDACTED]</p>	<p>Contract Title :- A66 North Trans Pennine Scheme D Section 8</p>
<p>Page 1 of 1</p>		<p>AEG Contract No :- 4322D</p>	

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gm Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DL2 2PG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blaxdown, BB1 5BL - Tel: 01712 735 300 Fax: 01712 735 399

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

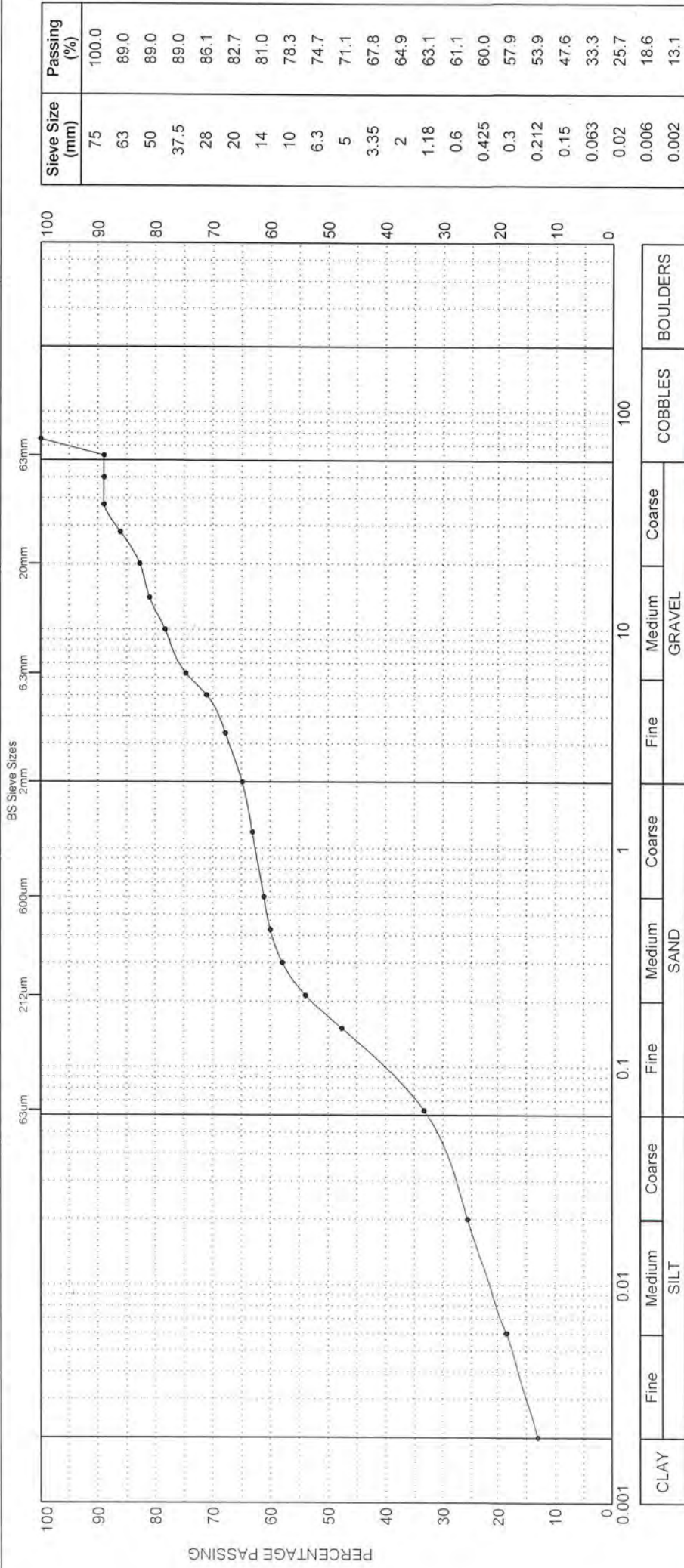
Exploratory Hole No :- BH CLR011

Depth (m) :- 0.40

Sample Type & No :- B2

Specific Depth (m) :- 0.40

Date Tested :- 26/03/2021



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/BH CLR011/B2/0.40	Signed 	Page 1 of 1	
	Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322D	AEG Contract No :- 4322D	

Abb North Trans Femine Scheme D Section 8

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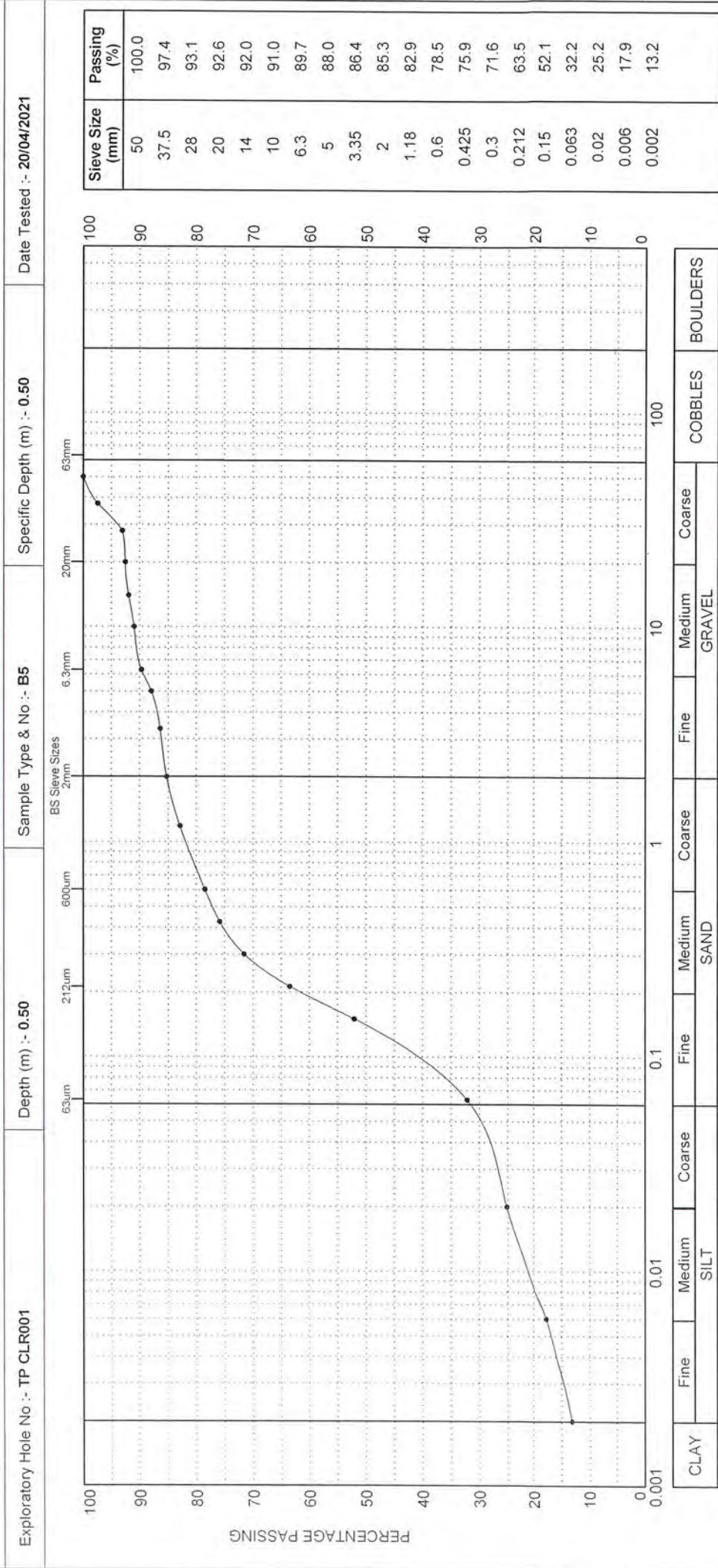


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stalls Gill Industrial Estate, Pelton, Fife, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Bladon, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021  
Certificate No :- PSD/4322D/TP CLR001/B5/0.50  
Sign

Client :- AMEY OW Limited  
Contract Title :-



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EG Contract No :- 4322D  
1367

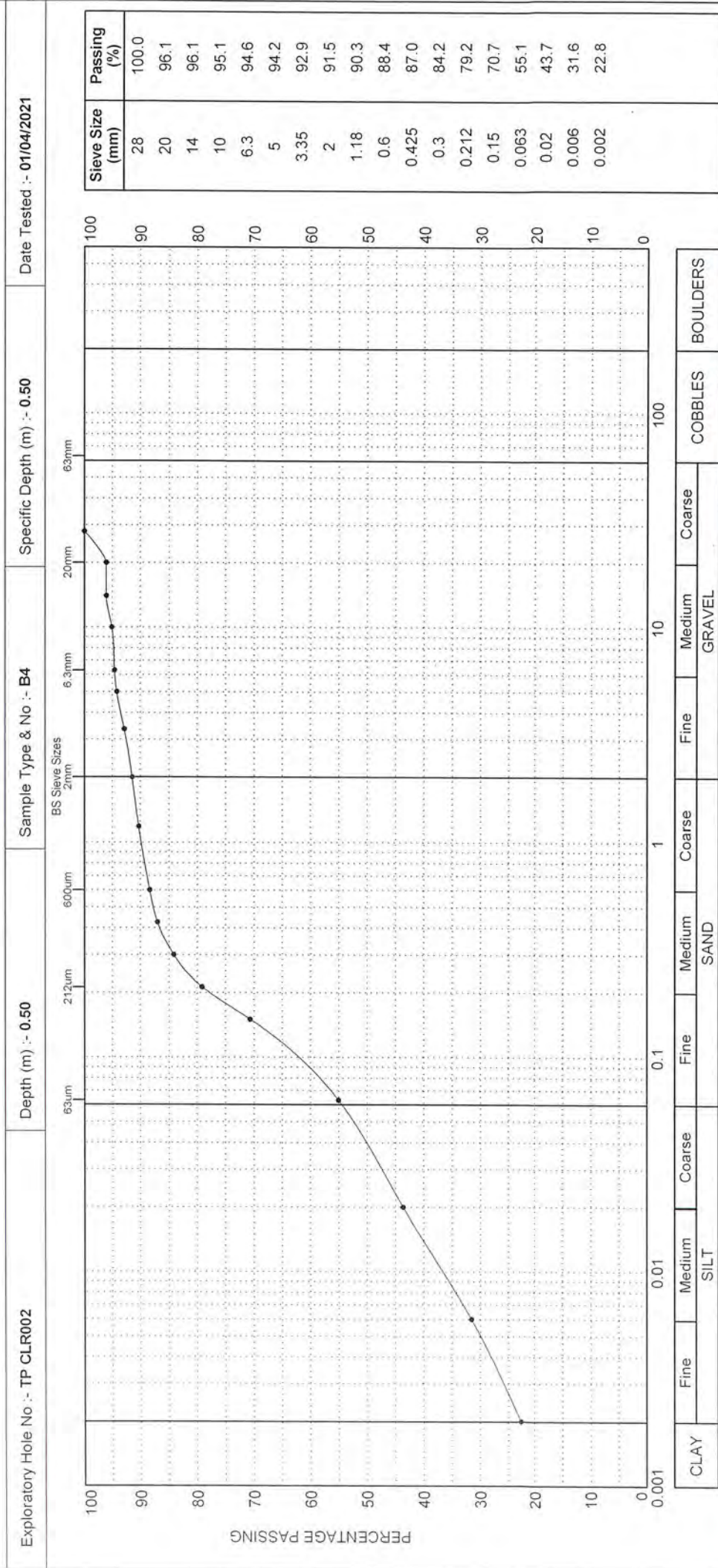


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Status Court Industrial Estate, Falkon, Ed. Chesham St. Co. Dunsm. DR2 2EG. Tel: 0183 387 4700 Fax: 01831 387 4710  
Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021

Certificate No :- PSD/4322D/TP CLR002/B4/0.50

Signature

[Redacted Signature]

Client :- AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

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REG Contract No :- 4322D



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# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Palfon Fell, Cheshire Street, Co Durham, BF2 2BG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 998

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990  
(Test deviated from standard due to insufficient sample mass)

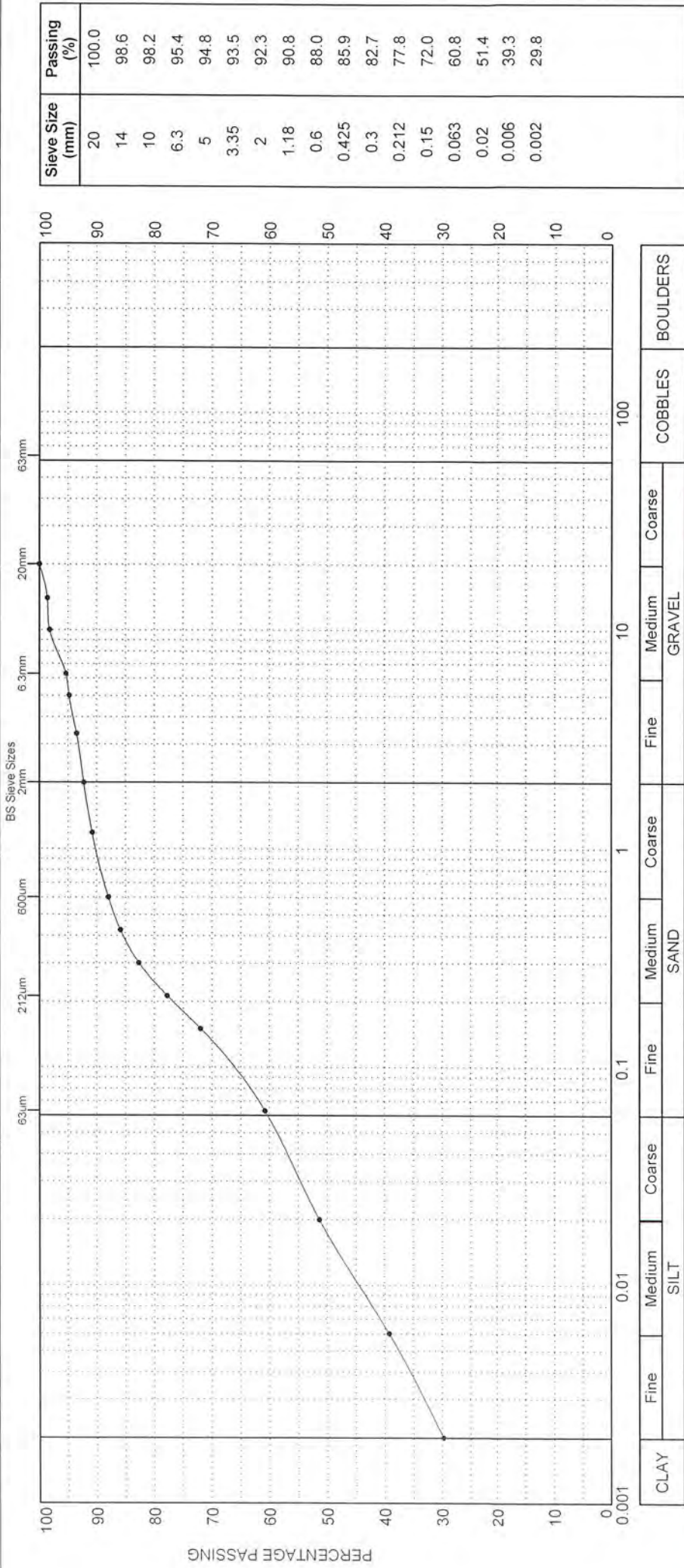
Exploratory Hole No :- TP CLR002A

Depth (m) :- 0.80

Sample Type & No :- B5

Specific Depth (m) :- 0.80

Date Tested :- 03/03/2021



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021

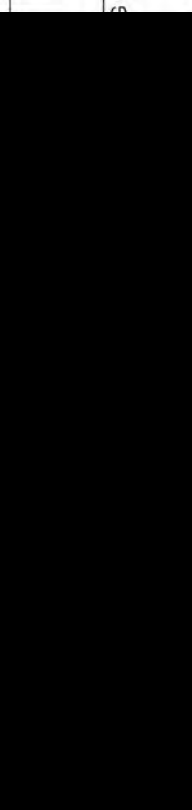
Certificate No :- PSD/4322D/TP CLR002A/B5/0.80

Signed :-

Client :-

AMEY OW Limited

Contract Title :-



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Contract No :- 4322D



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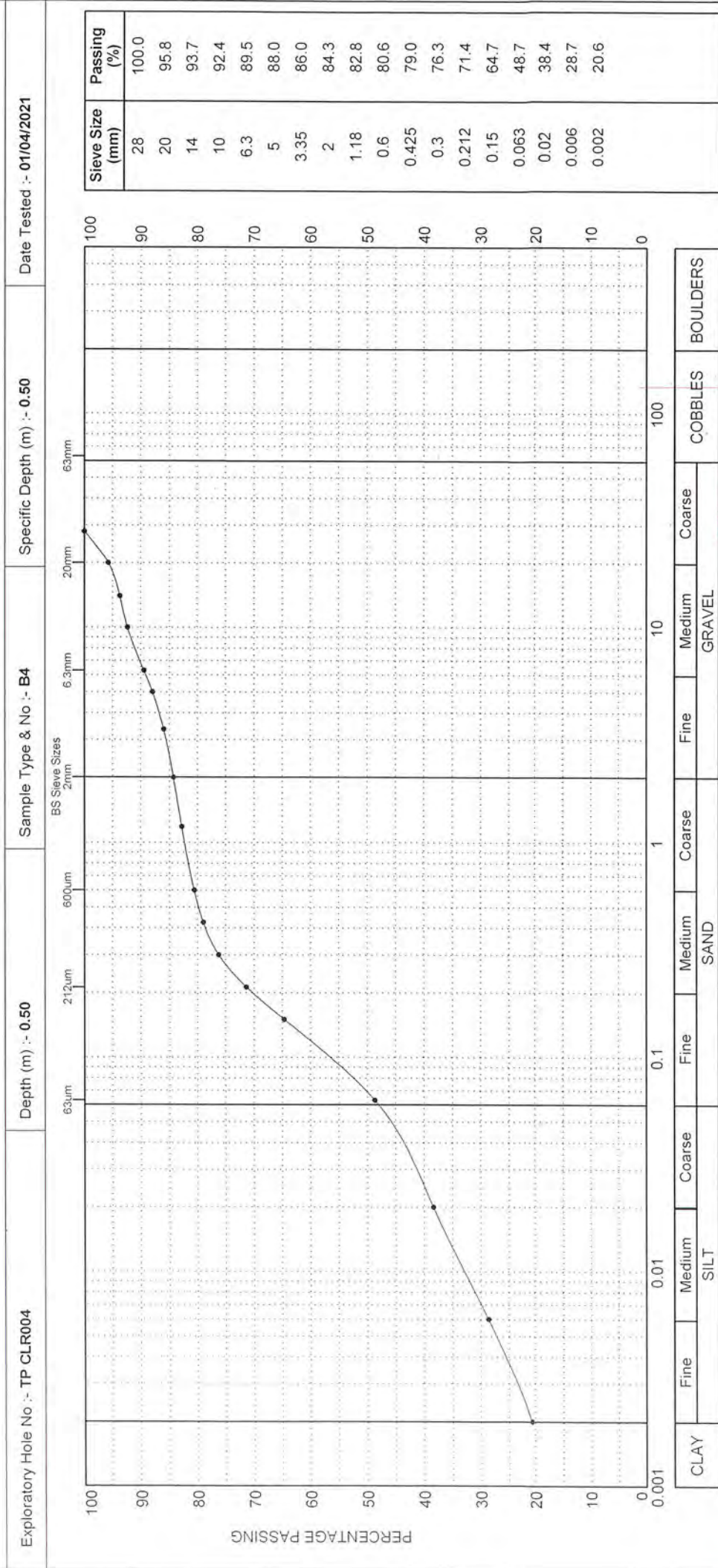


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Steels Gill Industrial Estate, Felton Park, Chester-le-Street, Co. Durham, BH2 2EG. Tel: 0191 287 4700 Fax: 0191 287 4710  
Regional Office: Unit 23, Business Development Centre, Eram Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample

	Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR004/B4/0.50 Sig	Page 1 of 1
	Client :- AMEY OW Limited		Contract Title :-
A66 North Trans Pennine Scheme D Section 8			1367





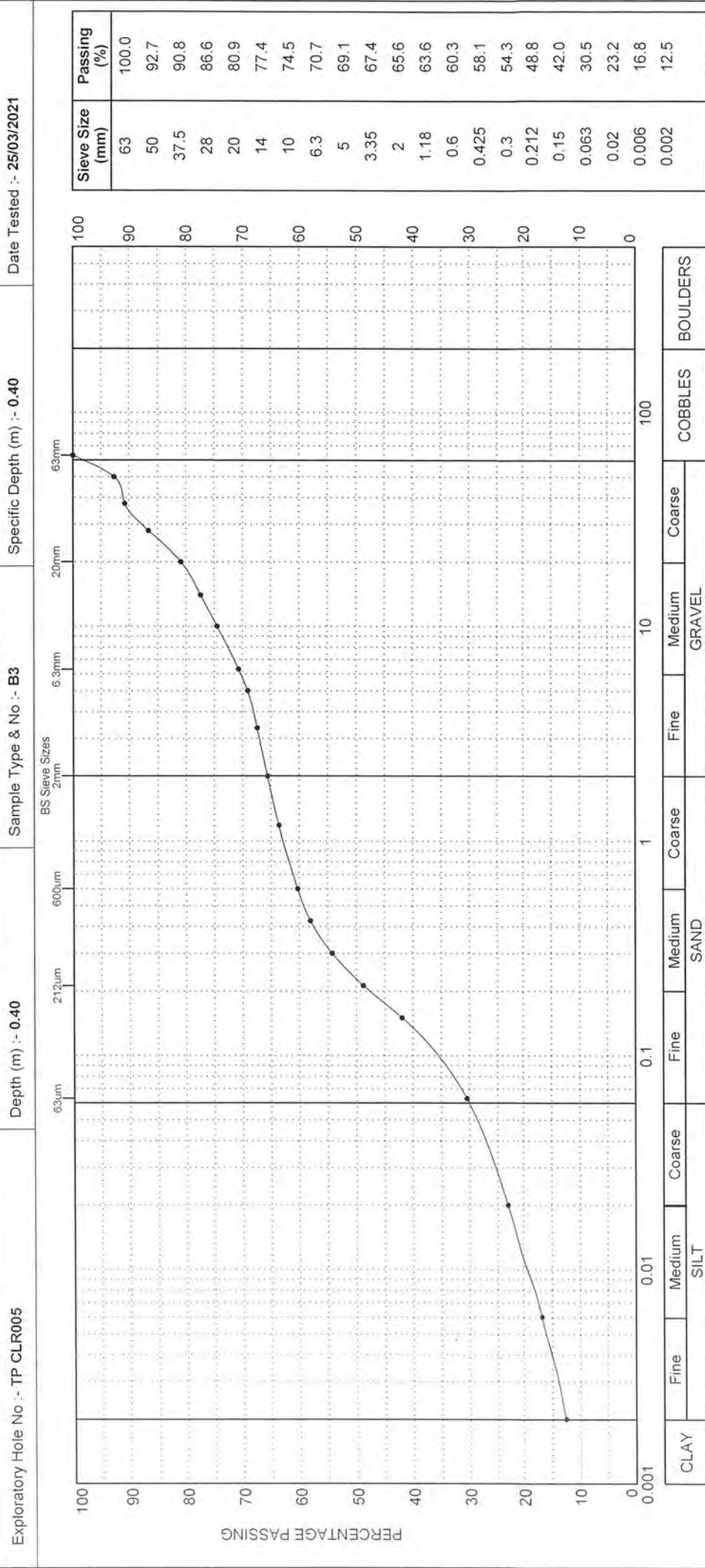
# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Sialia Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easingham Road, Blackburn, BB1 3BL - Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR005/B3/0.40	Signature
Client :- AMEY OW Limited	Contract Title :-	Contract No :- 4322D

AMEY OW Limited

Page 1 of 1

AEG Contract No :- 4322D

UKAS TESTING 1367

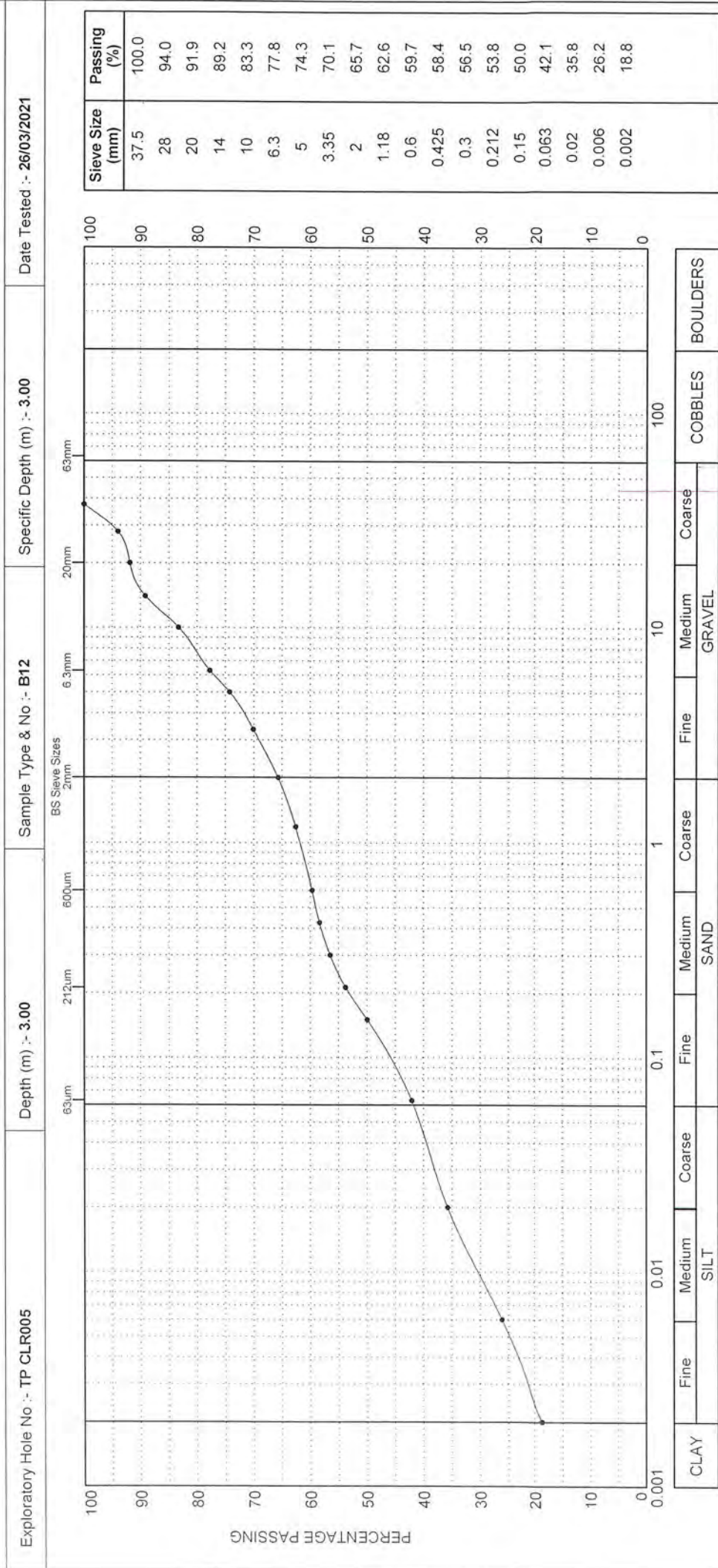


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Court Industrial Estate, Fellon Park, Chester-le-Street, Co. Durham, DL2 2EG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021

Certificate No :- PSD/4322D/TP CLR005/B12/3.00

Sign

Client :-

AMEY OW Limited

Contract Title :-



Page 1 of 1

AEG Contract No :- 4322D



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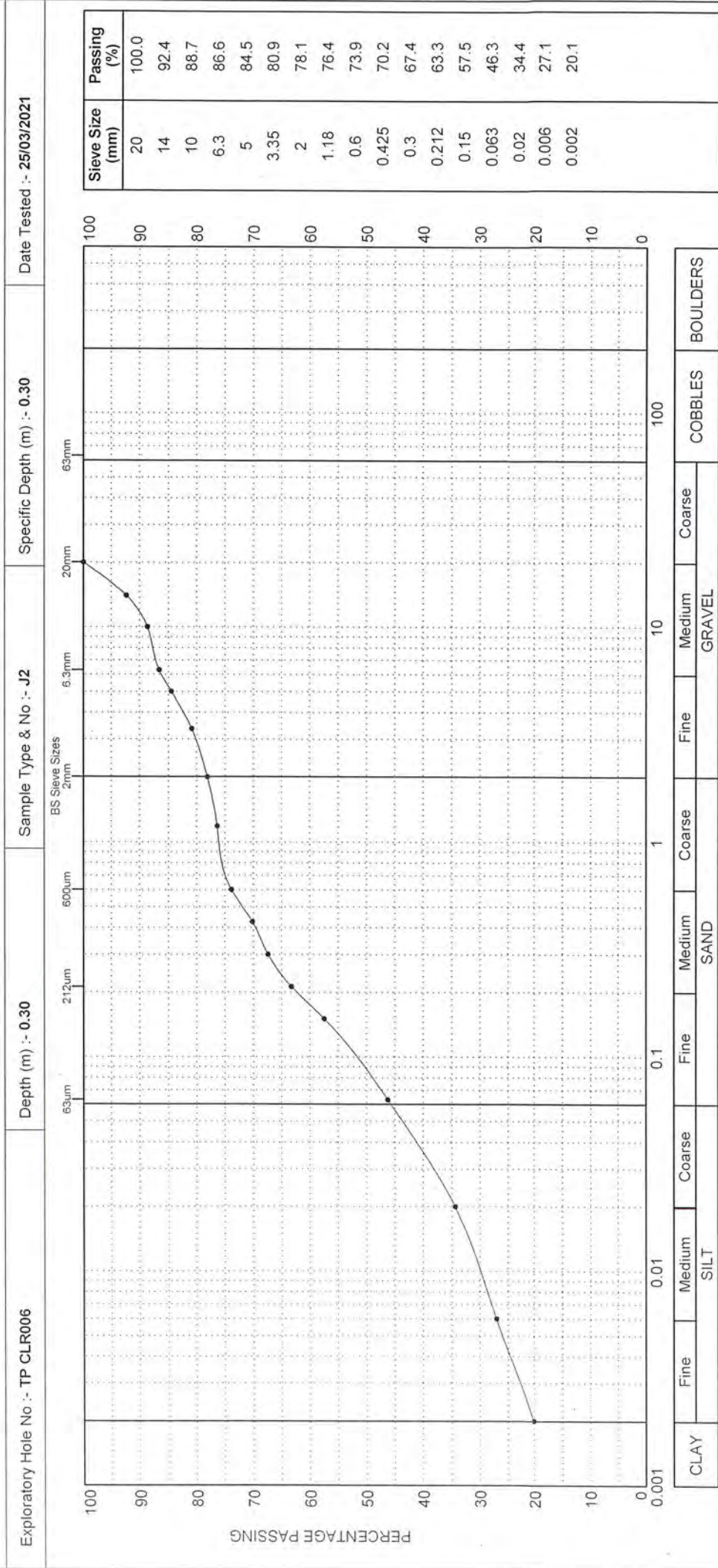


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Stella Gill Industrial Estate, Pelton, East, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Earsam Wharf, Blaxburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

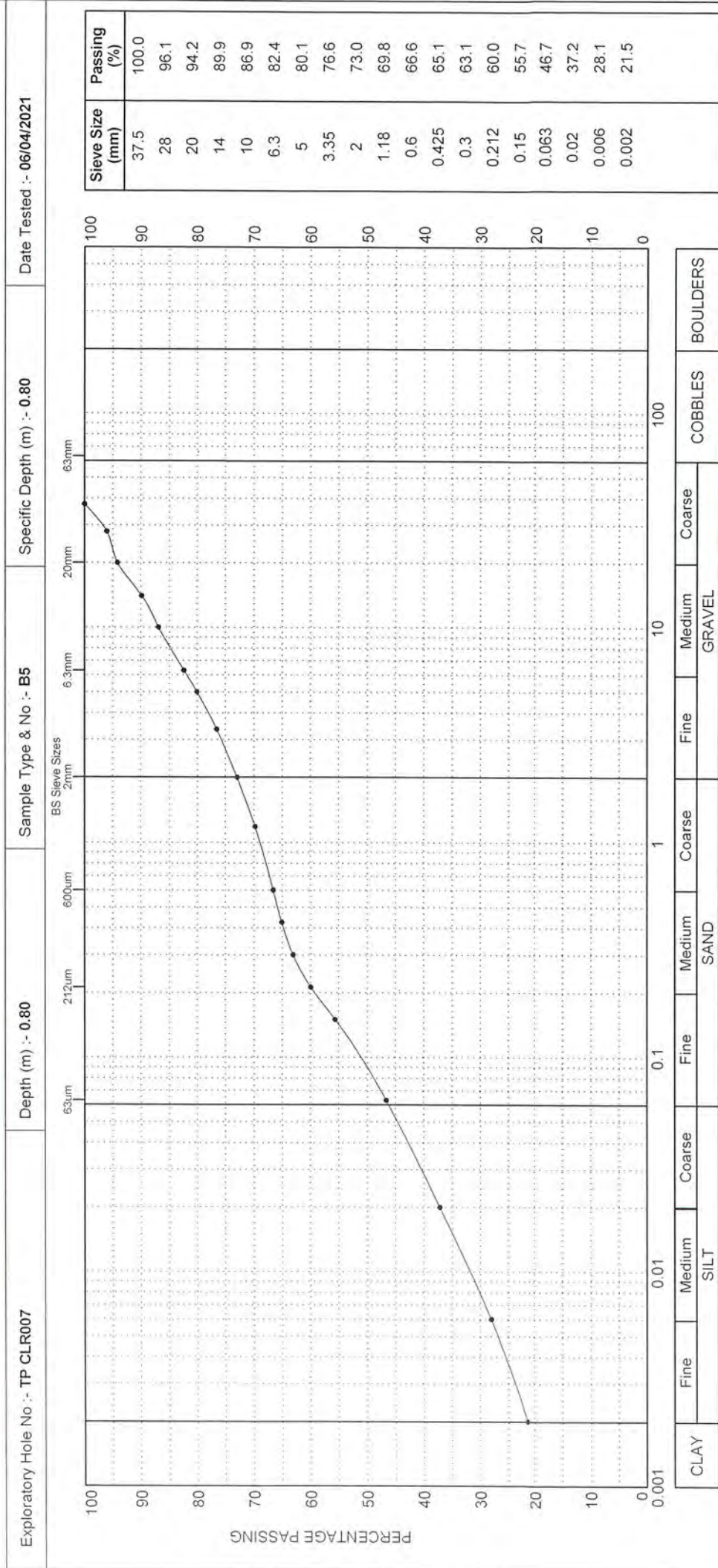
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Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 8		AEG Contract No :- 4322D
			1367

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Mill 25 Steels, 67 Industrial Estate, Felton Park, Chester-le-Street, Co. Durham, BH2 2RS. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Epsom Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021

Certificate No :- PSD/4322D/TP CLR007/B5/0.80

Signed :-

Client :-

AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

AEG Contract No :- 4322D

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# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blaxhoun, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 599

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

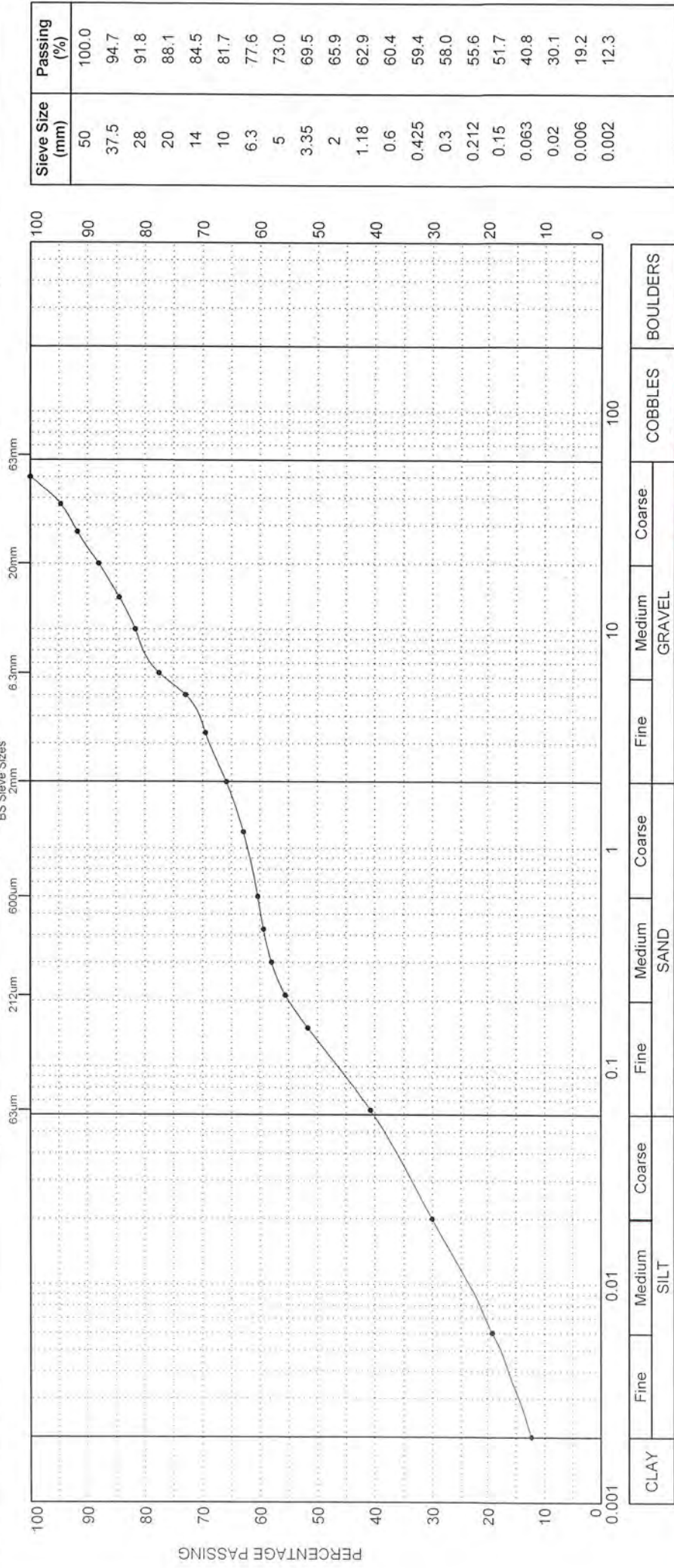
Exploratory Hole No :- TP CLR007

Depth (m) :- 1.80

Sample Type & No :- B8

Specific Depth (m) :- 1.80

Date Tested :- 01/04/2021



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :-

27/04/2021

Certificate No :-

PSD/4322D/TP CLR007/B8/1.80

Signed

Client :-

AMEY OW Limited

Contract Title :-

Abb North Trans Pennine Scheme D Section 8

Page 1 of 1

AEG Contract No :-

4322D



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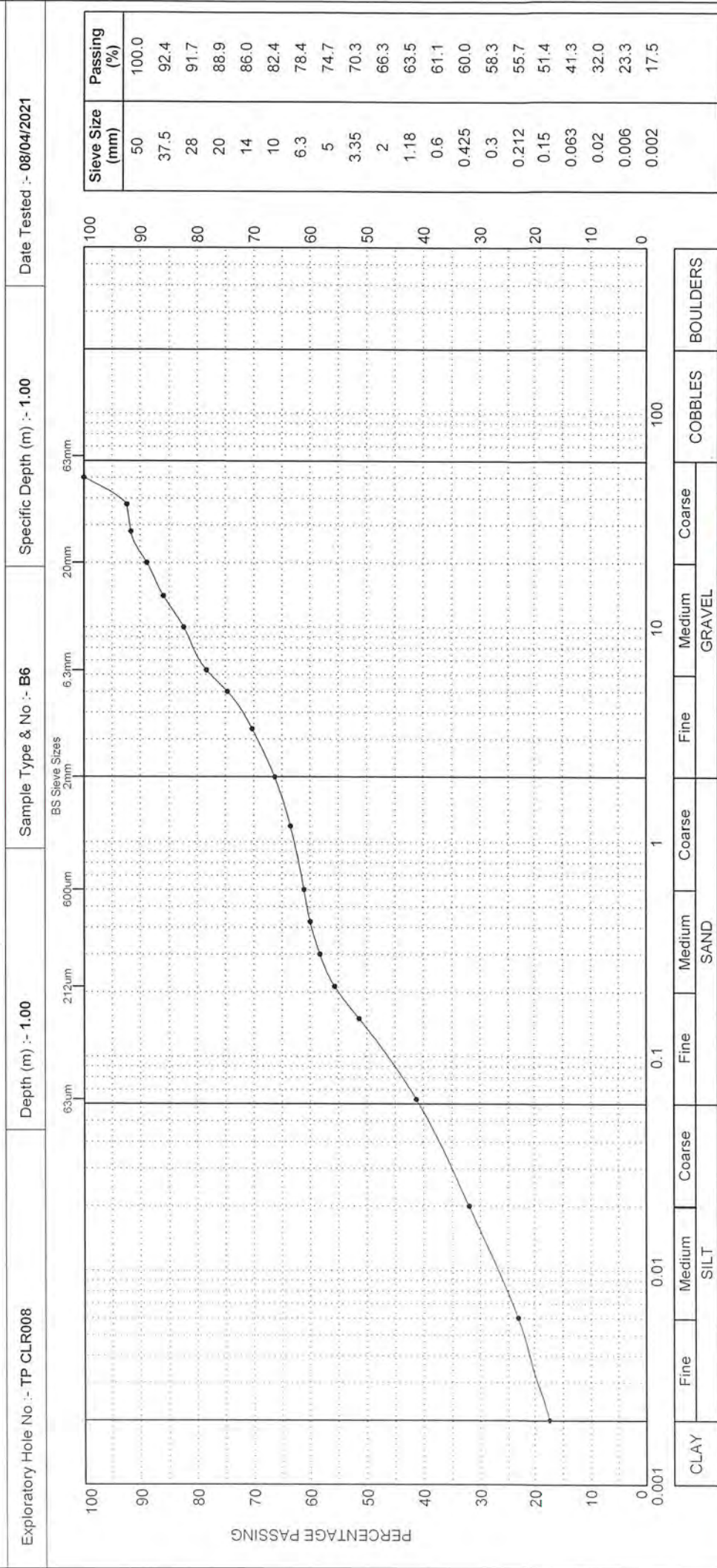


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 23 Stella Gill Industrial Estate, Pelton Park, Chester-le-Street Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Epsom Road, Blackburn, BB 15B. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021

Certificate No :- PSD/4322D/TP CLR008/B6/1.00

Client :- AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Page 1 of 1



AEG Contract No :- 4322D

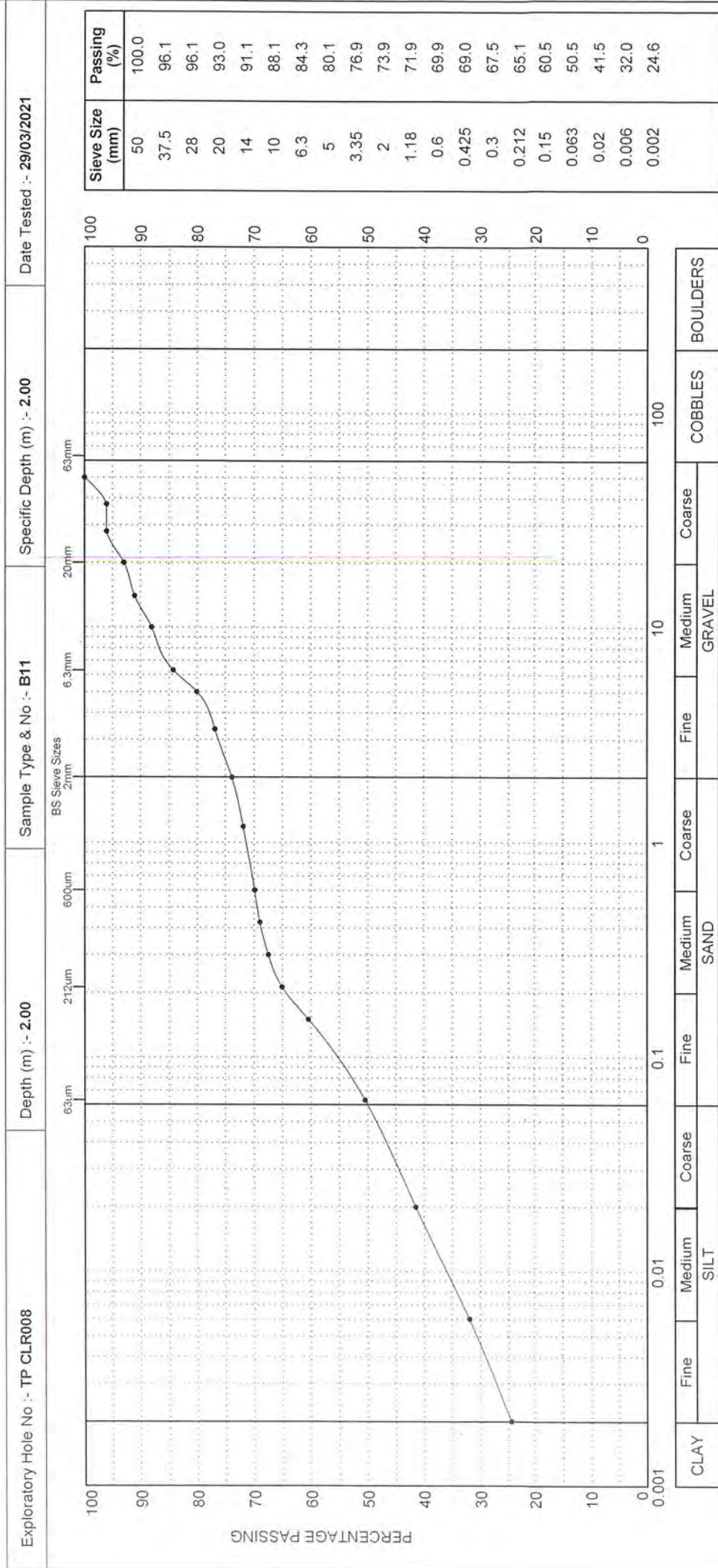
1367

# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella GM Industrial Estate, Felton Fell, Chester-le-Street, Co. Durham, DL2 2RS. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 23, Business Development Centre, Eram Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR008/B11/2.00	Page 1 of 1
Client :- AMEY OW Limited	Contract Title :- <div style="background-color: black; color: black; display: inline-block; width: 100%; height: 1.2em; vertical-align: middle;">[REDACTED]</div>		
		AEG Contract No :- 4322D	

A66 North Trans Pennine Scheme D Section 8

1367

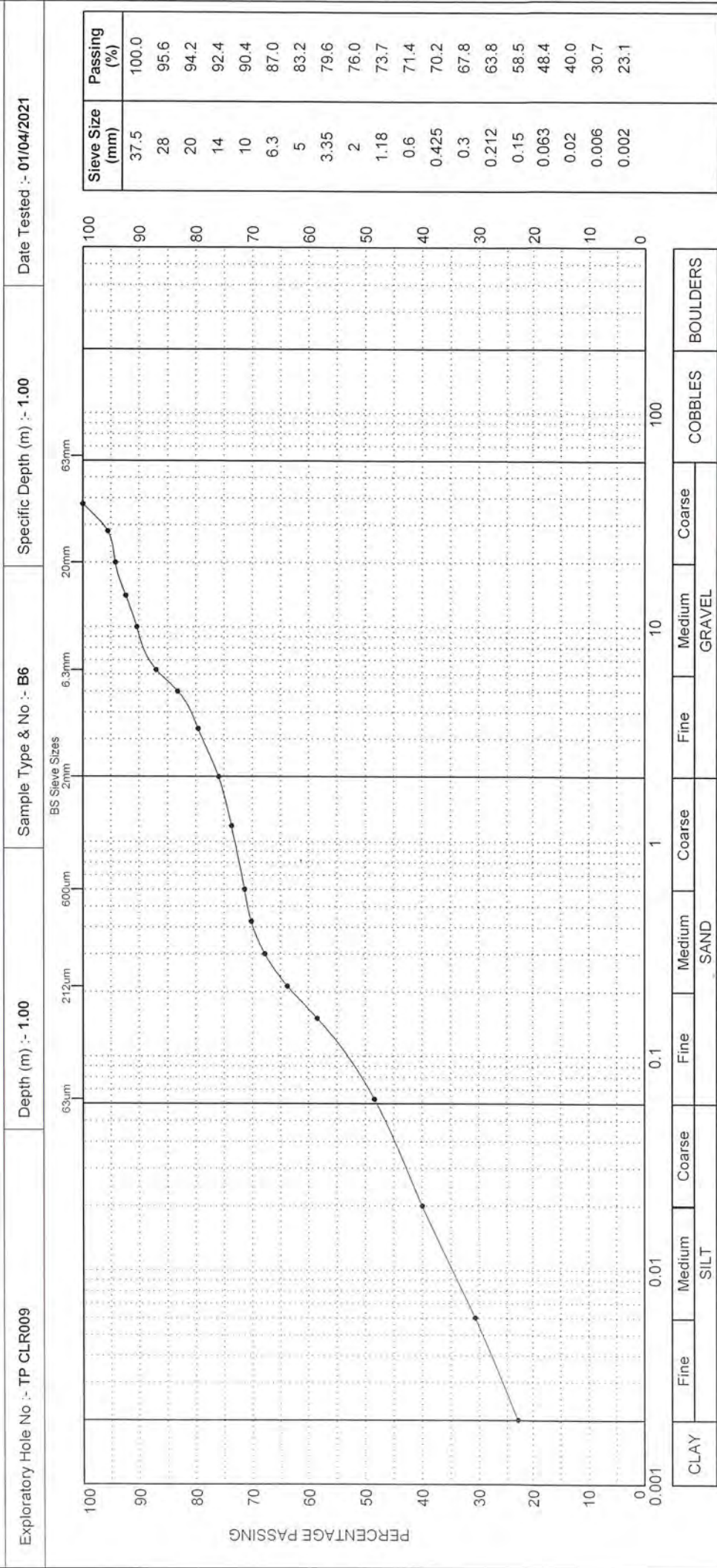


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Sialia Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Epsom Wharf, Blackburn, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

<p>Date of issue :- 27/04/2021</p> <p>Client :- AMEY OW Limited</p>	<p>Certificate No :- PSD/4322D/TP CLR009/B6/1.00</p> <p>Signed :- [Redacted]</p>	<p>Contract Title :- A66 North Trans Pennine Scheme D Section 8</p>	<p>Page 1 of 1</p> <p>AEG Contract No :- 4322D</p>
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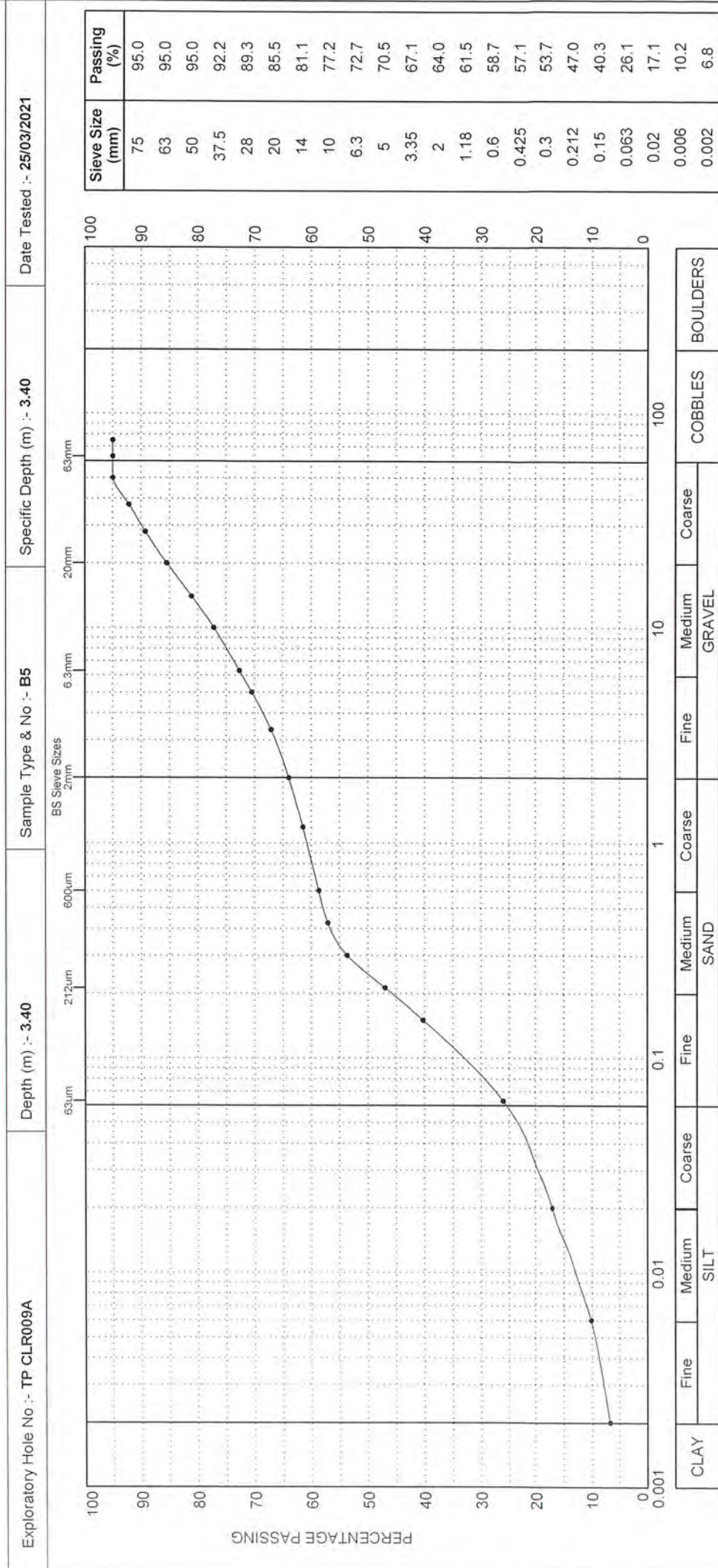


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2PG - Tel: 0191 387 4700 Fax: 0191 387 4710  
 Regional Office: Unit 20, Business Development Centre, Etraham Wharf, Blaydon, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 868

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :-  
27/04/2021

Certificate No :-

PSD/4322D/TP CLR009A/B5/3.40

Signed :-

Client :-

AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

AEG Contract No :-

4322D

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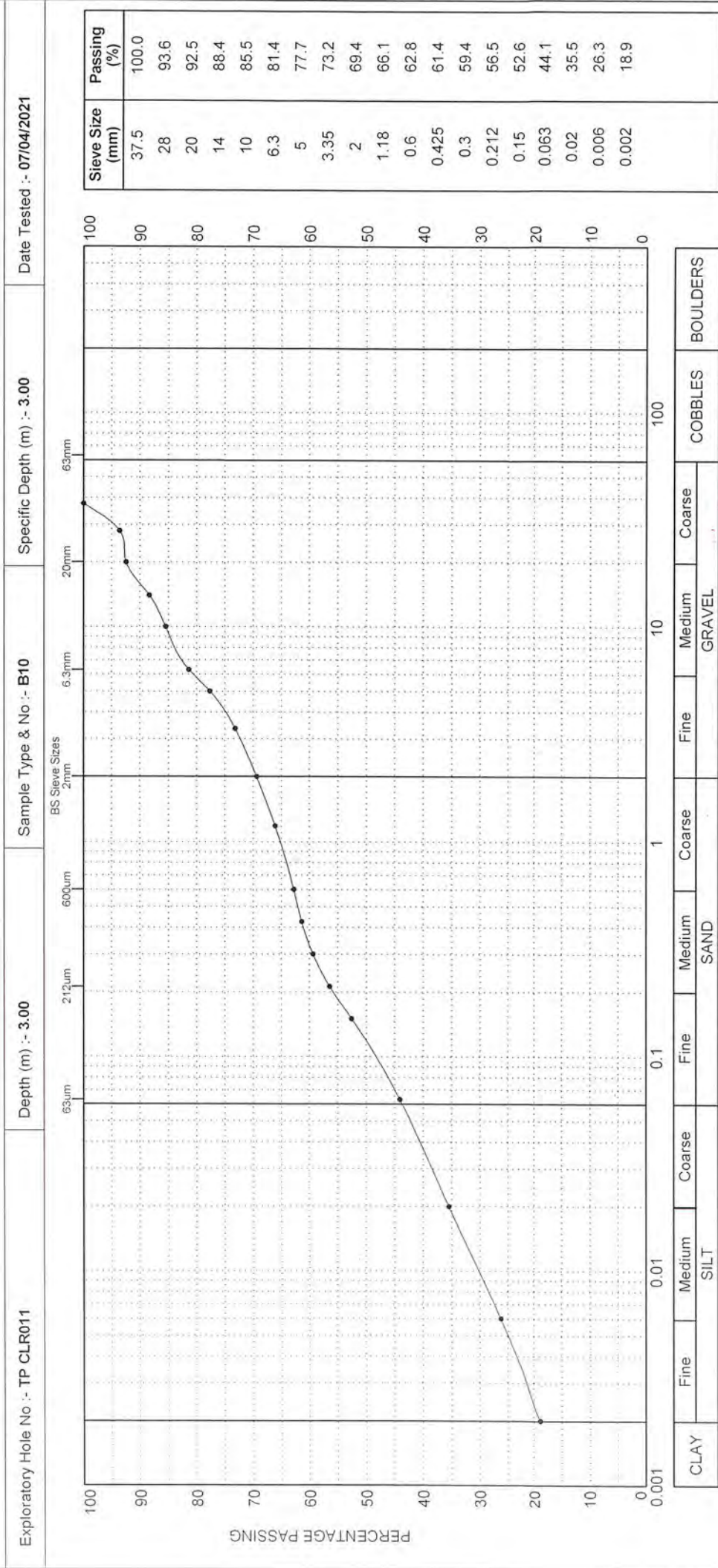


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25, Station Hill Industrial Estate, Felton East, Chester-le-Street, Co. Durham, DH2 2RG. Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Blaxbun, BB1 5BL. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR011/B10/3.00	Signed :- [Redacted]	Page 1 of 1
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 8	AEG Contract No :- 4322D	



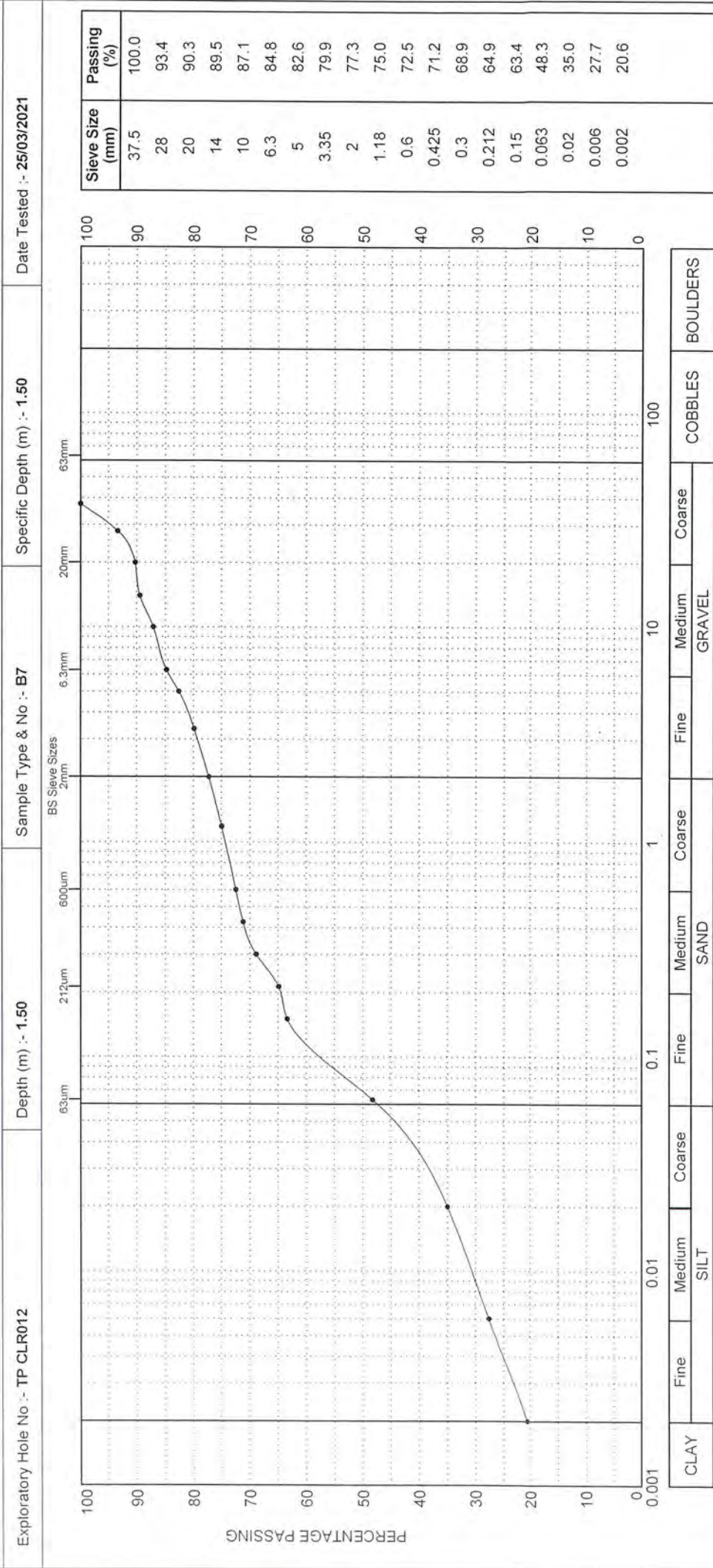


# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Steila Gill Industrial Estate, Pelton Hill, Chesham Street, Co. Durham, Dyke 2FG, Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Easing Wharf, Biddisford, BB1 5BL, Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR012/B7/1.50	Page 1 of 1	
Client :- AMEY OW Limited		AEG Contract No :- 4322D	



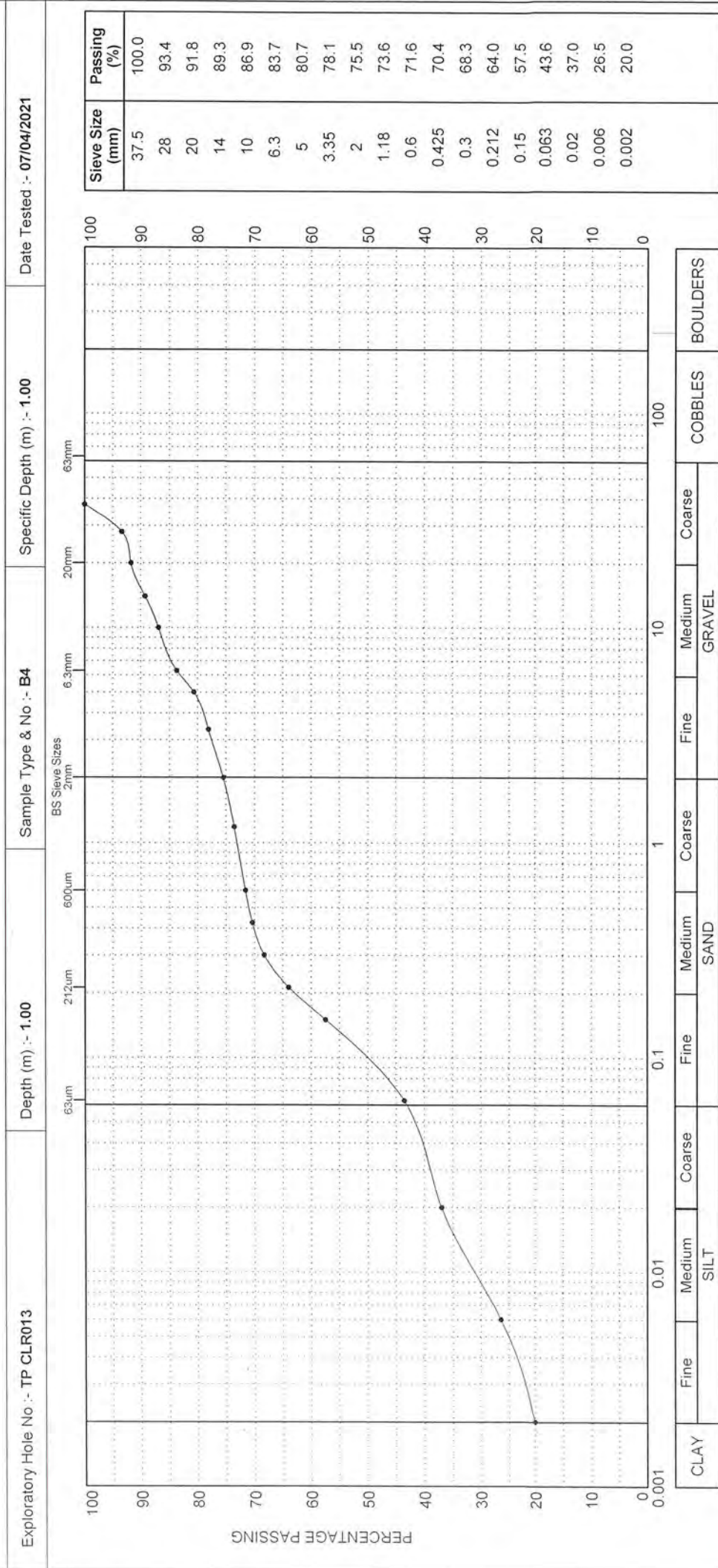
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Regional Office: Unit 20, Business Development Centre, Eram Wharf, Blackburn, BB1 5BH. Tel: 01772 735 300 Fax: 01772 735 999

## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



For description of sample please refer to the Laboratory Sample Description Sheet

<b>Date of issue :-</b> 27/04/2021	<b>Certificate No :-</b> PSD/4322D/TP CLR013/B4/1.00	<b>Signed :-</b> [Redacted]	<b>Page 1 of 1</b>
<b>Client :-</b> AMEY OW Limited	<b>EG Contract No :-</b> 4322D		



Acc North Trans Pennine Scheme D Section 8

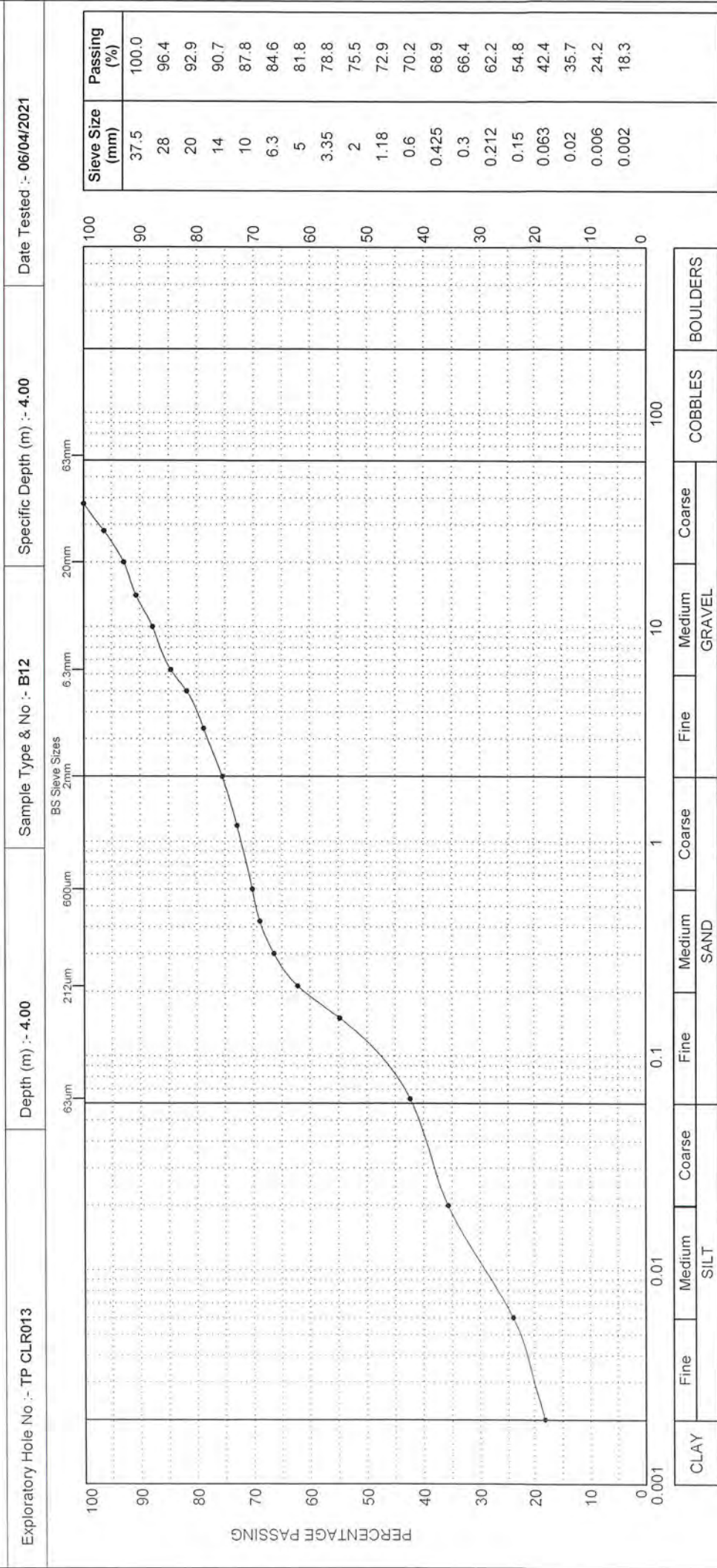


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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



	Date of issue :- 27/04/2021	Certificate No :- PSDI/4322D/TP CLR013/B12/4.00	Signed :-
	Client :- AMEY OW Limited	Contract Title :-	
A66 North Trans Pennine Scheme D Section 8		AEG Contract No :- 4322D	
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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

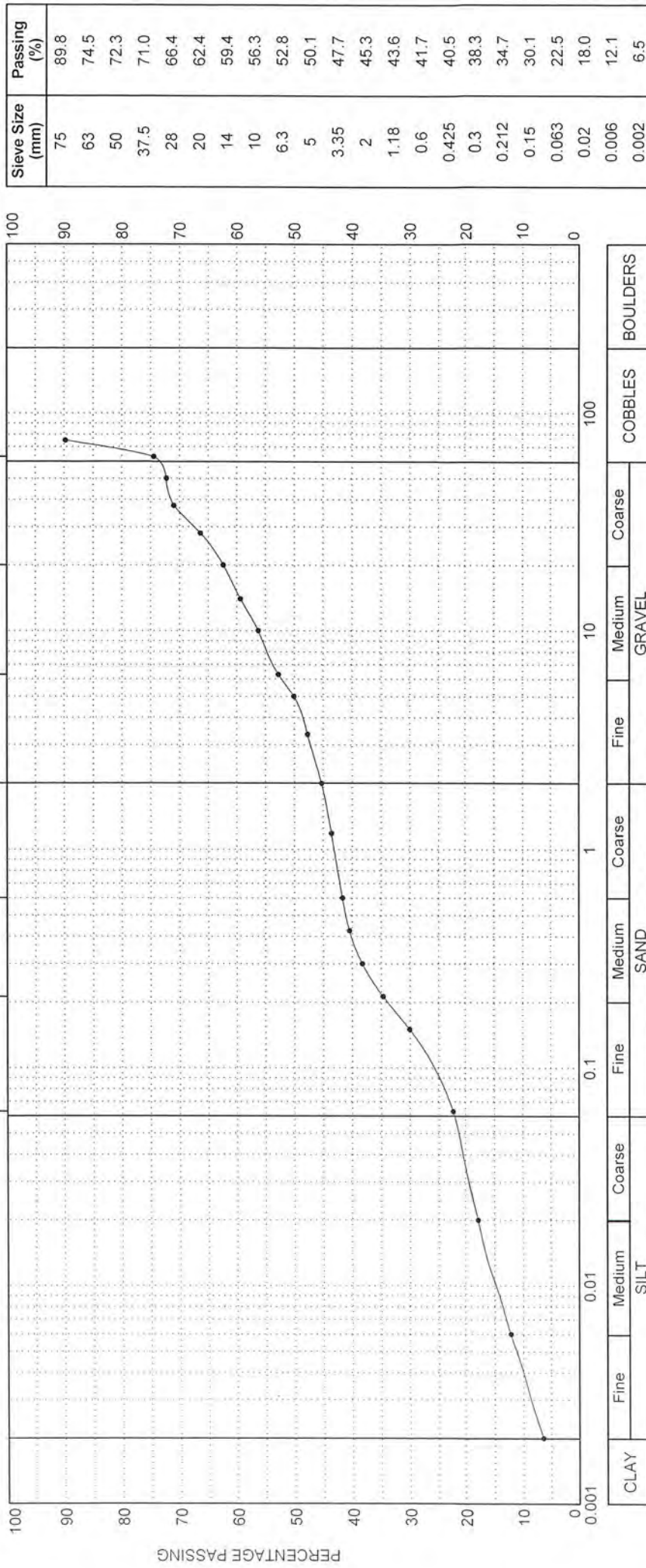
Exploratory Hole No :- TP CLR015

Depth (m) :- 0.50

Sample Type & No :- B4

Specific Depth (m) :- 0.50

Date Tested :- 26/03/2021



For description of sample please refer to the Laboratory Sample Description Sheet



Date of issue :- 27/04/2021

Certificate No :-

PSD/4322D/TP CLR015/B4/0.50

Signed

Client :-

AMEY OW Limited

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

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REG Contract No :-

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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

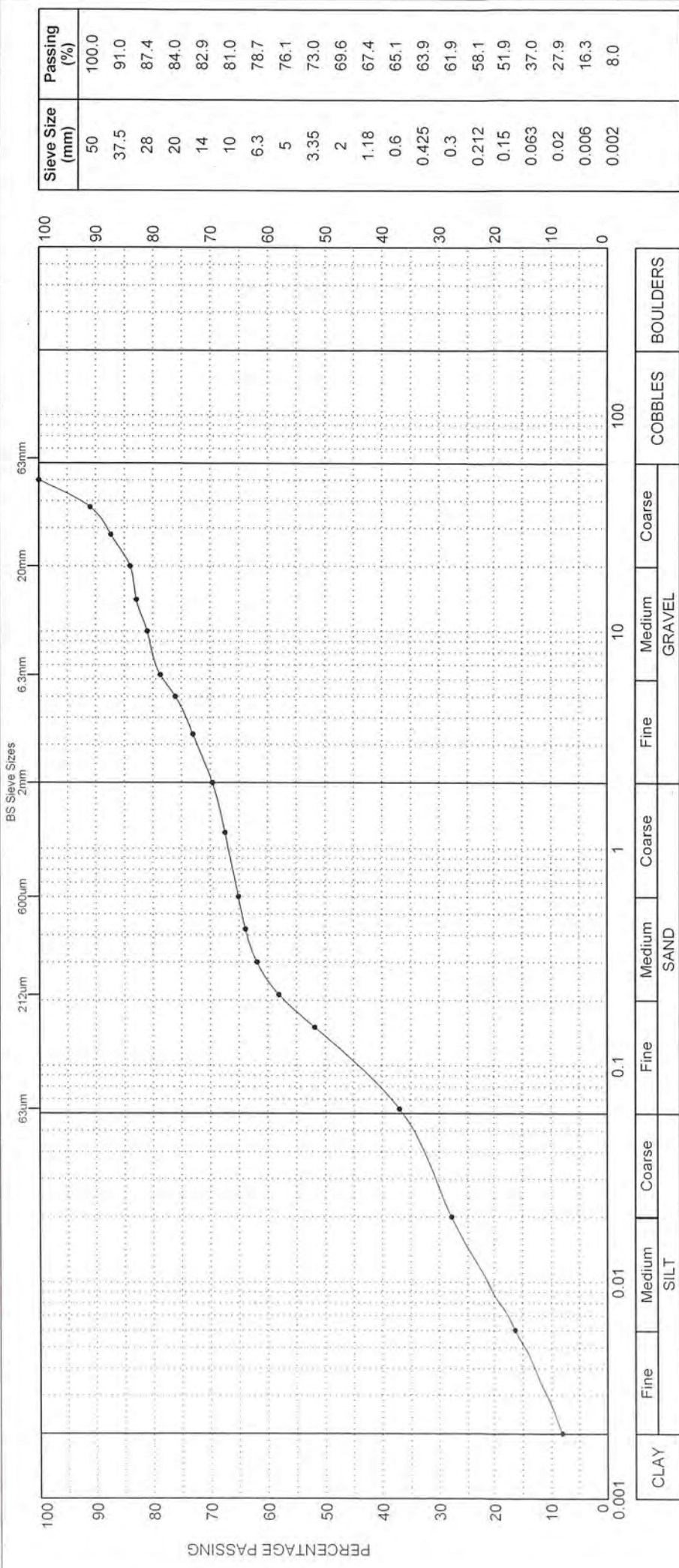
Exploratory Hole No :- TP CLR020

Depth (m) :- 2.00

Sample Type & No :- B7

Specific Depth (m) :- 2.00

Date Tested :- 06/04/2021



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR020/B7/2.00 Sig	Page 1 of 1
	Client :- AMEY OW Limited		
Contract Title :- A66 North Trans Pennine Scheme D Section 8			1367

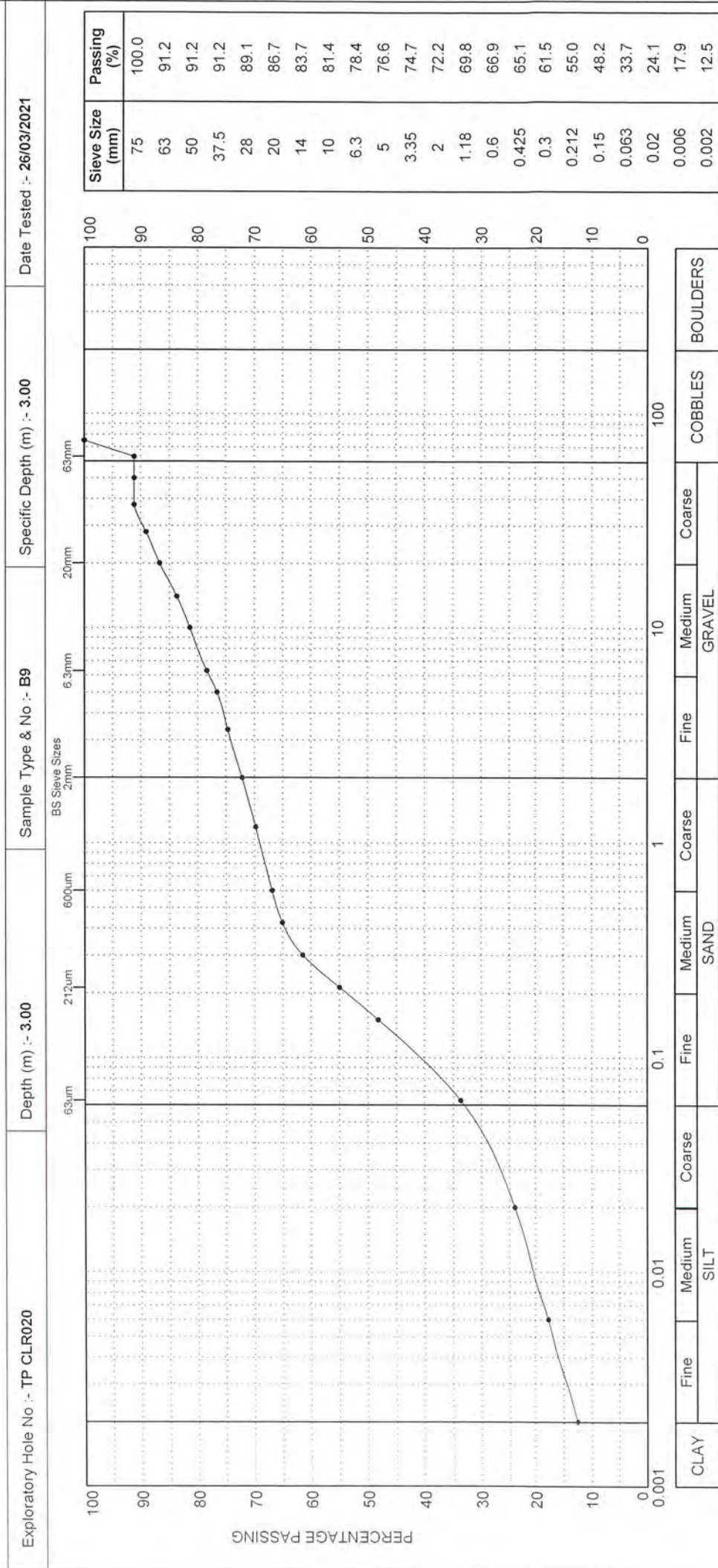


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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990



**AMEY**

Date of issue :- 27/04/2021

Client :- AMEY OW Limited

Certificate No :- PSD/4322D/TP CLR020/B9/3.00

Contract Title :-

For description of sample p

CLAY    SILT    SAND    GRAVEL    COBBLES    BOULDERS

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Contract No :- 4322D

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## PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

(Test deviated from standard due to insufficient sample mass)

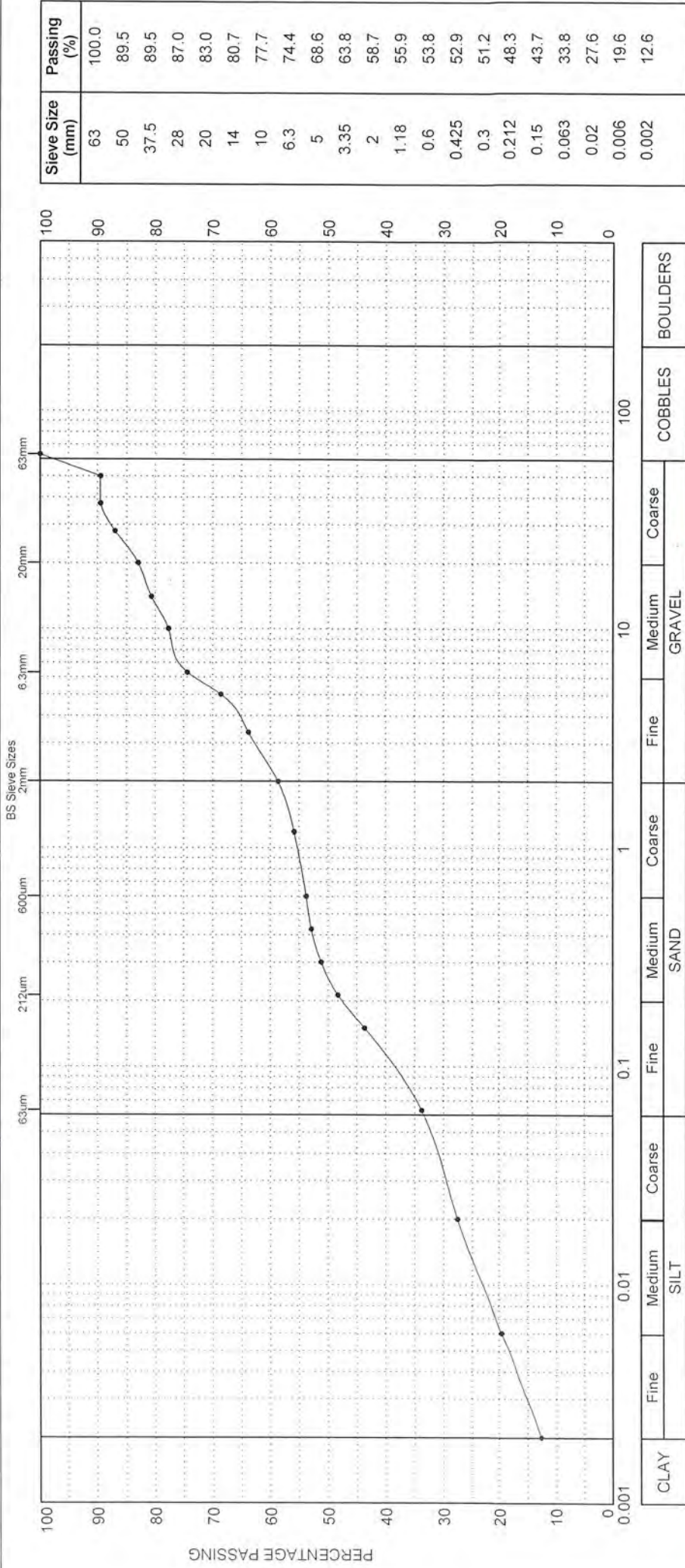
Exploratory Hole No :- TP CLR023

Depth (m) :- 0.40

Sample Type & No :- B4

Specific Depth (m) :- 0.40

Date Tested :- 09/04/2021



For description of sample please refer to the Laboratory Sample Description Sheet

	Date of issue :- 27/04/2021	Certificate No :- PSD/4322D/TP CLR023/B4/0.40 Signed: [Redacted]	Page 1 of 1	
	Client :- AMEY OW Limited			

**Determination of Chloride, Total Sulphur, Sulphate and pH  
(Tested Externally)**





## Certificate of Analysis

*Certificate Number* 21-07314

*Issued:* 15-Apr-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-07314

*Client Reference* 4322D

*Order No* LA2488

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 10 Soil samples.

*Date Received* 08-Apr-21

*Date Started* 08-Apr-21

*Date Completed* 15-Apr-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved*



Adam Fenwick  
Contracts Manager



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# Summary of Chemical Analysis Soil Samples

Our Ref 21-07314

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1828494	1828495	1828496	1828497	1828498	1828499
Sample ID	BH CLR003	BH CLR003	BH CLR003	BH CLR003	TP CLR015	TP CLR015
Depth	2.00	2.80	5.10	8.20	1.50	3.50
Other ID	11	13	17	24	8	13
Sample Type	J	J	J	J	J	J
Sampling Date	15/02/2021	15/02/2021	16/02/2021	16/02/2021	19/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units
<b>Inorganics</b>			
pH	DETSC 2008#		pH
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l
Sulphur as S, Total	DETSC 2320	0.01	%
Sulphate as SO4, Total	DETSC 2321#	0.01	%



# Summary of Chemical Analysis Soil Samples

Our Ref 21-07314

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1828500	1828501	1828502	1830769
Sample ID	WS CLR003	WS CLR005	WS CLR005	BH CLR001
Depth	2.20	1.20	2.20	1.20
Other ID	8	5	7	4
Sample Type	J	J	J	ES
Sampling Date	11/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units
<b>Inorganics</b>			
pH	DETSC 2008#		pH
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l
Sulphur as S, Total	DETSC 2320	0.01	%
Sulphate as SO4, Total	DETSC 2321#	0.01	%

## Information in Support of the Analytical Results

Our Ref 21-07314  
 Client Ref 4322D  
 Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1828494	BH CLR003 2.00 SOIL	15/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828495	BH CLR003 2.80 SOIL	15/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828496	BH CLR003 5.10 SOIL	16/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828497	BH CLR003 8.20 SOIL	16/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828498	TP CLR015 1.50 SOIL	19/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828499	TP CLR015 3.50 SOIL	19/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828500	WS CLR003 2.20 SOIL	11/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828501	WS CLR005 1.20 SOIL	16/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1828502	WS CLR005 2.20 SOIL	16/02/21	PT 500ml	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1830769	BH CLR001 1.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	

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

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





## Information in Support of the Analytical Results

*Our Ref* 21-07314

*Client Ref* 4322D

*Contract* A66 North Trans Pennine Scheme D Section 8

End of Report

## Determination of Dry Density/Moisture Content Relationship



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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- **TP CLR002**

Depth (m) :- **0.50**

Sample Type & No :- **B4**

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = **14**

Particle Density (Measured) = **2.66**

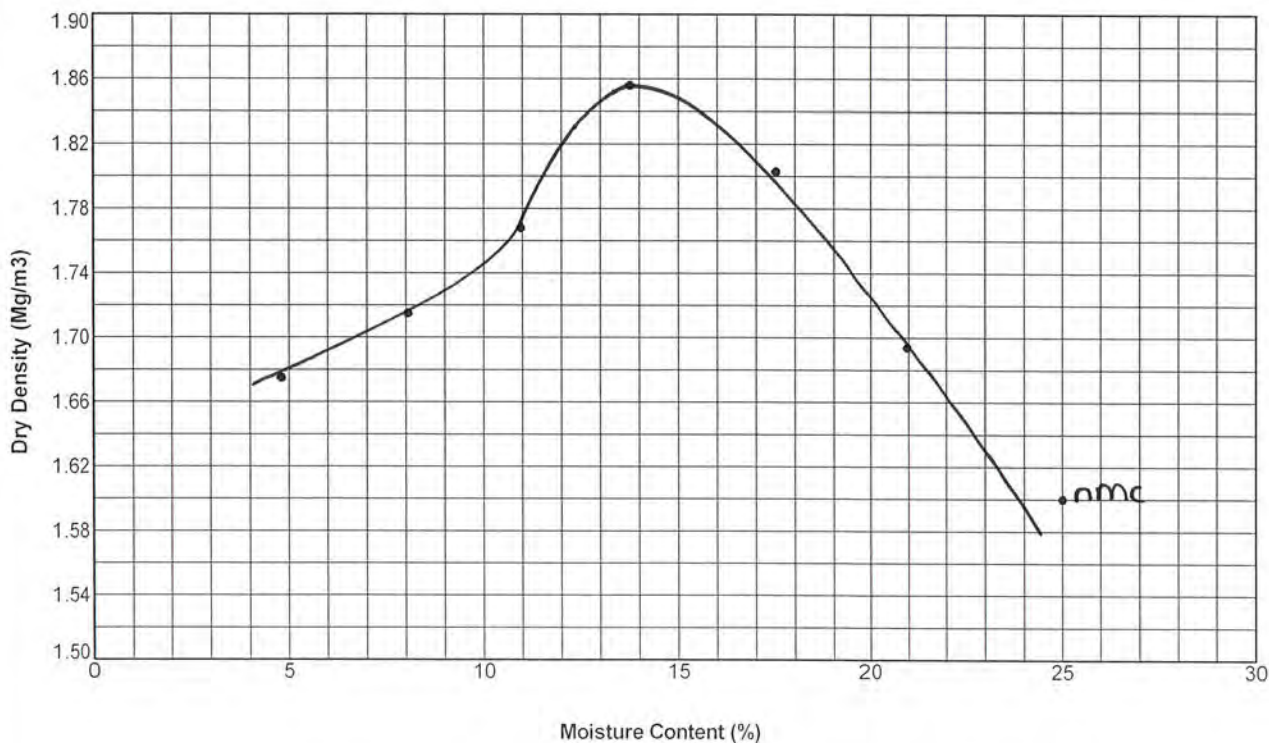
Maximum Dry Density (Mg/m<sup>3</sup>) = **1.86**

Retained on 20mm Sieve (%) = **4.0**

Date Tested = **31/03/2021**

Retained on 37.5mm Sieve (%) = **0.0**

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



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27/04/2021

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Contract No. :-  
**4322D**





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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR004

Depth (m) :- 1.40

Sample Type & No :- B7

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 10

Particle Density (Measured) = 2.64

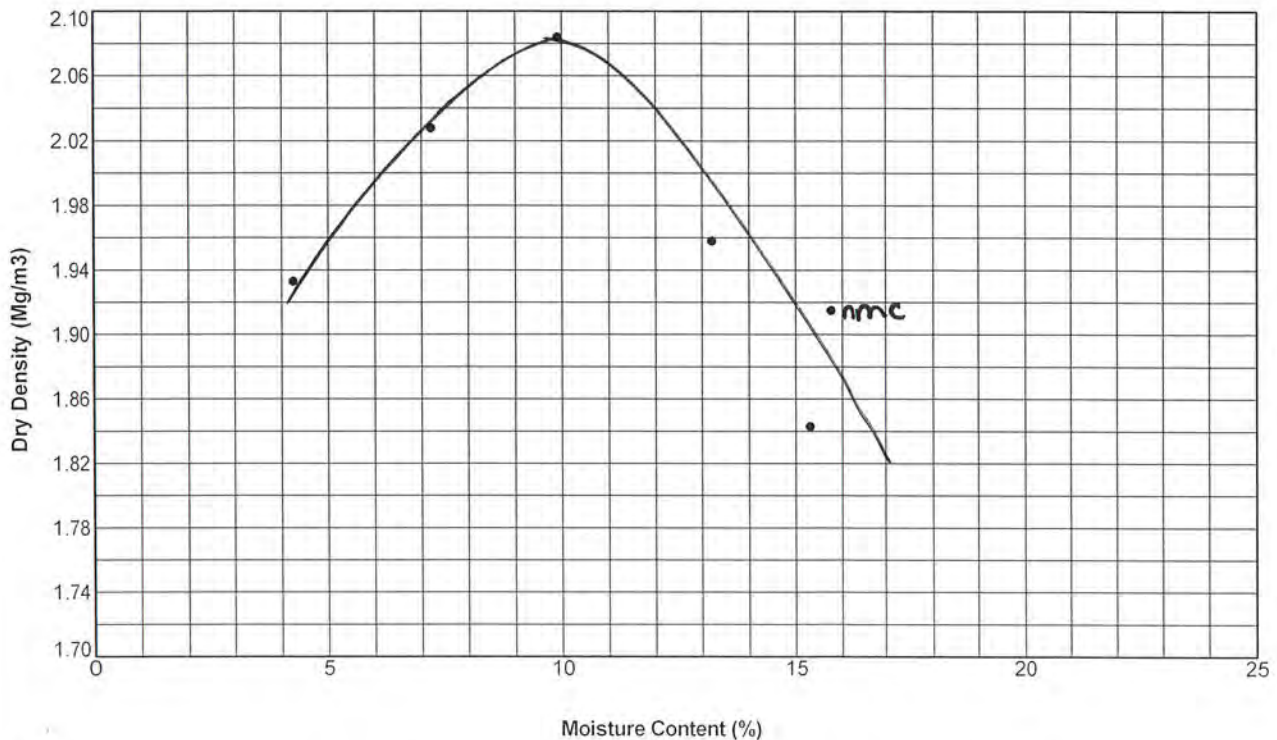
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.08

Retained on 20mm Sieve (%) = 20.0

Date Tested = 06/04/2021

Retained on 37.5mm Sieve (%) = 13.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



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Date of

27/04/2021

COMP/4322D/1

EG Contract No. :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR005

Depth (m) :- 1.00

Sample Type & No :- B6

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 10

Particle Density (Measured) = 2.66

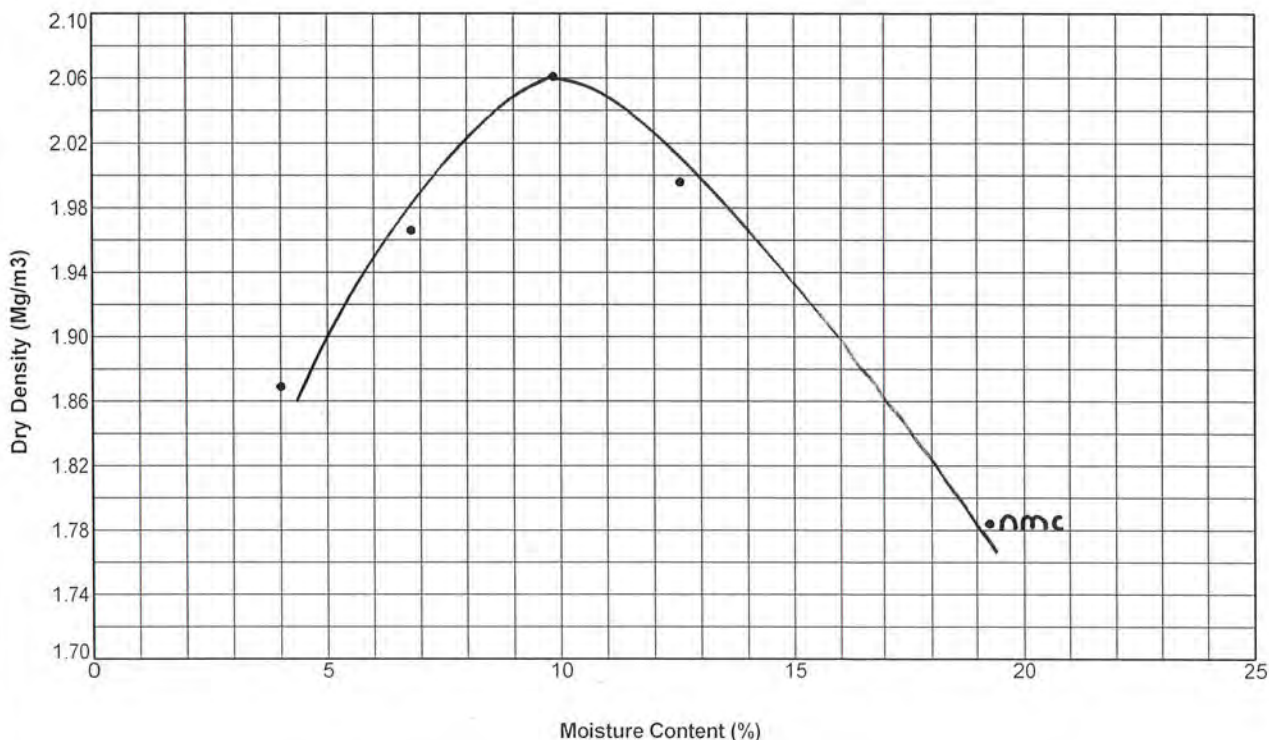
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.06

Retained on 20mm Sieve (%) = 5.6

Date Tested = 01/04/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

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Date of Issue :-

27/04/2021

Certificate No. :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR007

Depth (m) :- 0.80

Sample Type & No :- B5

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 11

Particle Density (Measured) = 2.65

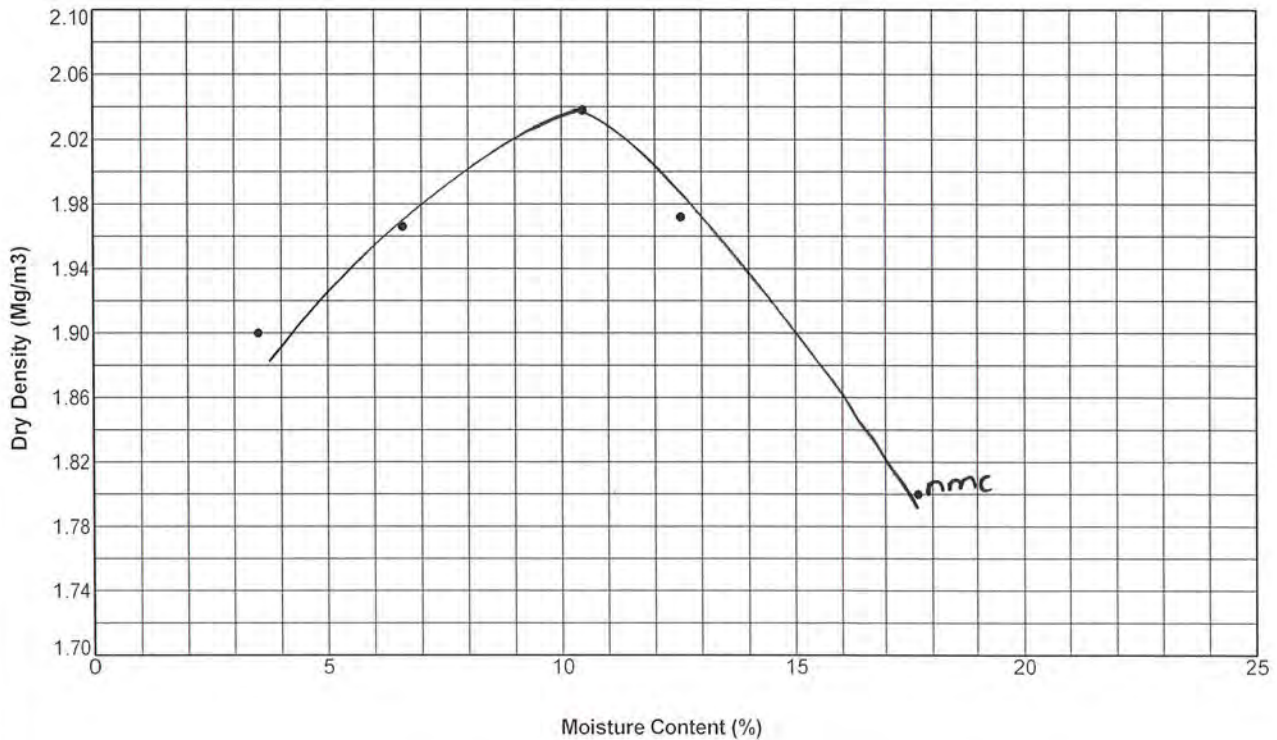
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.04

Retained on 20mm Sieve (%) = 6.0

Date Tested = 06/04/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Signature

Date

27/04/2021

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Contract No. :-  
 4322D





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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR008

Depth (m) :- 1.50

Sample Type & No :- B9

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 11

Particle Density (Measured) = 2.66

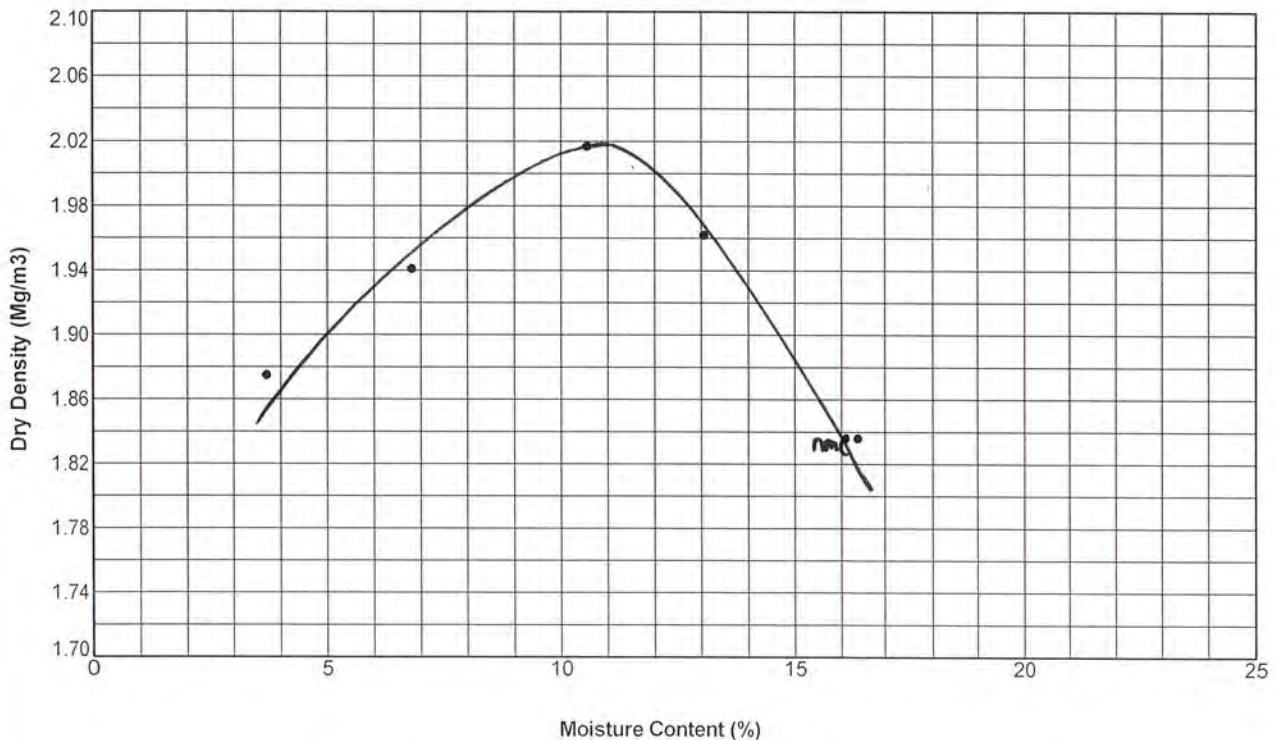
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.02

Retained on 20mm Sieve (%) = 7.3

Date Tested = 01/04/2021

Retained on 37.5mm Sieve (%) = 1.7

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Signed :-

Date of issue :-

27/04/2021

Certificate No :-

COMP/4322D/1

AEG Contract No. :-

4322D

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR009

Depth (m) :- 1.00

Sample Type & No :- B6

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 13

Particle Density (Measured) = 2.64

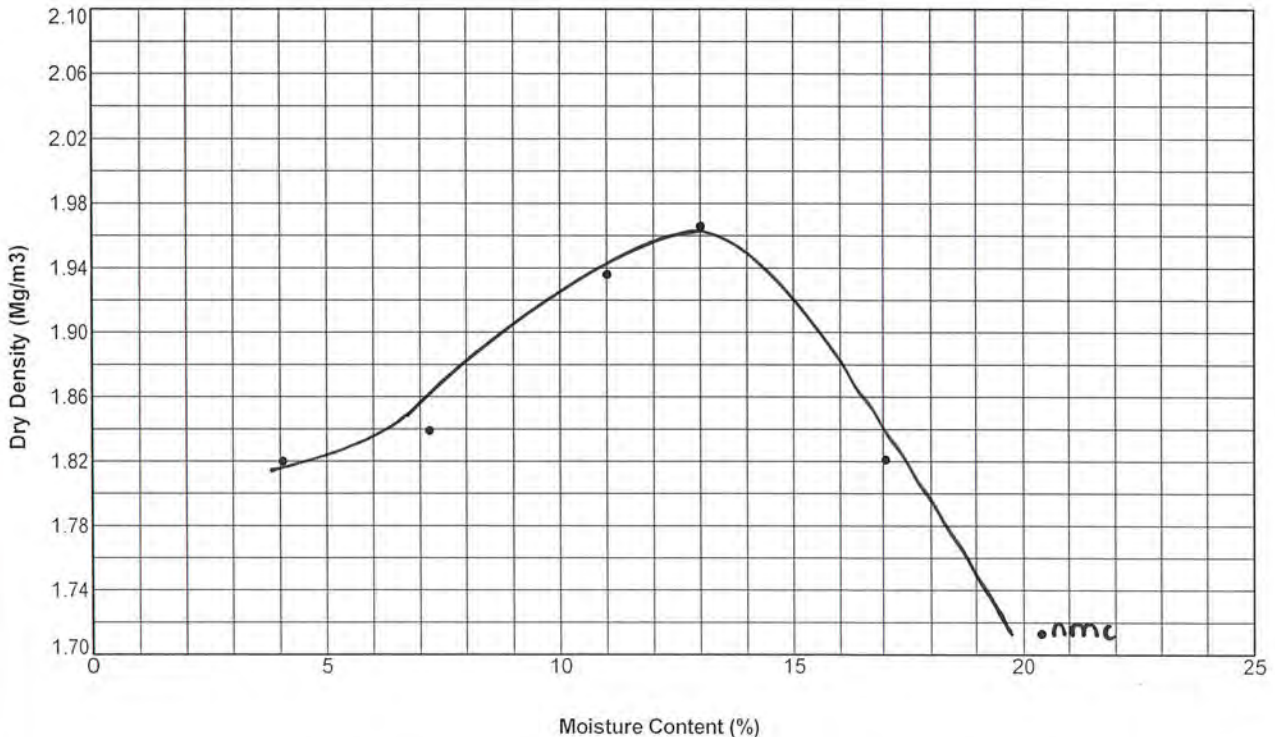
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.97

Retained on 20mm Sieve (%) = 6.0

Date Tested = 01/04/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

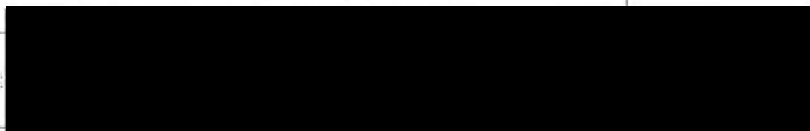
A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



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Date of issue :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP

BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR013

Depth (m) :- 1.00

Sample Type & No :- B4

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 10

Particle Density (Measured) = 2.57

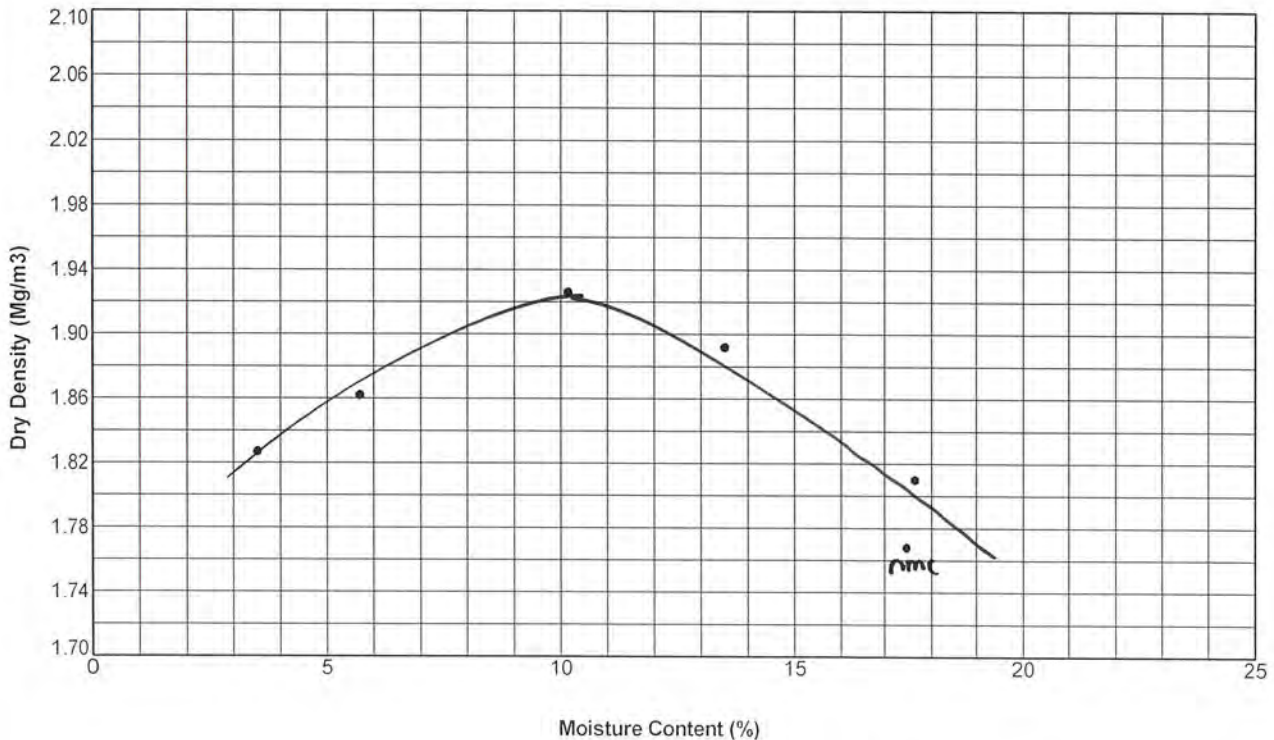
Maximum Dry Density (Mg/m<sup>3</sup>) = 1.93

Retained on 20mm Sieve (%) = 8.0

Date Tested = 06/04/2021

Retained on 37.5mm Sieve (%) = 0.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Sign

Date

27/04/2021

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AEG Contract No. :-

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## MOISTURE CONTENT/DRY DENSITY RELATIONSHIP BS 1377 : Part 4 : 1990

### Specimen Identification

Exploratory Hole No :- TP CLR023

Depth (m) :- 0.80

Sample Type & No :- B6

### Test Method

4.5kg Compaction

Single Sample

### Test Results

Optimum Moisture Content (%) = 11

Particle Density (Assumed) = 2.70

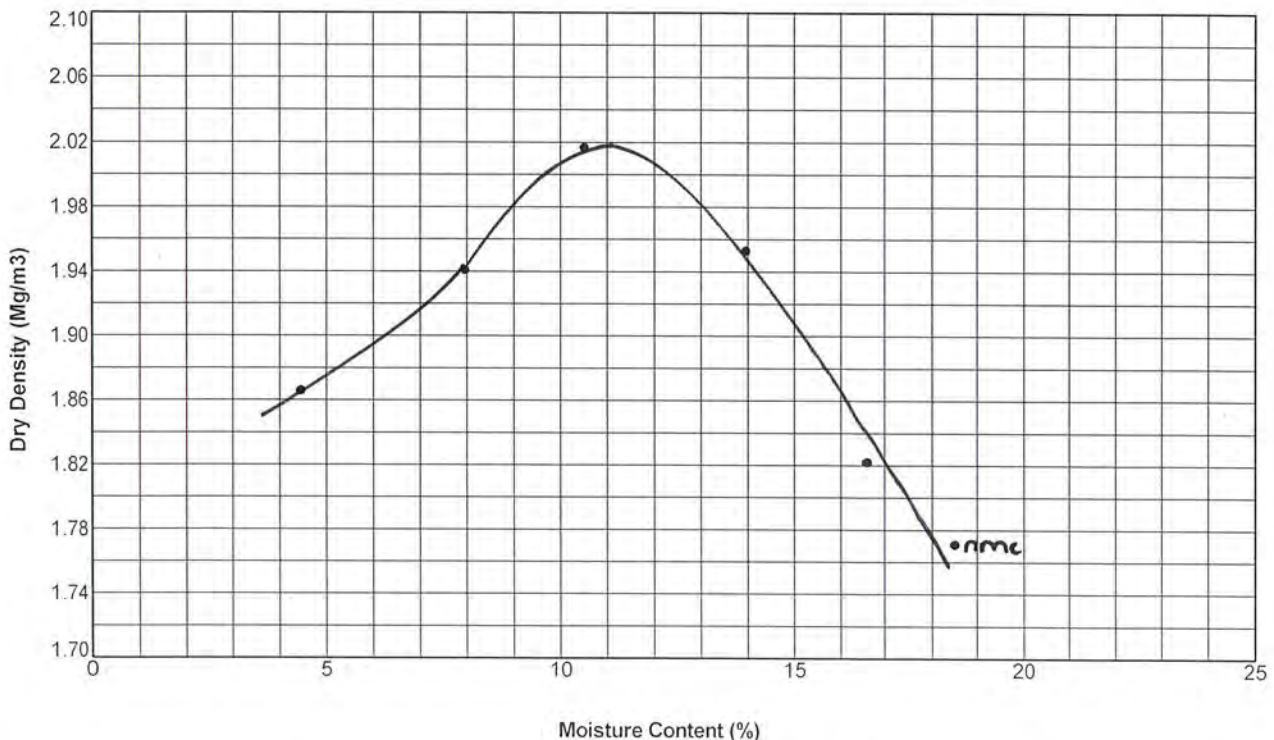
Maximum Dry Density (Mg/m<sup>3</sup>) = 2.02

Retained on 20mm Sieve (%) = 4.2

Date Tested = 31/03/2021

Retained on 37.5mm Sieve (%) = 1.0

### Remarks :



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Signed :-

Date of issue :-

27/04/2021

Certificate No :-

COMP/4322D/1

AEG Contract No. :-

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## Determination of MCV/Moisture Relationship





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell

Chester-le-Street, Co Durham DH2 2RG

a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

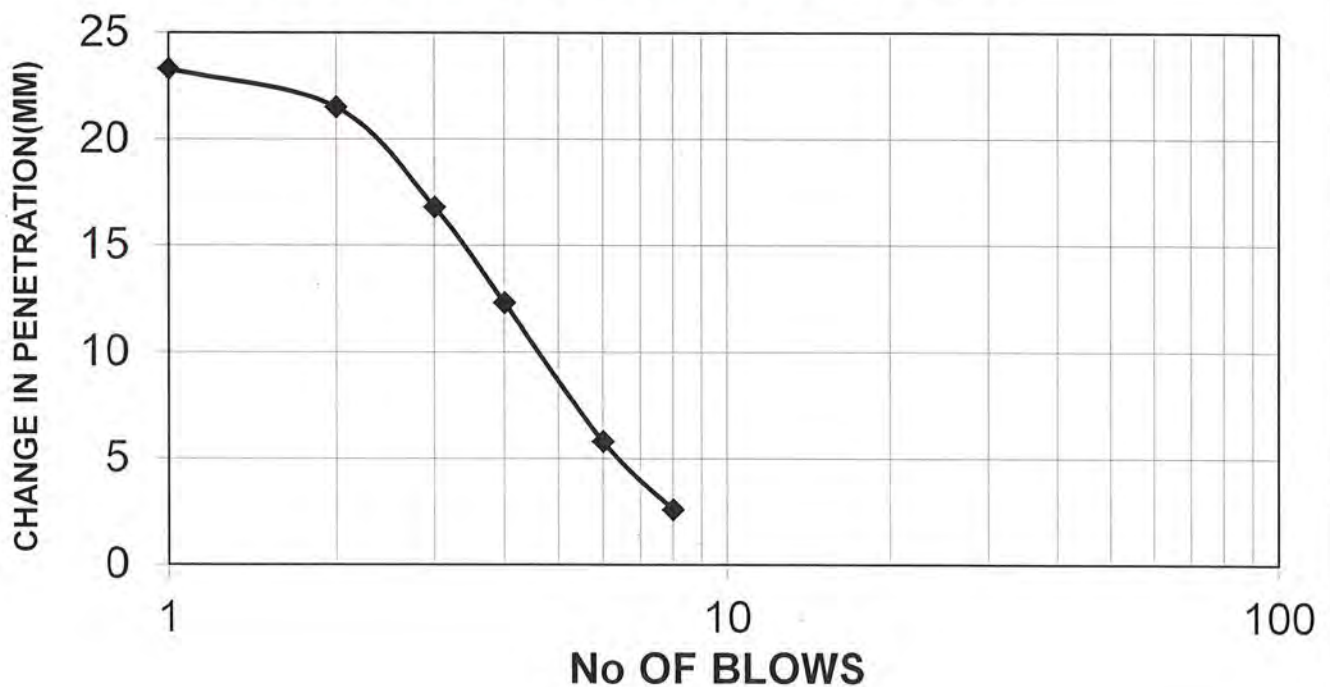
**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D

**CLIENT:** AMEY OW Limited      **Depth:** 1.00m

**Sample No:** TP CLR013 B4      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CHANGE IN PENETRATION PLOT



Sample	NAT
MCV	8.1
M.C.(%)	18
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>	

**Remarks:** 8.0% Retained on 20mm sieve  
Insufficient sample for 5 point test

DATE TESTED: 06/05/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:

NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell

Chester-le-Street, Co Durham DH2 2RG

a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**


No. 1367

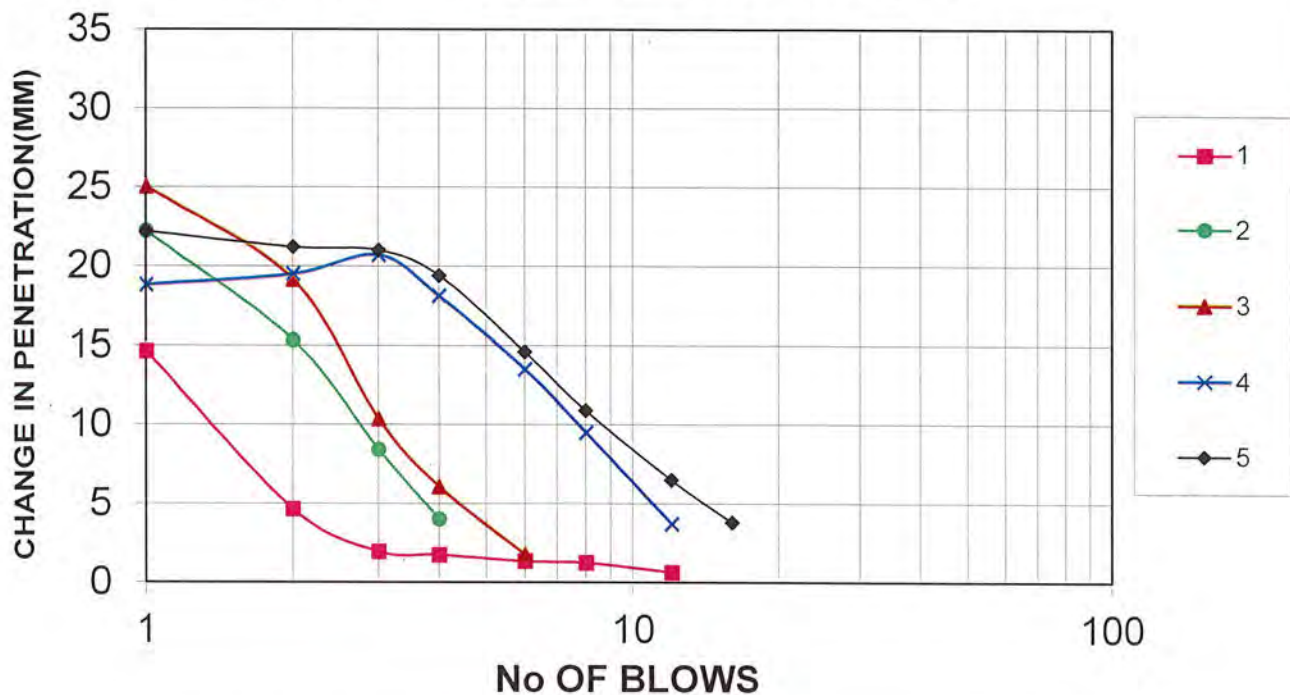
**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D

**CLIENT:** AMEY OW Limited      **Depth:** 0.50m

**Sample No:** TP CLR002 B4      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CHANGE IN PENETRATION PLOT



Sample	1	2	3	4 (NAT)	5
MCV	2.9	5.7	6.4	10.4	11.6
M.C.(%)	28	27	26	25	22
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 3.0% Retained on 20mm sieve.

DATE TESTED: 06/05/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY

NAME: Michelle Selkirk



**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
 Chester-le-Street , Co Durham DH2 2RG  
 a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

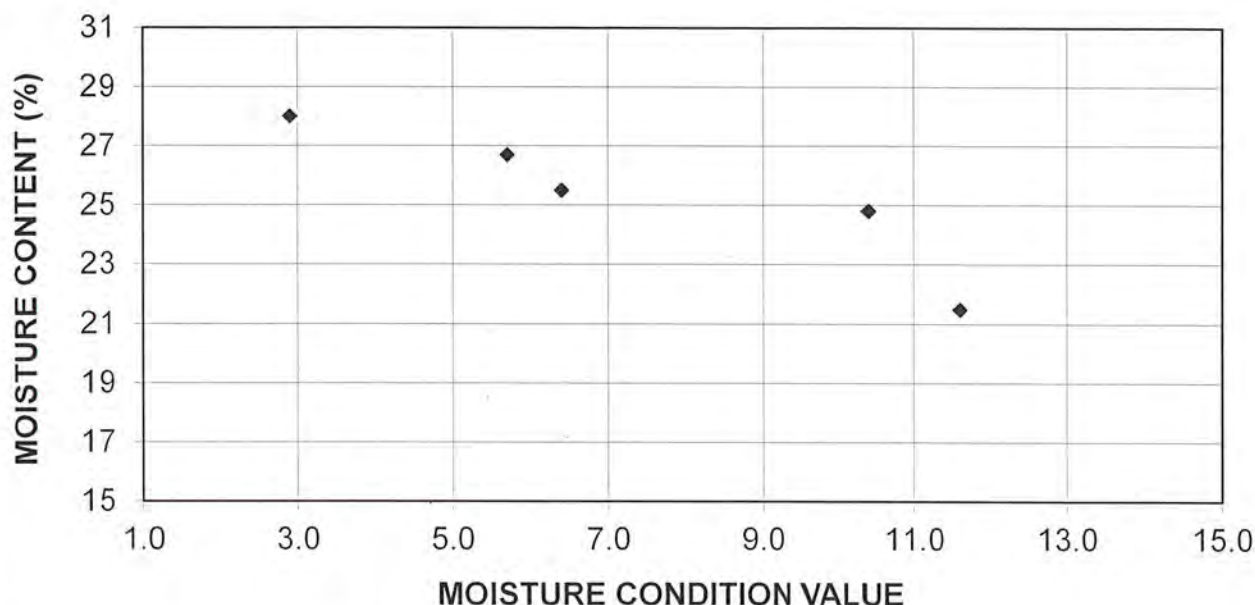


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 0.50m  
**Sample No:** TP CLR002 B4      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CALIBRATION LINE**



Sample	1	2	3	4 (NAT)	5
MCV	2.9	5.7	6.4	10.4	11.6
M.C.(%)	28	27	26	25	22
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
INTERCEPT (MC% AXIS)			29.99	REMARKS:	
SLOPE			-0.634		
SENSITIVITY (1/SLOPE)			-1.578		





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 Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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 a UKAS Testing Laboratory No.1367  
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

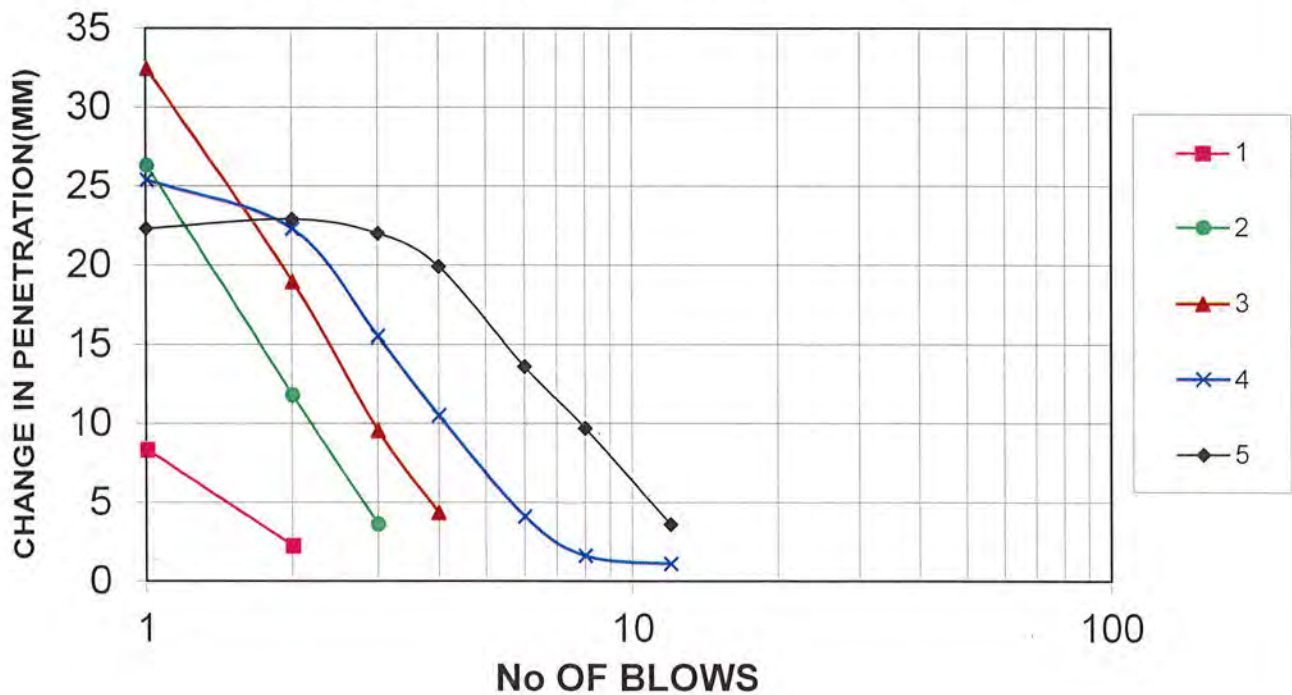


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.40m  
**Sample No:** TP CLR004 B7      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CHANGE IN PENETRATION PLOT**



Sample	1	2	3	4 (NAT)	5
MCV	1.7	4.5	5.8	7.6	10.4
M.C.(%)	18	16	16	15	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 13.9% Retained on 20mm sieve.

DATE TESTED: 06/05/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

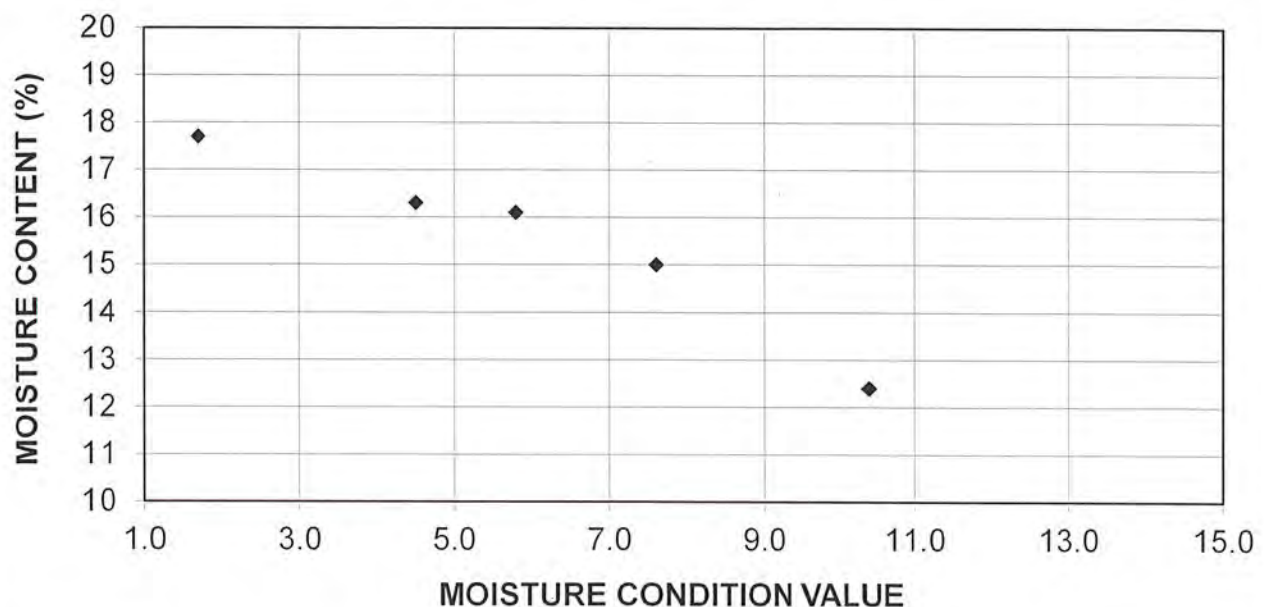


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.40m  
**Sample No:** TP CLR004 B7      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2	3	4 (NAT)	5
MCV	1.7	4.5	5.8	7.6	10.4
M.C.(%)	18	16	16	15	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
INTERCEPT (MC% AXIS)			19.04	REMARKS:	
SLOPE			-0.591		
SENSITIVITY (1/SLOPE)			-1.693		



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 Unit 25 Stella Gill Industrial Estate , Pelton Fell  
 Chester-le-Street , Co Durham DH2 2RG  
 a UKAS Testing Laboratory No.1367  
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.00m  
**Sample No:** TP CLR005 B6      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



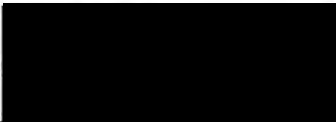
Sample	1	2 (NAT)	3	4	5
MCV	6.2	8.3	8.9	11.3	11.7
M.C.(%)	19	18	17	15	14
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 5.6% Retained on 20mm sieve.

DATE TESTED: 30/04/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY



NAME: Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

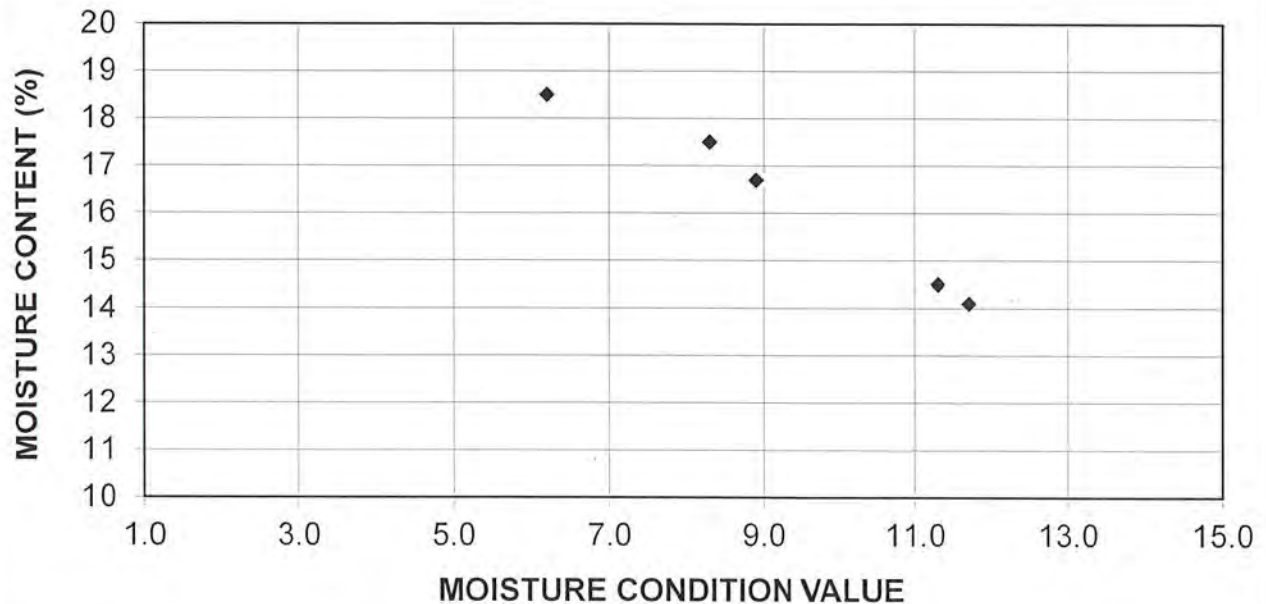


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.00m  
**Sample No:** TP CLR005 B6      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	6.2	8.3	8.9	11.3	11.7
M.C.(%)	19	18	17	15	14
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
INTERCEPT (MC% AXIS)			23.97	REMARKS:	
SLOPE			-0.831		
SENSITIVITY (1/SLOPE)			-1.203		





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell

Chester-le-Street, Co Durham DH2 2RG

a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8

**JOB No:** 4322D

**CLIENT:** AMEY OW Limited

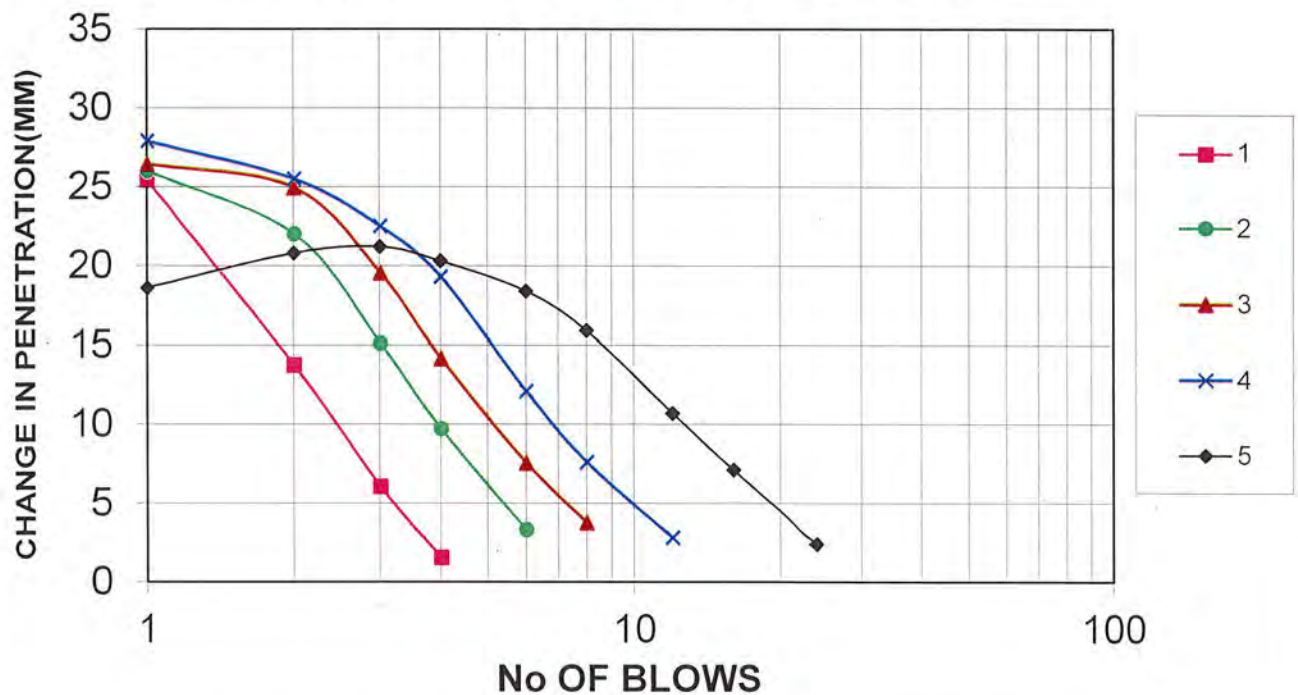
**Depth:** 0.80m

**Sample No:** TP CLR007 B5

**Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CHANGE IN PENETRATION PLOT



Sample	1	2	3 (NAT)	4	5
MCV	5.3	7.3	8.7	10.0	12.8
M.C.(%)	19	18	17	15	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 5.9% Retained on 20mm sieve.

DATE TESTED: 05/05/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:



NAME:

Michelle Selkirk



## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No. 1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**



No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8

**JOB No:** 4322D

**CLIENT:** AMEY OW Limited

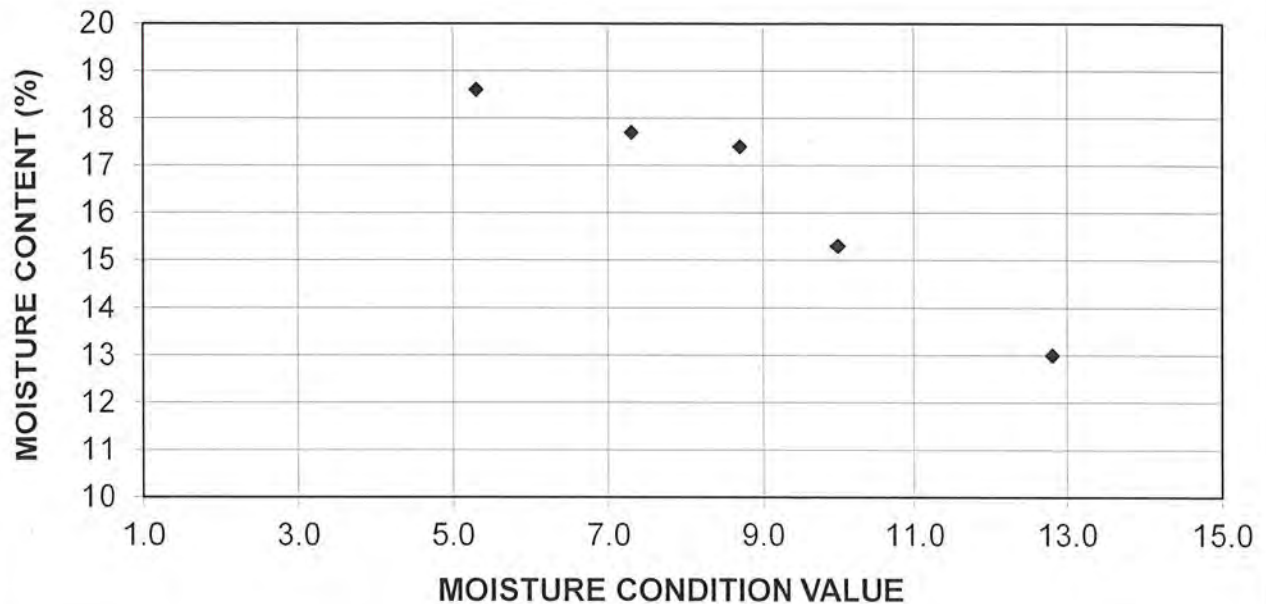
**Depth:** 0.80m

**Sample No:** TP CLR007 B5

**Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2	3 (NAT)	4	5
MCV	5.3	7.3	8.7	10.0	12.8
M.C.(%)	19	18	17	15	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
INTERCEPT (MC% AXIS)			23.21	REMARKS:	
SLOPE			-0.772		
SENSITIVITY (1/SLOPE)			-1.295		





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Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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 a UKAS Testing Laboratory No.1367



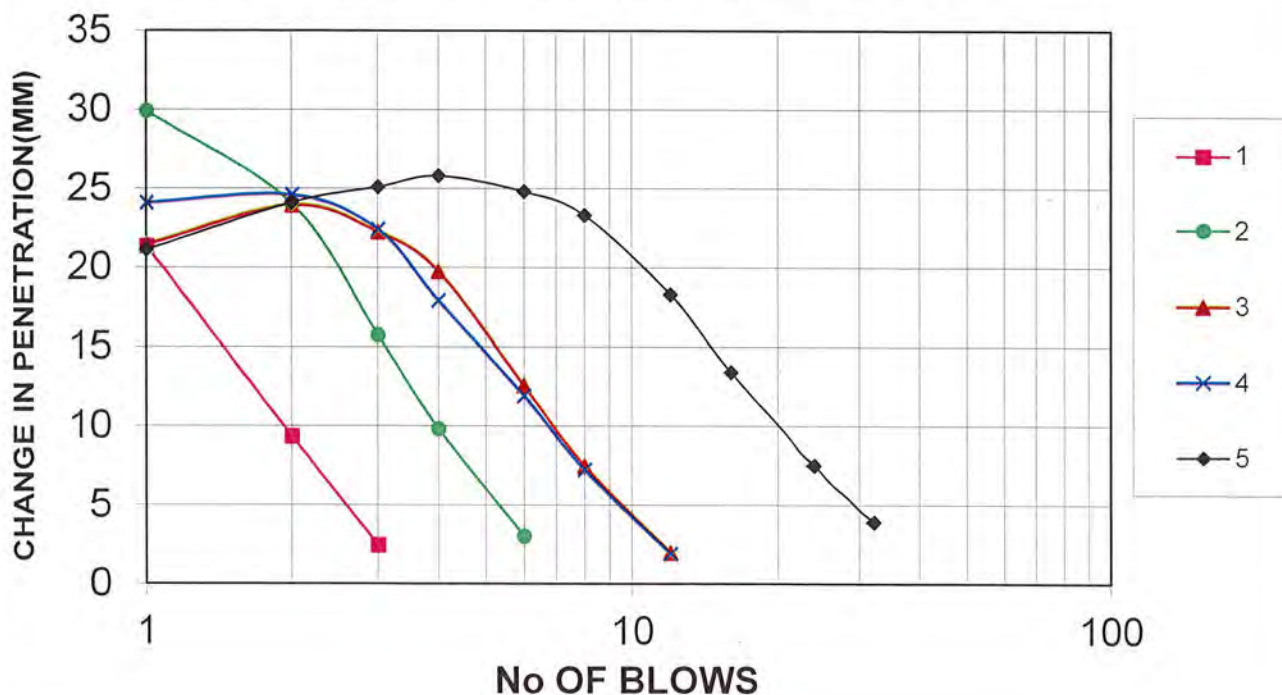
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.50m  
**Sample No:** TP CLR008 B9      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



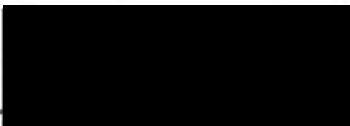
Sample	1	2	3	4 (NAT)	5
MCV	4.2	8.6	9.5	9.7	14.6
M.C.(%)	19	18	17	16	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 7.3% Retained on 20mm sieve.

DATE TESTED: 06/05/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

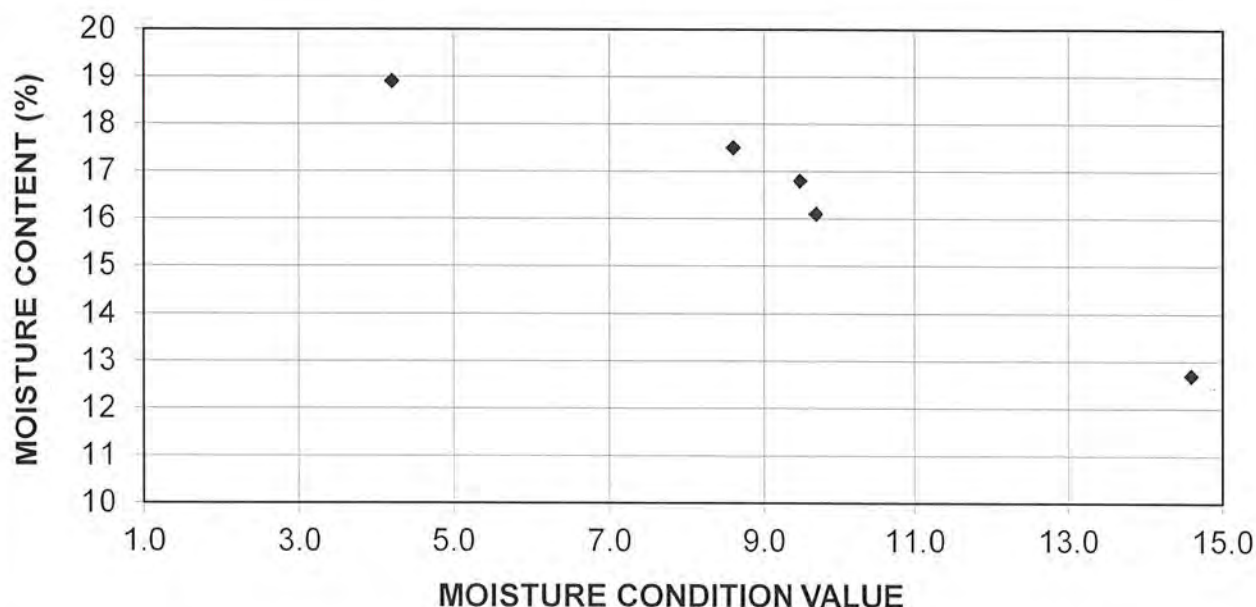


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.50m  
**Sample No:** TP CLR008 B9      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2	3	4 (NAT)	5
MCV	4.2	8.6	9.5	9.7	14.6
M.C.(%)	19	18	17	16	13
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
INTERCEPT (MC% AXIS)		22.04		REMARKS:	
SLOPE		-0.605			
SENSITIVITY (1/SLOPE)		-1.652			



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Unit 25 Stella Gill Industrial Estate , Pelton Fell

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a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

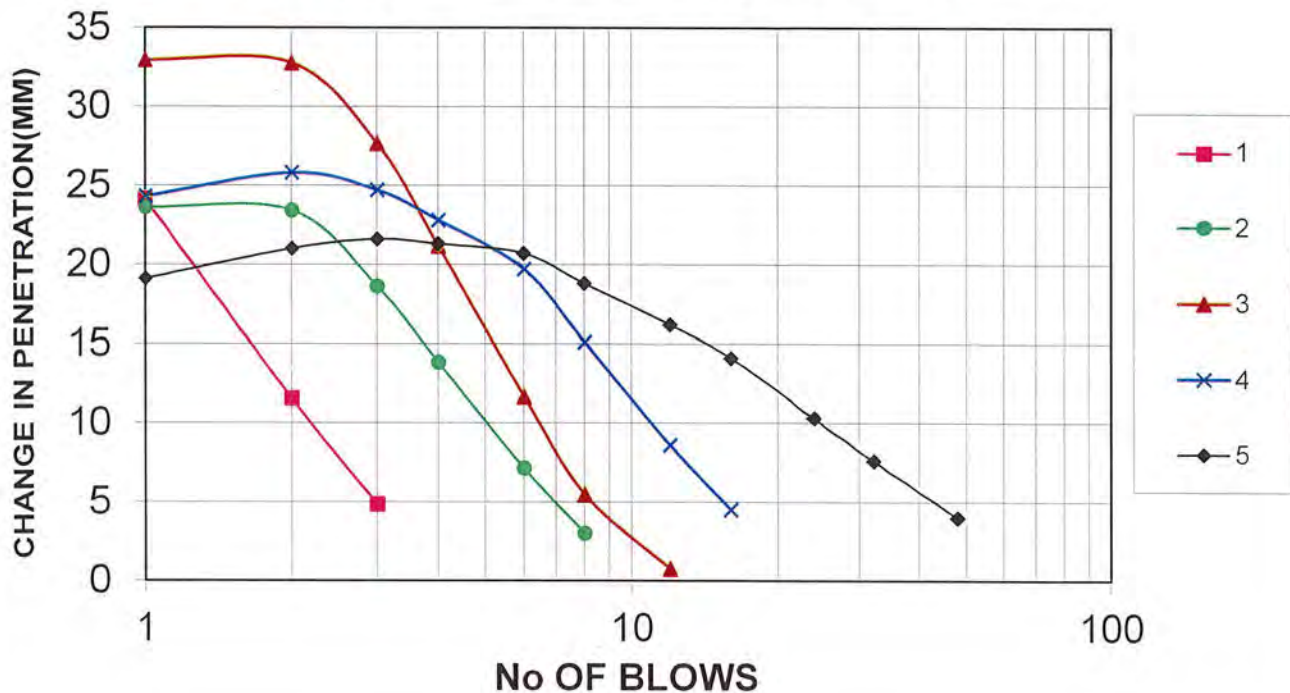


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.00m  
**Sample No:** TP CLR009 B6      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CHANGE IN PENETRATION PLOT**



Sample	1	2 (NAT)	3	4	5
MCV	4.6	8.4	9.2	11.9	16.2
M.C.(%)	22	21	19	16	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

**Remarks:** 6.0% Retained on 20mm sieve.

DATE TESTED: 29/04/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
Chester-le-Street , Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

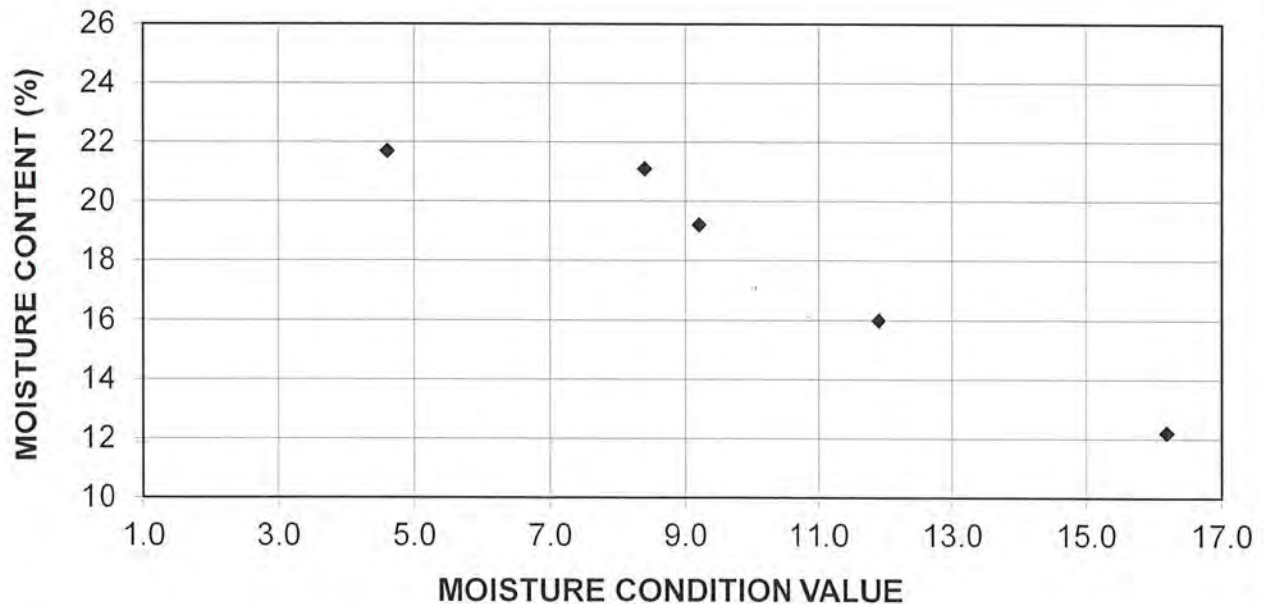


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 1.00m  
**Sample No:** TP CLR009 B6      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2 (NAT)	3	4	5
MCV	4.6	8.4	9.2	11.9	16.2
M.C.(%)	22	21	19	16	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>		26.92		<b>REMARKS:</b>	
<b>SLOPE</b>		-0.883			
<b>SENSITIVITY (1/SLOPE)</b>		-1.133			





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Unit 25 Stella Gill Industrial Estate , Pelton Fell  
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 a UKAS Testing Laboratory No.1367



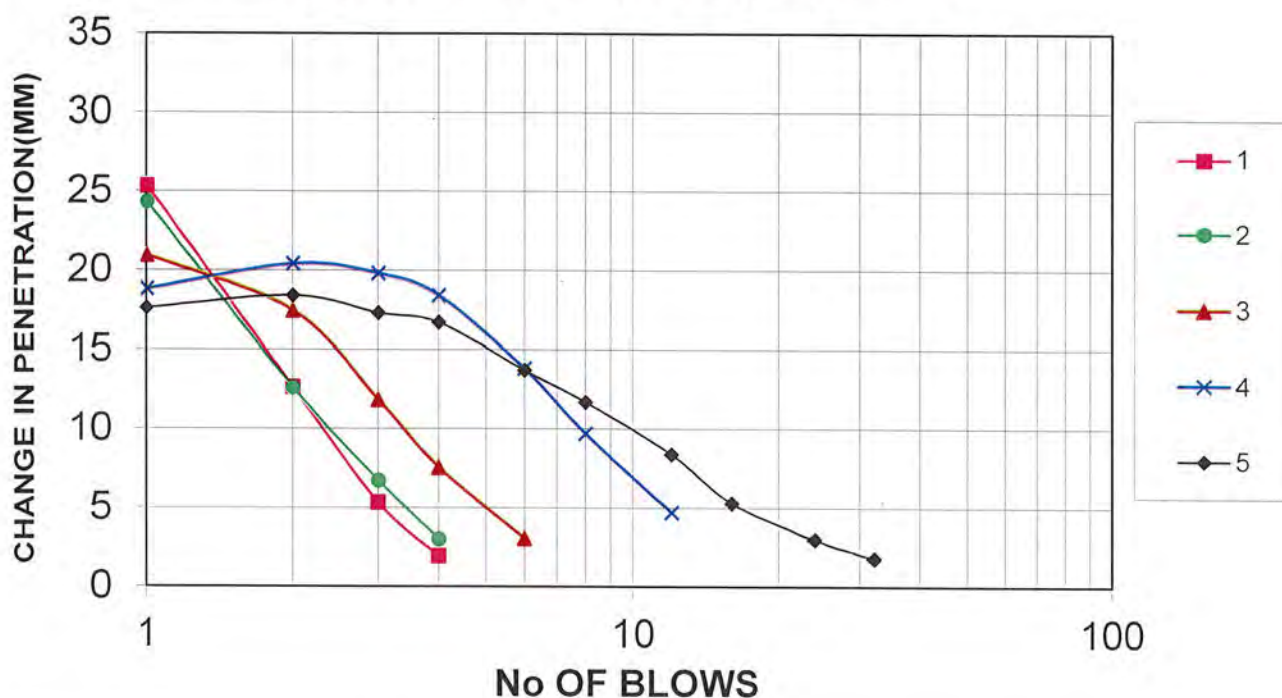
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 2.00m  
**Sample No:** TP CLR020 B7      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



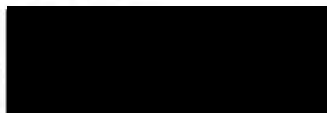
Sample	1	2	3	4	5 (NAT)
MCV	5.0	5.4	7.0	10.7	12.3
M.C.(%)	18	17	16	14	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 14.0% Retained on 20mm sieve.

DATE TESTED: 29/04/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:



NAME: Michelle Selkirk



**ALLIED EXPLORATION & GEOTECHNICS LIMITED**

Unit 25 Stella Gill Industrial Estate , Pelton Fell  
 Chester-le-Street , Co Durham DH2 2RG  
 a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

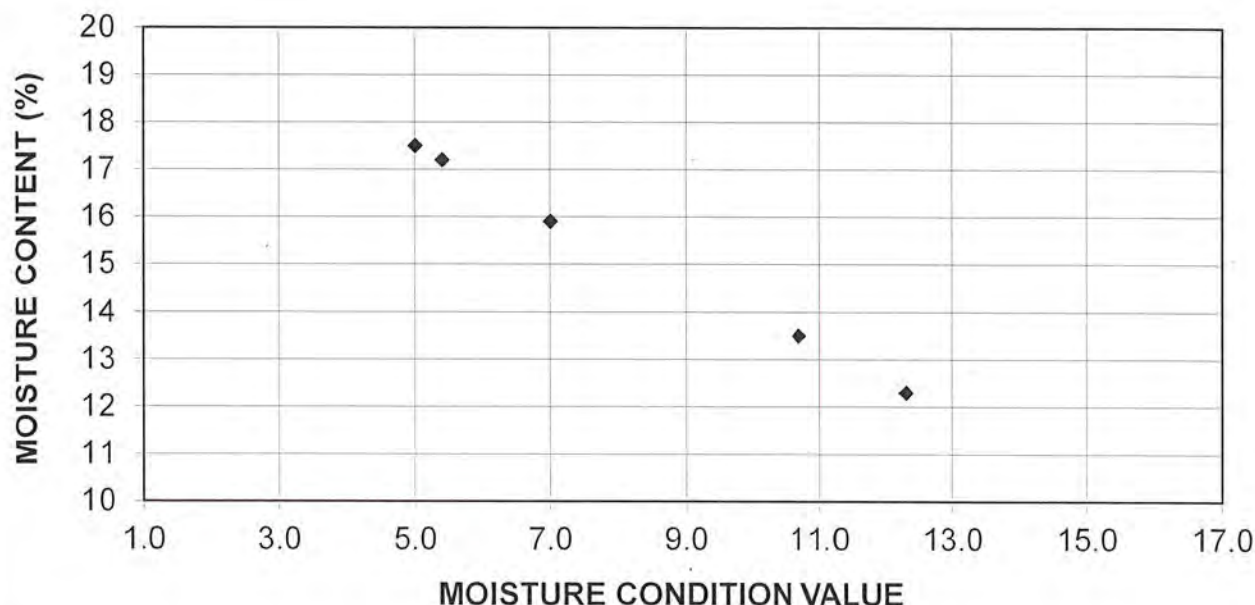


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 2.00m  
**Sample No:** TP CLR020 B7      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

**CALIBRATION LINE**



Sample	1	2	3	4	5 (NAT)
MCV	5.0	5.4	7.0	10.7	12.3
M.C.(%)	18	17	16	14	12
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
INTERCEPT (MC% AXIS)			20.96	REMARKS:	
SLOPE			-0.703		
SENSITIVITY (1/SLOPE)			-1.422		





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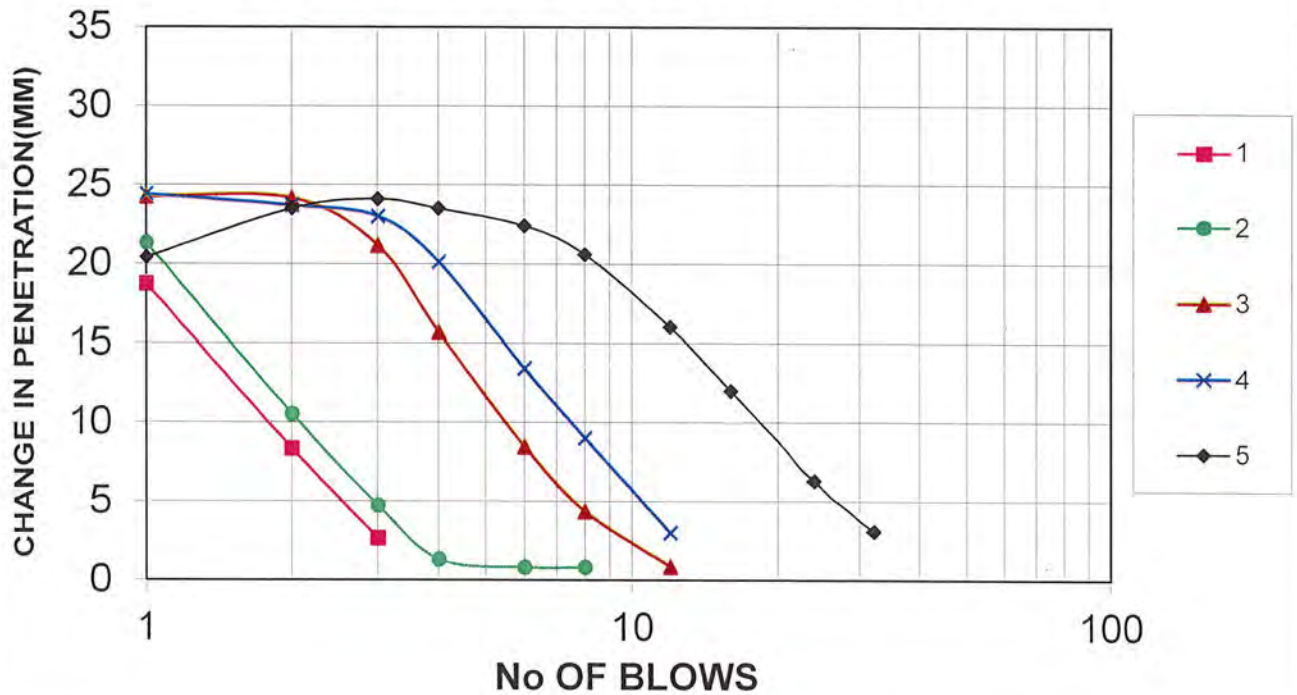
**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 0.80m  
**Sample No:** TP CLR023 B6      **Specific Depth:** N/A

For sample description please refer to sample description sheet.

**CHANGE IN PENETRATION PLOT**



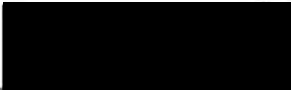
Sample	1	2	3 (NAT)	4	5
MCV	4.1	4.7	8.8	10.2	14.3
M.C.(%)	21	21	18	16	14
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					

Remarks: 4.2% Retained on 20mm sieve.

DATE TESTED: 06/05/2021

DATE OF ISSUE: 28/05/2021

APPROVED BY:



NAME: Michelle Selkirk





## ALLIED EXPLORATION & GEOTECHNICS LIMITED

Unit 25 Stella Gill Industrial Estate, Pelton Fell  
Chester-le-Street, Co Durham DH2 2RG  
a UKAS Testing Laboratory No.1367

**MOISTURE CONDITION VALUE (BS 1377:PART4:1990 CLAUSE 5)**

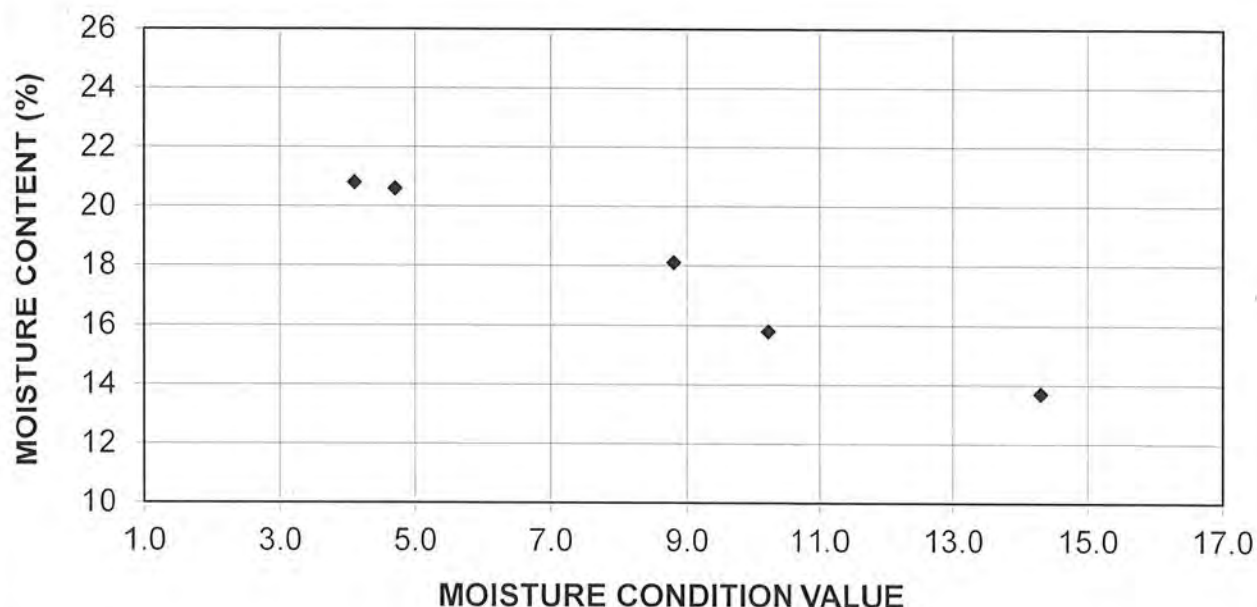


No. 1367

**SITE:** A66 North Trans Pennine Scheme D Section 8      **JOB No:** 4322D  
**CLIENT:** AMEY OW Limited      **Depth:** 0.80m  
**Sample No:** TP CLR023 B6      **Specific Depth:** N/A

**For sample description please refer to sample description sheet.**

### CALIBRATION LINE



Sample	1	2	3 (NAT)	4	5
MCV	4.1	4.7	8.8	10.2	14.3
M.C.(%)	21	21	18	16	14
<b>MCV = 10 Log No. OF BLOWS @ 5MM PENETRATION</b>					
<b>INTERCEPT (MC% AXIS)</b>			23.89	<b>REMARKS:</b>	
<b>SLOPE</b>			-0.724		
<b>SENSITIVITY (1/SLOPE)</b>			-1.382		

## Determination of California Bearing Ratio



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## DETERMINATION OF THE CALIFORNIA BEARING RATIO

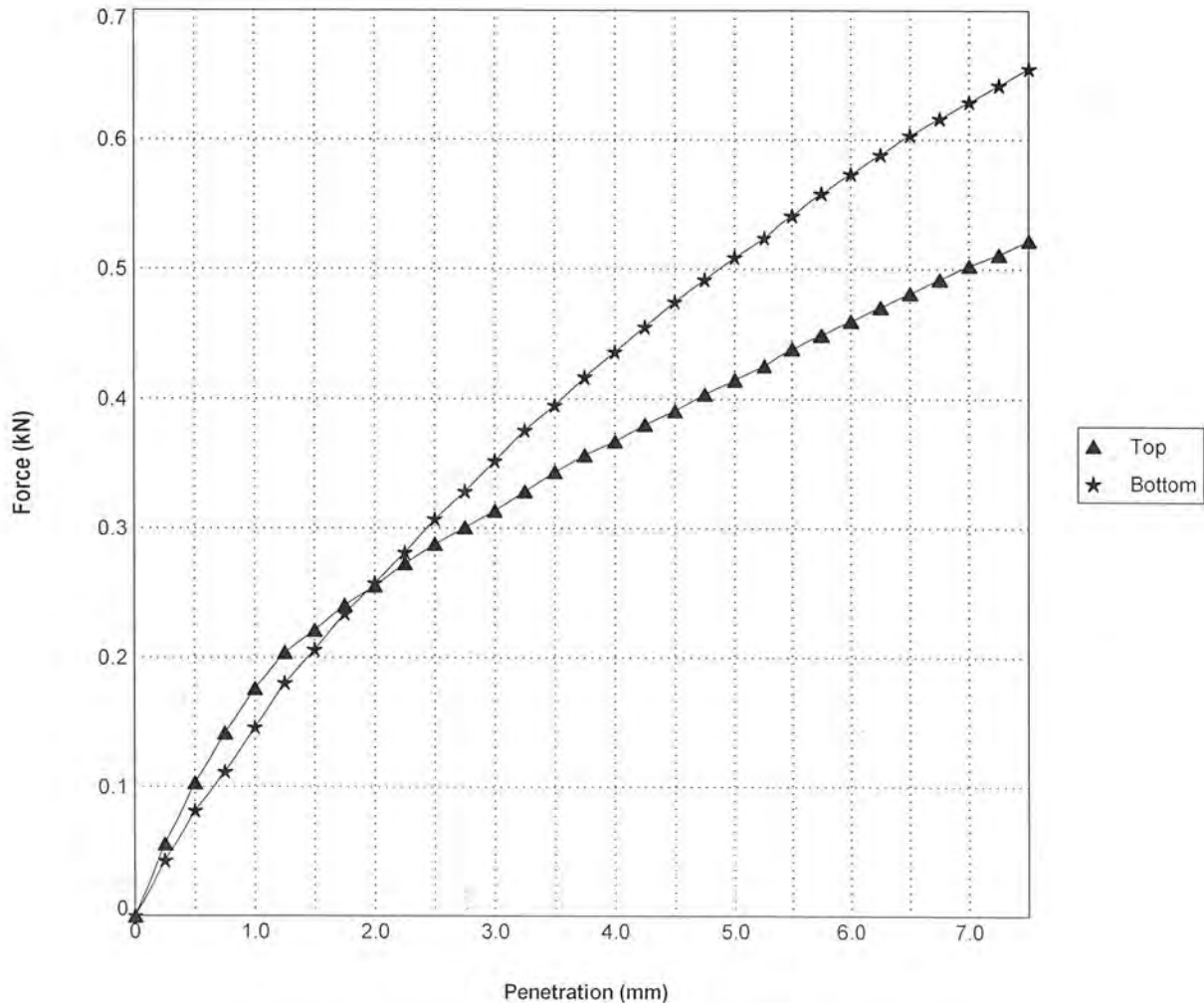
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - TP CLR002

Sample No. - B4

Depth (m) - 0.50

"As Received" Moisture Content (%) :	Surcharge (Kg) :	6
Retained on 20mm (%) :	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	Test Moisture Content (%) :	Top 26 / Bottom 25
Soaking Time (Days) :	Bulk Density (Mg/m <sup>3</sup> ) :	2.00
Swelling (mm) :	Dry Density (Mg/m <sup>3</sup> ) :	1.60
Date Tested :	CBR Value (%) :	Top 2.2 / Bottom 2.6
Preparation Method :	4.5kg Compaction	
Remarks :		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

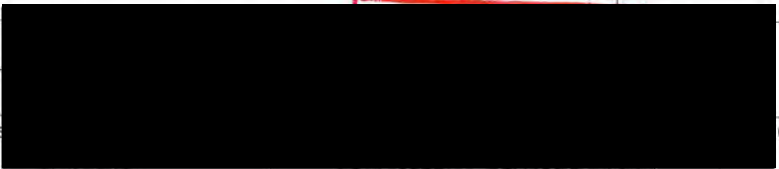
Client :-

AMEY OW Limited



Signed :-

Date of is



Page 1 of 1

Contract No. :-  
4322D





# ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG - Tel: 0191 387 4700 Fax: 0191 387 4710  
Regional Office: Unit 20, Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## DETERMINATION OF THE CALIFORNIA BEARING RATIO

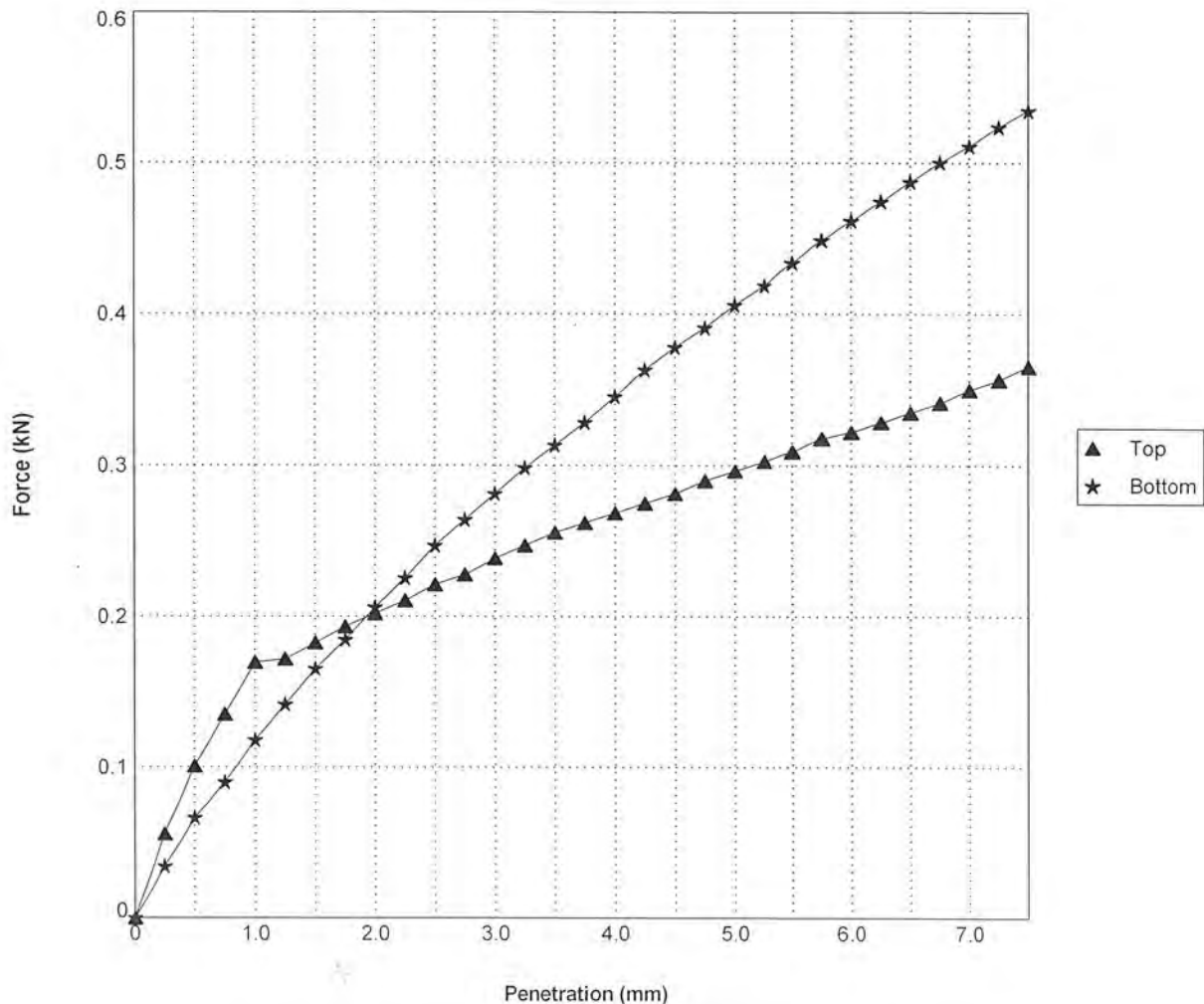
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- TP CLR002A

Sample No.- B5

Depth (m)- 0.80

"As Received" Moisture Content (%) :	Surcharge (Kg) :	6
Retained on 20mm (%) :	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	Test Moisture Content (%) :	Top 25 / Bottom 23
Soaking Time (Days) :	Bulk Density (Mg/m <sup>3</sup> ) :	2.02
Swelling (mm) :	Dry Density (Mg/m <sup>3</sup> ) :	1.63
Date Tested :	04/03/2021	CBR Value (%) :
Preparation Method :	4.5kg Compaction	Top 1.7 / Bottom 2.0
Remarks :		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Signed :-

Date of issue :-

27/04/2021

Certificate No. :-

CBR/4322D/TP CLR002A/B5/0.80/1

Contract No. :-

4322D

Page 1 of 1



# ALLIED EXPLORATION & GEOTECHNICS LIMITED

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

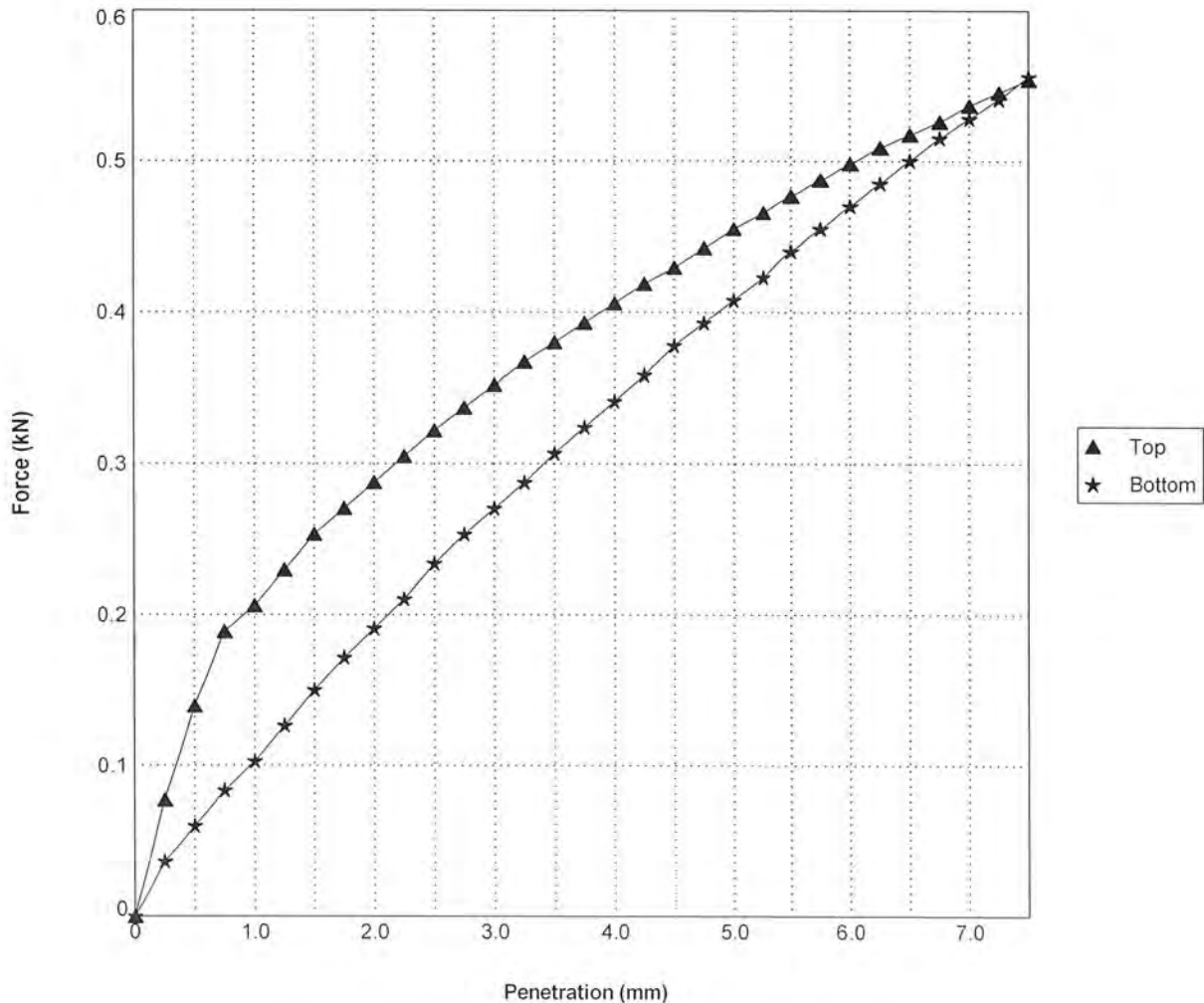
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP CLR004**

Sample No.- **B4**

Depth (m)- **0.50**

"As Received" Moisture Content (%) :	Surcharge (Kg) :	6
Retained on 20mm (%) :	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	Test Moisture Content (%) :	Top 19 / Bottom 18
Soaking Time (Days) :	Bulk Density (Mg/m <sup>3</sup> ) :	2.09
Swelling (mm) :	Dry Density (Mg/m <sup>3</sup> ) :	1.77
Date Tested :	CBR Value (%) :	Top 2.4 / Bottom 2.0
Preparation Method :	4.5kg Compaction	
Remarks :		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



Signed :

Date of



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Contract No. :-  
4322D



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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

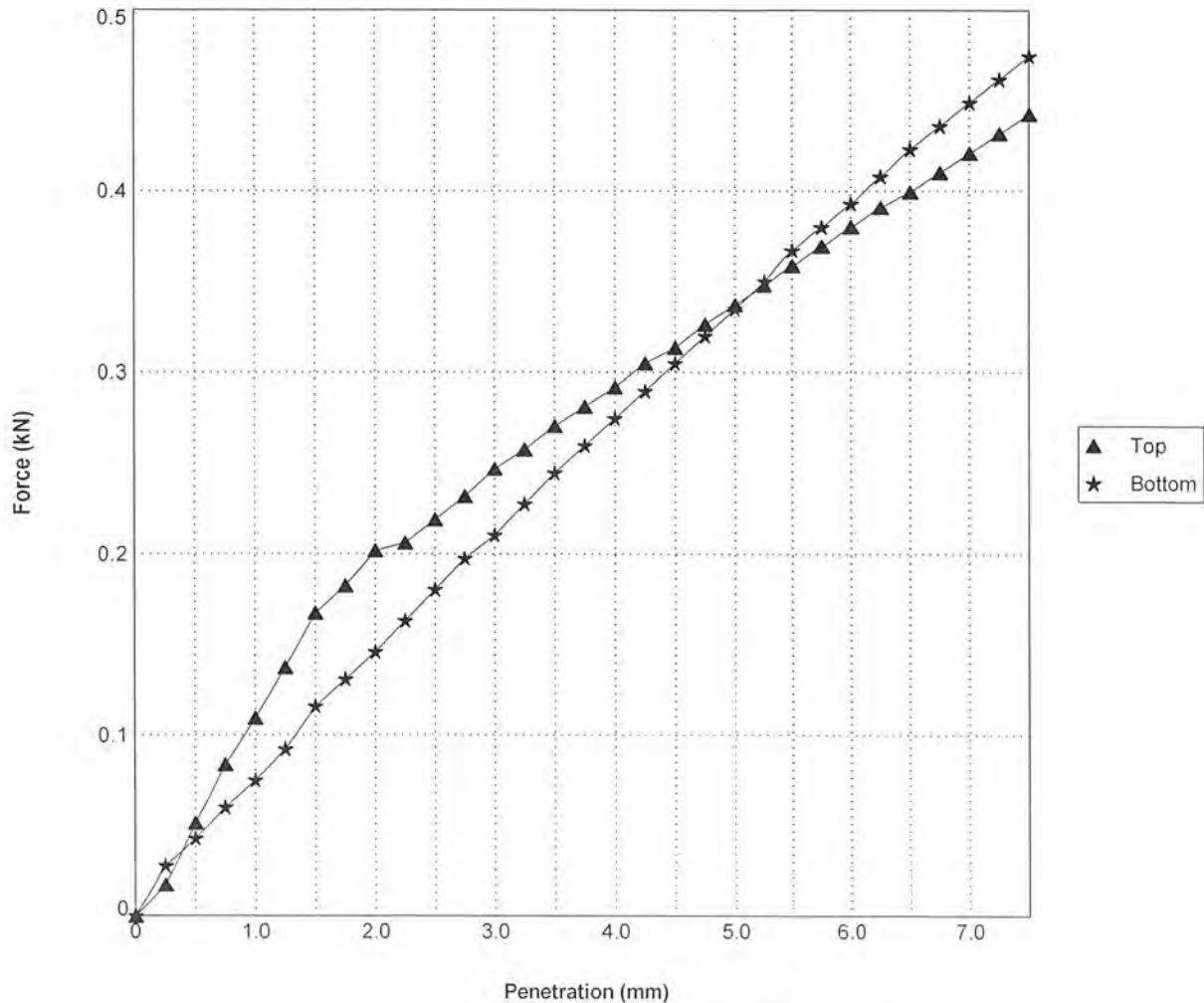
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- TP CLR005

Sample No.- B9

Depth (m)- 2.00

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	20.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 15 / Bottom 14
Soaking Time (Days) :	8	Bulk Density (Mg/m <sup>3</sup> ) :	2.19
Swelling (mm) :	0.01	Dry Density (Mg/m <sup>3</sup> ) :	1.91
Date Tested :	07/04/2021	CBR Value (%) :	Top 1.7 / Bottom 1.7
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

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Date of issue :-

27/04/2021

Certificate No :-

CBR/4322D/TP CLR005/B9/2.00/1

AEG Contract No. :-

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

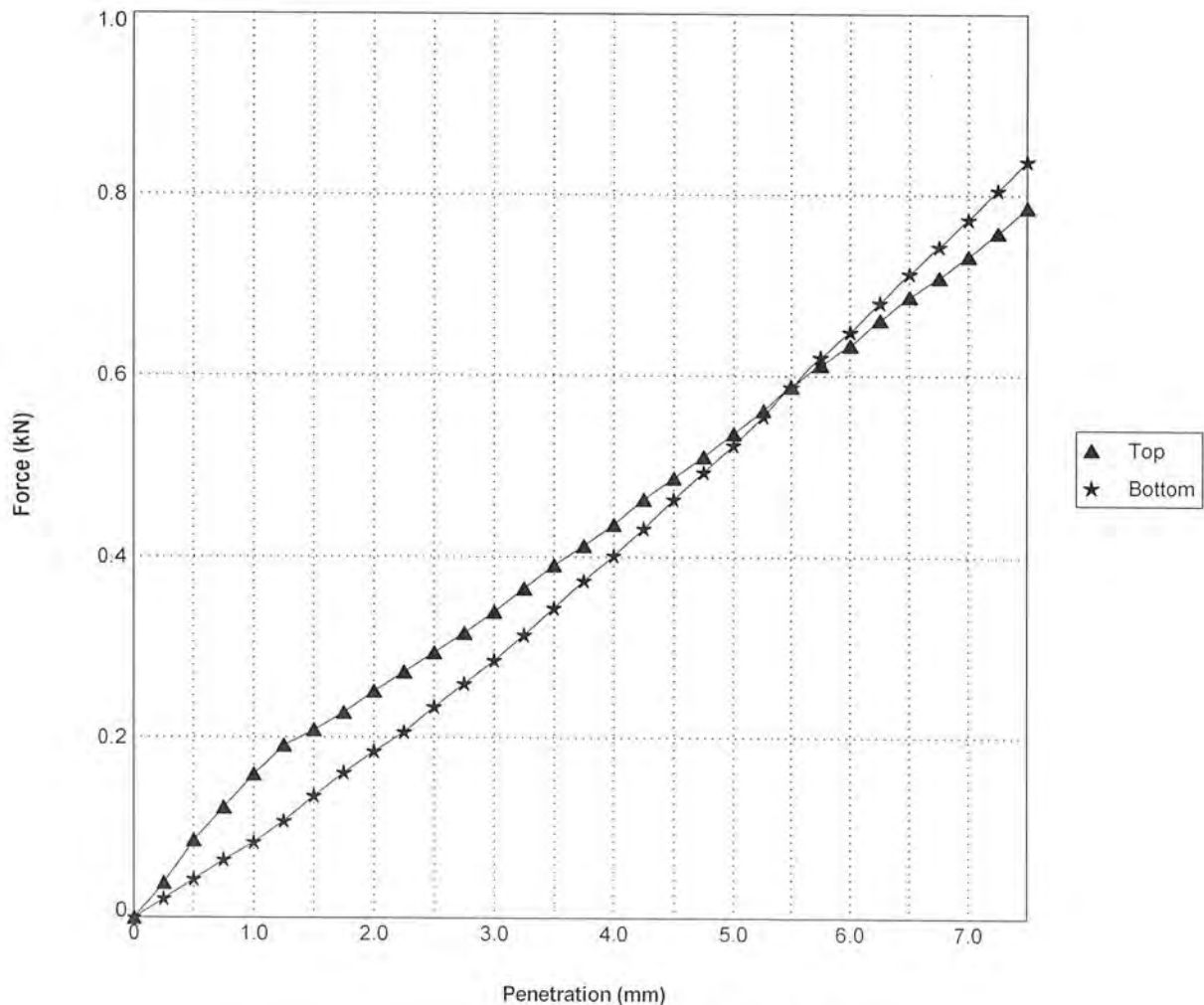
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP CLR007**

Sample No.- **B8**

Depth (m)- **1.80**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	12.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 14 / Bottom 14
Soaking Time (Days) :	12	Bulk Density (Mg/m <sup>3</sup> ) :	2.19
Swelling (mm) :	0.2	Dry Density (Mg/m <sup>3</sup> ) :	1.92
Date Tested :	01/04/2021	CBR Value (%) :	Top 2.7 / Bottom 2.6
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



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Date of issue :-

27/04/2021

Certificate No. :-

CBR/4322D/TP CLR007/B8/1.80/1

AEG Contract No. :-

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

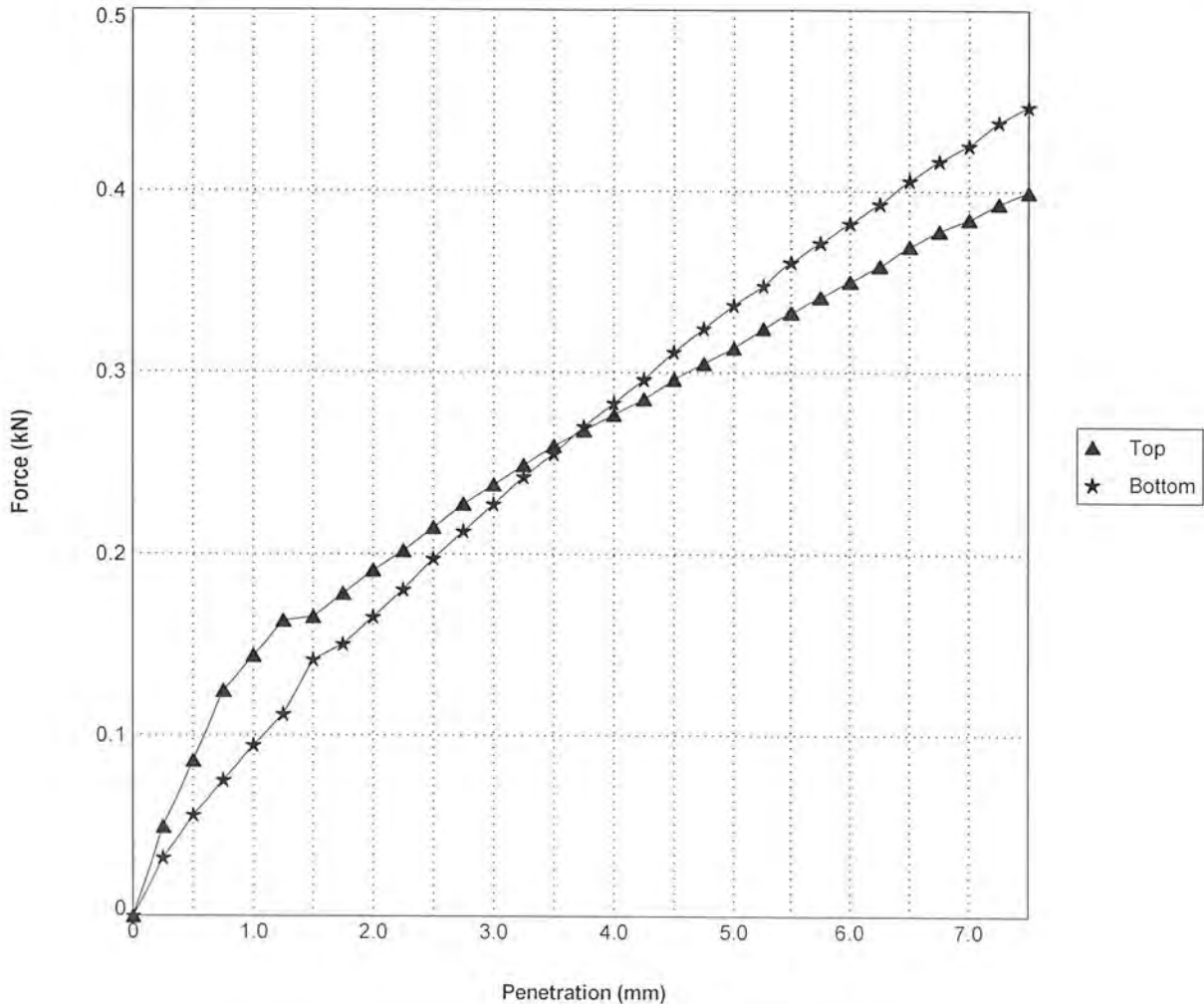
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- TP CLR008

Sample No.- B6

Depth (m)- 1.00

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	11.0	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 18 / Bottom 18
Soaking Time (Days) :	7	Bulk Density (Mg/m <sup>3</sup> ) :	2.13
Swelling (mm) :	0.1	Dry Density (Mg/m <sup>3</sup> ) :	1.80
Date Tested :	08/04/2021	CBR Value (%) :	Top 1.6 / Bottom 1.7
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

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Date of issue

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CBR/4322D/TP CLR008/B6/1.00/1

AEG Contract No. :-  
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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

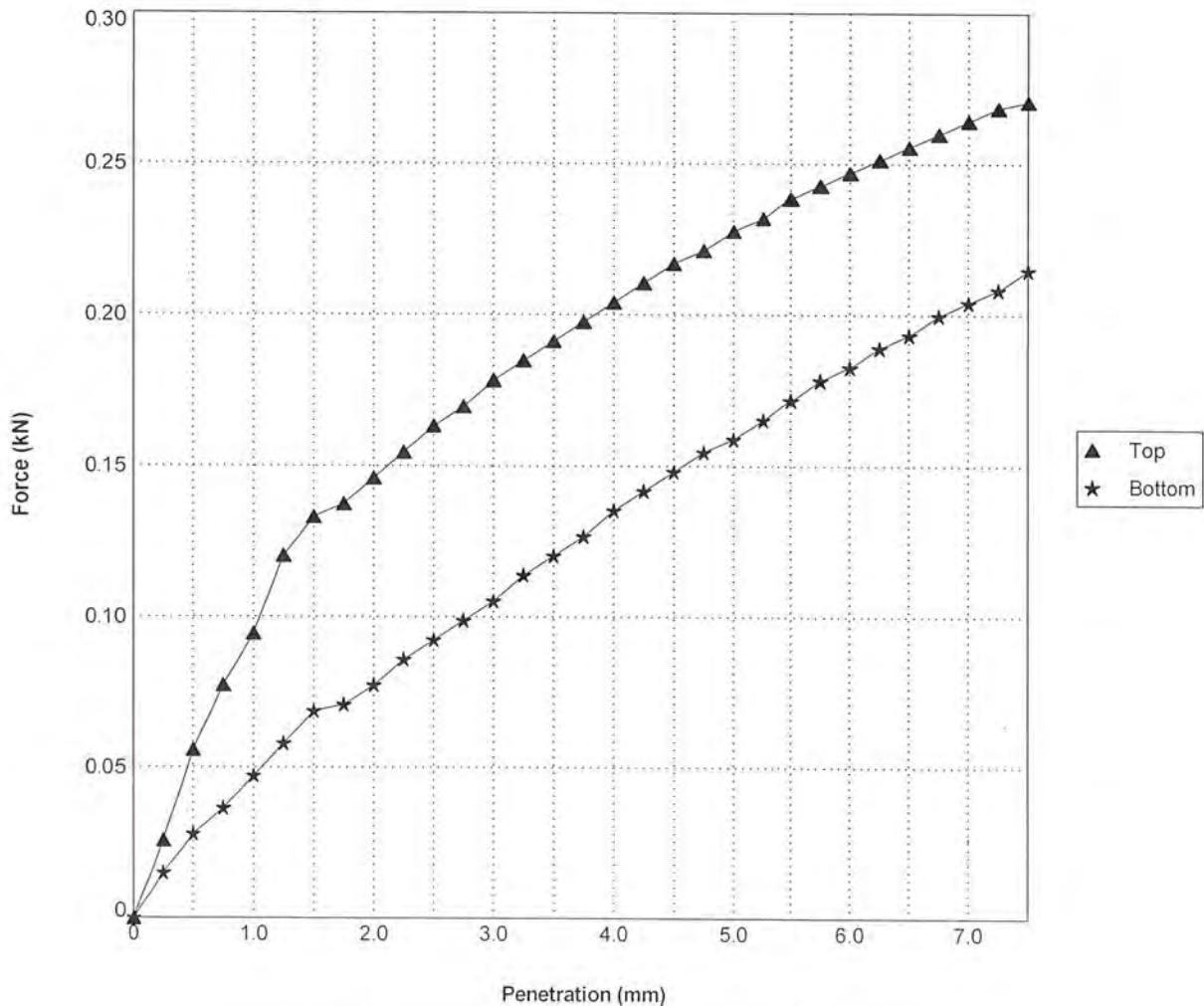
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- **TP CLR009**

Sample No.- **B4**

Depth (m)- **0.40**

"As Received" Moisture Content (%) :		Surcharge (Kg) :	6
Retained on 20mm (%) :	8.9	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	No	Test Moisture Content (%) :	Top 25 / Bottom 25
Soaking Time (Days) :	22	Bulk Density (Mg/m <sup>3</sup> ) :	1.97
Swelling (mm) :	0.6	Dry Density (Mg/m <sup>3</sup> ) :	1.58
Date Tested :	01/04/2021	CBR Value (%) :	Top 1.2 / Bottom 0.79
Preparation Method :	4.5kg Compaction		
Remarks :			



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



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Date of issue :-

27/04/2021

Certificate No. :-

CBR/4322D/TP CLR009/B4/0.40/1

ALG Contract No. :-

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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

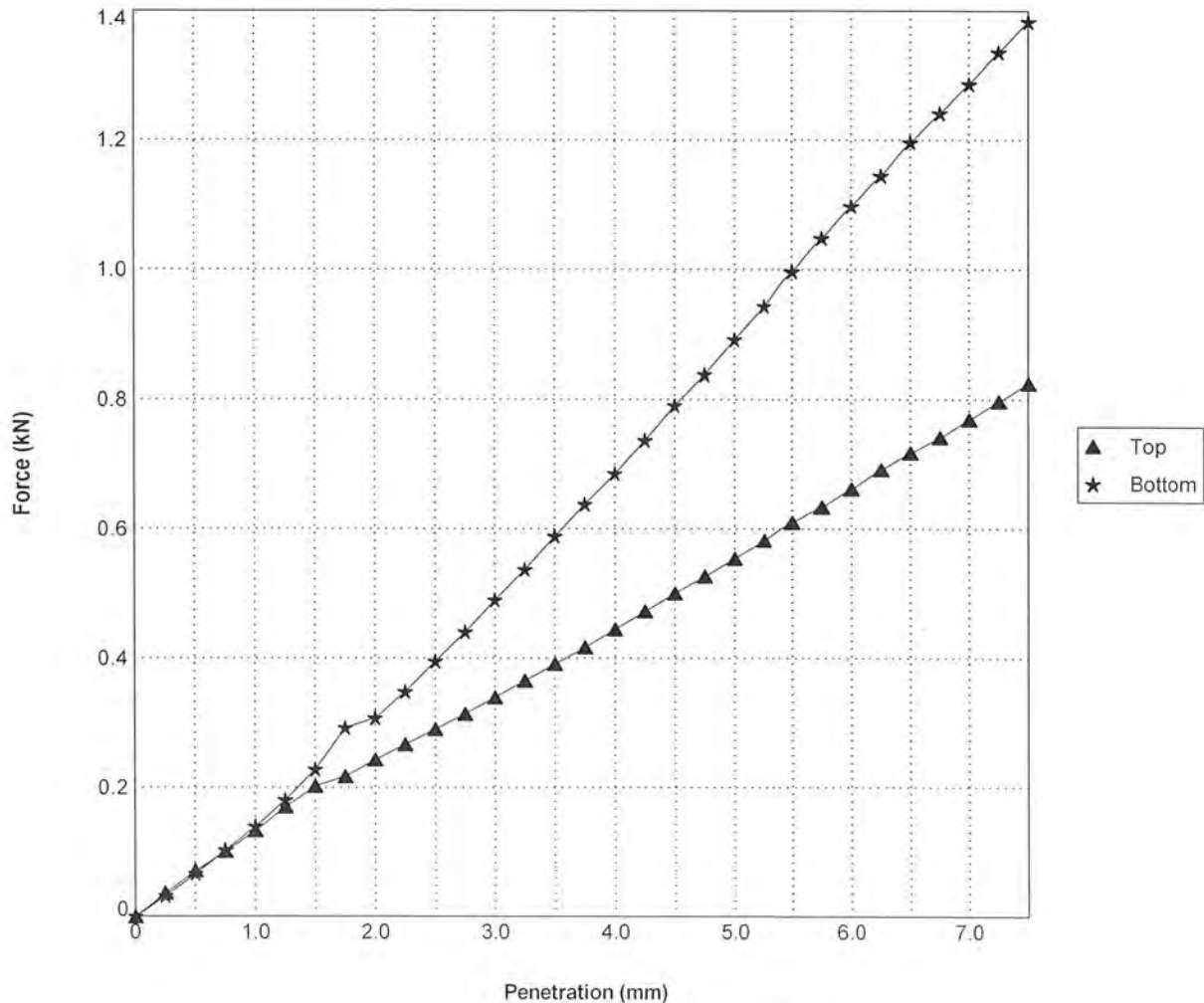
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No.- TP CLR020

Sample No.- B7

Depth (m)- 2.00

"As Received" Moisture Content (%) :	Surcharge (Kg) :	6
Retained on 20mm (%) :	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	Test Moisture Content (%) :	Top 14 / Bottom 14
Soaking Time (Days) :	Bulk Density (Mg/m <sup>3</sup> ) :	2.20
Swelling (mm) :	Dry Density (Mg/m <sup>3</sup> ) :	1.93
Date Tested :	06/04/2021	CBR Value (%) :
Preparation Method :	4.5kg Compaction	Top 2.8 / Bottom 4.5
Remarks :		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-  
A66 North Trans Pennine Scheme D Section 8

Client :-  
AMEY OW Limited



Signed :- [Redacted Signature]  
Date of issue :- 27/04/2021  
Contract No. :- CBR/4322D/TP CLR020/B7/2.00/1

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Contract No. :- 4322D



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## DETERMINATION OF THE CALIFORNIA BEARING RATIO

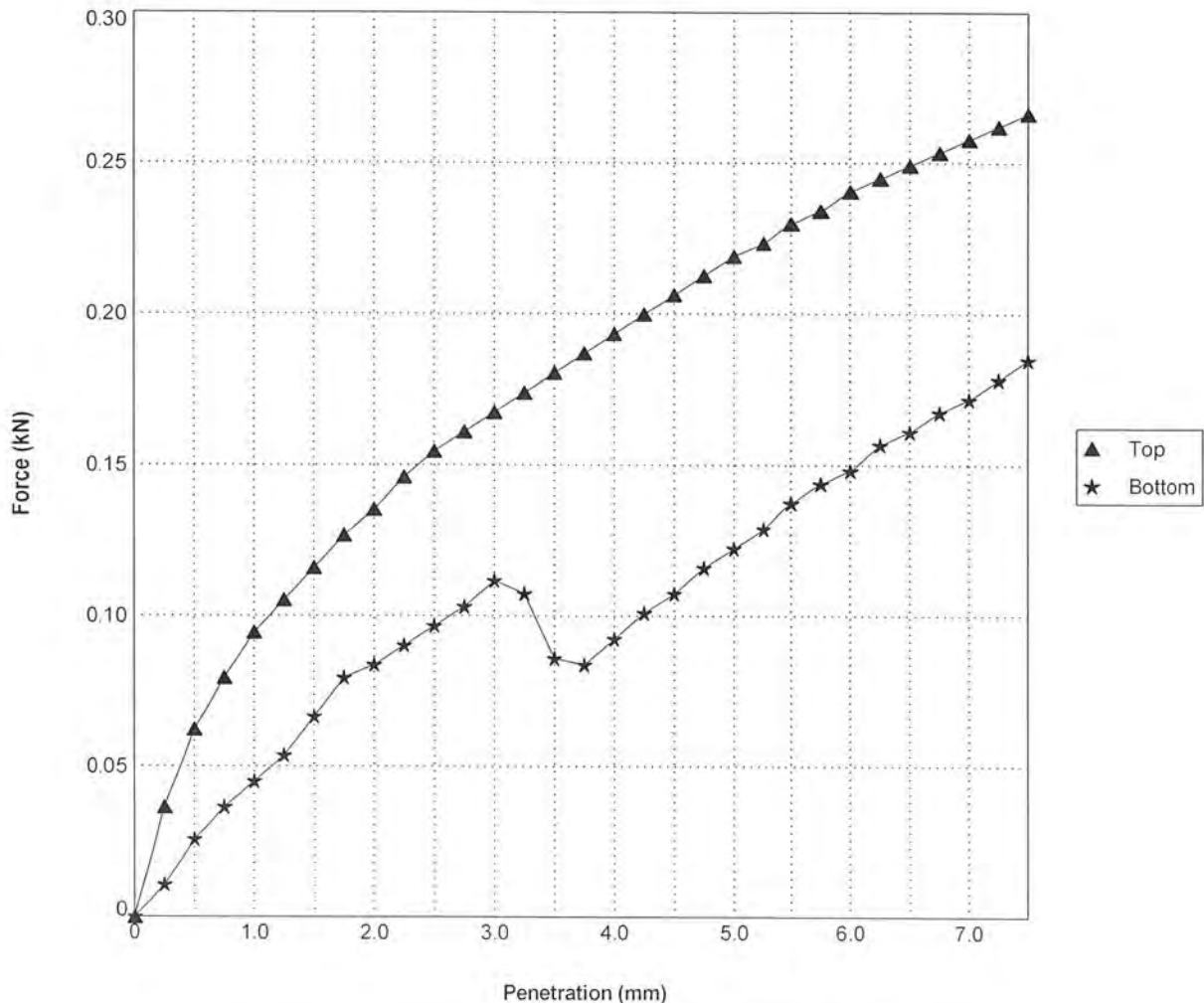
BS 1377 : Part 4 : 1990 and Part 2 : Clause 3.2 : 1990

Exploratory Hole No. - TP CLR023

Sample No. - B4

Depth (m) - 0.40

"As Received" Moisture Content (%) :	Surcharge (Kg) :	6
Retained on 20mm (%) :	Seating Load (N) :	Top 10 / Bottom 10
Correction Needed :	Test Moisture Content (%) :	Top 22 / Bottom 20
Soaking Time (Days) :	Bulk Density (Mg/m <sup>3</sup> ) :	2.04
Swelling (mm) :	Dry Density (Mg/m <sup>3</sup> ) :	1.69
Date Tested :	CBR Value (%) :	Top 1.2 / Bottom 0.73
Preparation Method :		4.5kg Compaction
Remarks :		



For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :-

A66 North Trans Pennine Scheme D Section 8

Client :-

AMEY OW Limited



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Date of issue

27/04/2021

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CBR/4322D/TP CLR023/B4/0.40/1

## Determination of One Dimensional Consolidation Properties



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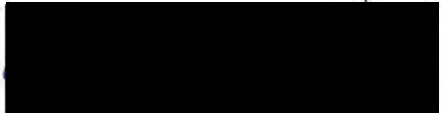
## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

<b>Exploratory Hole No</b>	<b>BH CLR003</b>	<b>Sample</b>	<b>U9</b>	<b>Depth (m)</b>	<b>1.20m</b>
<b>Specimen Type</b>	<b>Undisturbed</b>	<b>Orientation</b>	<b>Vertical</b>	<b>Specific Depth (m)</b>	<b>1.23m</b>
	<b>INITIAL</b>	<b>FINAL</b>			
Height	18.8	18.2	mm	Particle Density (Assumed)	2.70
Diameter	74.4	74.4	mm		
Moisture Content	14.6	15.0	%	Degree of Saturation (%)	94.5
Wet Density	2.18	2.25	Mg/m <sup>3</sup>		
Dry Density	1.91	1.96	Mg/m <sup>3</sup>	Test Duration (Days)	6
				Date Tested	26/03/2021

Square Root of Time Fitting Method				
Pressure Range kN/m <sup>2</sup>	Mv m <sup>2</sup> /MN	Cv m <sup>2</sup> /yr	Temp C	Voids Ratio
Initial				0.417
0 - 12.5	0.336	.	20	0.411
12.5 - 25	0.359	3.56	20	0.405
25 - 50	0.279	3.74	20	0.395
50 - 100	0.185	4.10	21	0.382
100 - 200	0.122	3.53	21	0.365
200 - 50	0.019	Swelling	20	0.369

For sample description please refer to the Laboratory Sample Description Sheet.

Contract Title:  <b>A66 North Trans Pennine Scheme D Section 8</b>	Client:  <b>AMEY OW Limited</b>
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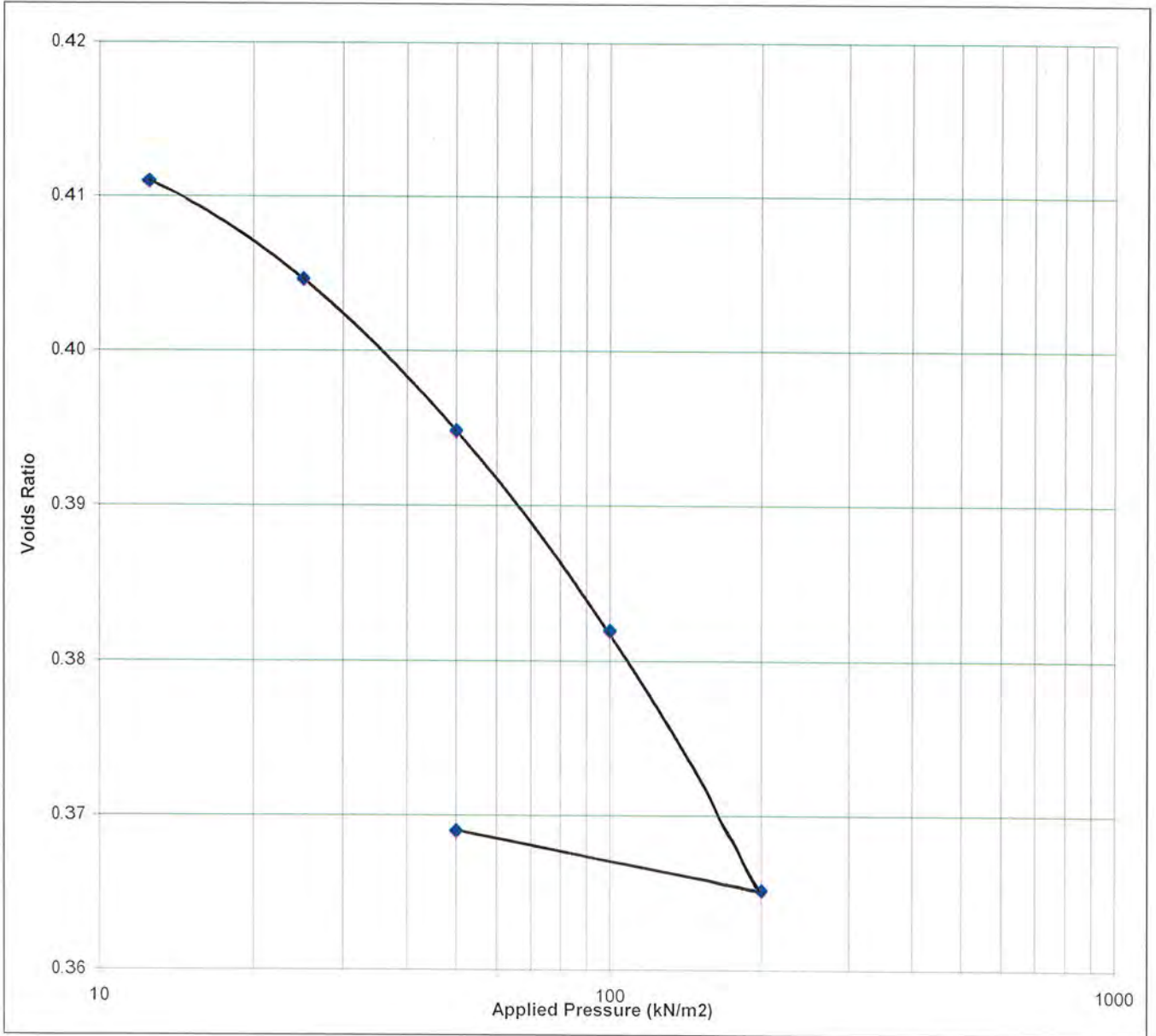
	Signed: 	Name: <b>M. SELKIRK</b>	Page 1 of 2
	Date of: <b>07/04/2021</b>	Date No: <b>4322D/A</b>	AEG Contract No: <b>4322D</b>

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## ONE DIMENSIONAL CONSOLIDATION PROPERTIES BS 1377 : PART 5 : 1990 : CLAUSE 3

Exploratory Hole No	BH CLR003	Sample	U9	Depth (m)	1.20m
Specimen Type	Undisturbed	Orientation	Vertical	Specific Depth (m)	1.23m



Contract Title:	Client:
A66 North Trans Pennine Scheme D Section 8	AMEY OW Limited

	Signed:		Name:	M. SELKIRK	Page 2 of 2	
	Date of Issue:		Certificate No:			
	07/04/2021		4322D/A	4322D		1367

## Shear Strength by Hand Vane





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## DETERMINATION OF SHEAR STRENGTH BY HAND VANE

For sample description please refer to Sample Description Sheet.

Exploratory Hole No.	Depth (m BGL)	Sample Type & No.	Vane Shear Strength	Remarks*
BH CLR003	10.00	U27	115kPa	TOP
			56kPa	
			68kPa	
			80kPa	Average
			126kPa	BOTTOM
BH CLR010	1.20	U8	>130kPa	
			>130kPa	
			>130kPa	Average
			30kPa	TOP
			30kPa	
			27kPa	
			29kPa	Average
			35kPa	BOTTOM
			30kPa	
			30kPa	
			32kPa	Average

\* All specific depths are approximate within the sample.

Contract Title:

A66 North Trans Pennine Scheme D Section 8

Client:

AMEY OW Limited



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Date of Issue

20/04/2021

Certificate No.4322D/HV01

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AEG Contract No. 4322D

4322D



**Undrained Shear Strength in Triaxial Cell  
without Pore Water Pressure Measurement**



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## UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

BS 1377 : Part 7 : Clauses 8 & 9 : 1990 Part 2 Clause 3.2

Exploratory Hole	Sample ID	Sample ID Depth (m)	Sample ID Type	Specific Depth (m)	Diameter (mm)	Length (mm)	Prep. Method	Stage No.	Initial Moisture Content (%)	Bulk Density (Mg/m <sup>3</sup> )	Dry Density (Mg/m <sup>3</sup> )	Membrane Thickness (mm)	Membrane Correction (kPa)	Cell Pressure (kPa)	Corrected Deviator Stress (kPa)	Failure Strain (%)	Mode of Failure	cu (kPa)	Date Tested
BH CLR003	U9	1.20	U9	1.35	103.3	211.4	UNDISTURBED	1	15	2.18	1.90	0.3	0.68	20	165	10.5	C	83	25/03/2021
BH CLR003	U9	1.20	U9	1.35			UNDISTURBED	2					0.94	40	183	16.5		92	25/03/2021
BH CLR003	U9	1.20	U9	1.35			UNDISTURBED	3					1.08	60	188	19.5		94	25/03/2021
BH CLR003	U27	10.00	U27	10.06	103.6	211.2	UNDISTURBED	1	13	2.22	1.97	0.3	0.90	100	392	15.5	P	196	25/03/2021
BH CLR003	U27	10.00	U27	10.06			UNDISTURBED	2					1.10	200	455	20.0		227	25/03/2021
BH CLR010	U8	1.20	U8	1.30	103.7	211.1	UNDISTURBED	1	20	2.09	1.74	0.3	0.50	20	42	7.0	BR	21	25/03/2021
BH CLR010	U8	1.20	U8	1.30			UNDISTURBED	2					0.66	40	47	10.0		23	25/03/2021
BH CLR010	U8	1.20	U8	1.30			UNDISTURBED	3					0.92	60	50	16.0		25	25/03/2021

For description of sample please refer to the Laboratory Sample Description Sheet. Please see no. [REDACTED] vertical. Latex membrane used.



Date of issue :- 27/04/2021

Certificate No :- TXL/4322D/1

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Client :-

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Contract Title :-

A66 North Trans Pennine Scheme D Section 8

AMEG Contract No :- 4322D

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## Moisture Content of Rock



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## MOISTURE CONTENT CERTIFICATE

ISRM : 1981

Exploratory Hole No.	Sample Depth (m)	Sample ID	Moisture Content (%)	Date Tested	Remarks
BH CLR004A	9.20	C6	10.8	24/03/2021	

For description of sample please refer to the Laboratory Sample Description Sheet

Contract Title :- A66 North Trans Pennine Scheme D Section 8	Client :- AMEY OW Limited
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			Page 1 of 1
			AEG Contract No. :- <b>4322D</b>
26/03/2021	RMC/4322D/1		

## Determination of Point Load Index



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## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH CLR004A	9.00	Diametral	174.9	71.9	39.7	5169.6	7.67	1.18	9.032	Mudstone	19/04/2021
BH CLR004A	9.30	Axial	85.7	42.1	20.2	4593.8	4.39	1.15	5.037	Sandstone	19/04/2021
BH CLR004A	9.40	Diametral	123.2	80.2	7.3	6432.0	1.1	1.24	1.4	Sandstone	19/04/2021
BH CLR004A	9.54	Axial	86.6	20.3	2.0	2238.3	0.89	0.98	0.9	Sandstone	19/04/2021
BH CLR004A	9.60	Irregular Lump	88.5	46.4	2.0	5228.4	0.38	1.18	0.452	Sandstone	19/04/2021
BH CLR004A	9.68	Irregular Lump	94.9	35.6	8.0	4301.6	1.9	1.1	2.1	Sandstone	19/04/2021
BH CLR004A	9.75	Irregular Lump	124.8	29.2	3.6	4639.9	0.78	1.15	0.892	Sandstone	19/04/2021
BH CLR004A	9.75	Diametral	143.7	84.9	6.2	7157.2	0.87	1.27	1.098	Sandstone	19/04/2021
BH CLR004A	9.90	Diametral	106.0	79.9	2.1	6384.0	0.33	1.23	0.406	Sandstone	19/04/2021
BH CLR004A	9.90	Axial	86.5	38.5	9.2	4240.2	2.17	1.13	2.4	Sandstone	19/04/2021
BH CLR004A	10.00	Irregular Lump	123.6	47.5	11.3	7475.2	1.51	1.28	1.9	Sandstone	19/04/2021
BH CLR004A	10.00	Irregular Lump	115.9	27.6	5.6	4072.9	1.37	1.12	1.535	Sandstone	19/04/2021
BH CLR004A	10.15	Diametral	139.3	54.7	1.3	2992.1	0.43	1.04	0.452	Sandstone	19/04/2021
BH CLR004A	10.15	Irregular Lump	93.8	28.6	6.3	3415.7	1.84	1.07	1.979	Sandstone	19/04/2021

NOTES - + Tested specimen measured using calibrated vernier caliper

Date of issue :- 28/04/2021	Certificate No :- PL/4322D/1	Signed :- 	Page 1 of 3
Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 8		AEG Contract No :- 4322D

# ALLIED EXPLORATION & GEOTECHNICS LIMITED


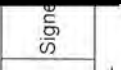

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## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH CLR004A	10.30	Irregular Lump	84.4	45.6	2.0	4900.2	0.41	1.16	0.475	Sandstone	19/04/2021
BH CLR004A	10.40	Diametral	148.5	78.6	13.3	6178.0	2.15	1.23	2.639	Sandstone	19/04/2021
BH CLR004A	10.53	Irregular Lump	109.6	36.2	8.0	5051.6	1.58	1.17	1.9	Sandstone	19/04/2021
BH CLR004A	10.70	Irregular Lump	116.5	36.2	5.0	5369.6	0.93	1.19	1.1	Sandstone	19/04/2021
BH CLR004A	10.80	Irregular Lump	113.2	43.5	3.0	6269.7	0.48	1.23	0.588	Sandstone	19/04/2021
BH CLR004A	10.93	Irregular Lump	73.4	43.2	2.0	4037.3	0.5	1.11	0.552	Sandstone	19/04/2021
BH CLR004A	12.60	Diametral	99.7	78.4	0.8	6146.6	0.13	1.22	0.159	Mudstone	20/04/2021
BH CLR004A	12.90	Axial	85.4	60.2	0.3	6545.8	0.05	1.24	0.057	Mudstone	20/04/2021
BH CLR004A	13.10	Diametral	96.6	82.6	6.6	6822.8	0.97	1.25	1.213	Sandstone	20/04/2021
BH CLR004A	13.10	Axial	86.4	44.1	3.4	4851.4	0.7	1.16	0.8	Sandstone	20/04/2021
BH CLR004A	13.20	Diametral	109.3	76.5	15.1	5852.3	2.58	1.21	3.124	Sandstone	20/04/2021
BH CLR004A	13.60	Diametral	131.3	84.3	0.7	7106.5	0.1	1.26	0.125	Siltstone	20/04/2021
BH CLR004A	13.60	Axial	86.5	45.4	1.4	5000.1	0.28	1.17	0.327	Siltstone	20/04/2021
BH CLR004A	13.80	Diametral	215.2	80.5	8.3	6480.3	1.28	1.24	1.587	Siltstone	20/04/2021

NOTES - + Tested specimen measured using calibrated vernier calipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

 Date of issue :- 28/04/2021	Certificate No :- PL/4322D/2	Signature 	Page 2 of 3	 1367

# ALLIED EXPLORATION & GEOTECHNICS LIMITED


Head Office: Unit 25 Stella Gill Industrial Estate, Felton Fall, Chester-le-Street, Co. Durham, DH2 2PG - Tel: 0191 387 4700 Fax: 0191 367 4710  
 Regional Office: Unit 20, Business Development Centre, Eannam Wharf, Blackburn, BB1 5BL - Tel: 01772 735 300 Fax: 01772 735 999

## POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De <sup>2</sup> (mm <sup>2</sup> )	Point Load (IS) (MPa)	Size Factor	Point Load Index (IS50) (MPa)	Type	Date Tested
BH CLR004A	13.80	Axial	86.6	45.3	13.6	4994.9	2.72	1.17	3.182	Siltstone	20/04/2021
BH CLR004A	13.90	Diametral	143.2	80.5	9.2	6480.3	1.42	1.24	1.759	Siltstone	20/04/2021

NOTES - + Tested specimen measured using calibrated vernier calipers #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

	Date of issue :- 28/04/2021	Certificate No :- PL/4322D/3	
	Client :- AMEY OW Limited	Contract Title :- A66 North Trans Pennine Scheme D Section 8	



**Determination of Unconfined Compressive Strength  
(Tested Externally)**



## LABORATORY TEST CERTIFICATE

**Certificate No :** 21/366 - 01  
**To :** Michelle Selkirk  
**Client :** **Allied Exploration & Geotechnics Ltd.**  
Unit 25 Stella Gill Industrial Estate  
Pelton Fell  
Chester-le-Street  
County Durham  
**DH2 2RG**

Dear Sirs,

### LABORATORY TESTING OF ROCK

#### Introduction

We refer to samples taken from A66 North TransPennine Scheme D Section 8 and delivered to our laboratory on 24th March 2021.

#### Material & Source

Sample Reference : See Report Plates  
Sampled By : Client  
Sampling Certificate : Not Supplied  
Location : See Report Plates  
Description : Rock Cores  
Date Sampled : Not Supplied  
Date Tested : 24th March 2021 Onwards  
Source : 4322D - A66 North TransPennine Scheme D Section 8

#### Test Results;

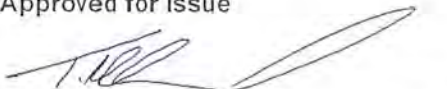
As Detailed On Page 2 to Page 3 inclusive

#### Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation  
This report should not be reproduced except in full without the written approval of the laboratory  
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

#### Remarks;

Approved for Issue



T McLelland (Director)

Date 02/04/2021

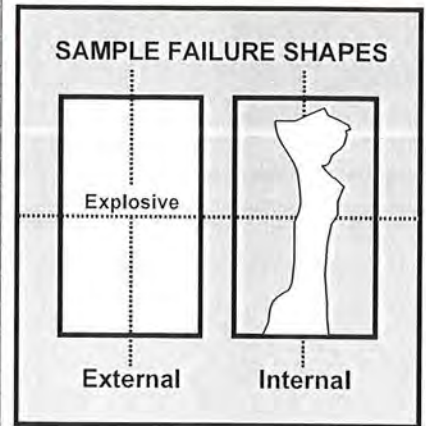
BOREHOLE	SAMPLE	DEPTH (m)	WATER CONTENT (%)	BULK DENSITY (Mg/m <sup>3</sup> )	DRY DENSITY (Mg/m <sup>3</sup> )
BH CLR004A	C	14.85	4.1	-	-
BH CLR004A	C	18.00	2.8	-	-

Tested in accordance with ISRM (2007)

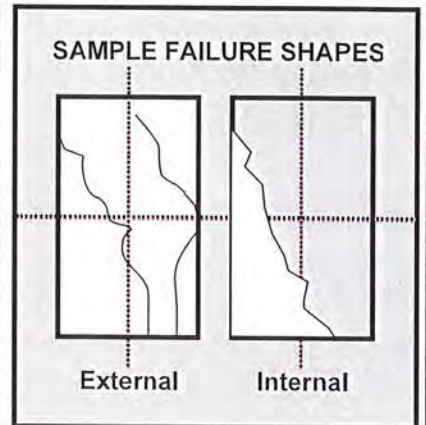
**SUMMARY OF WATER CONTENT  
AND DENSITY TEST RESULTS**



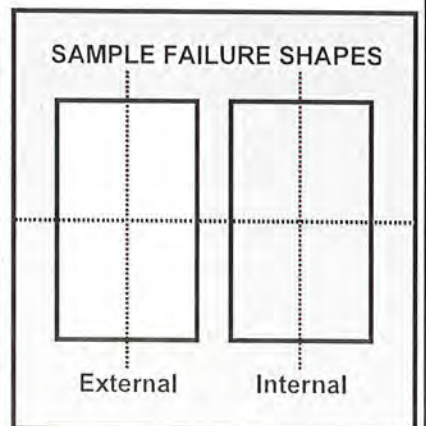
BOREHOLE		BH CLR004A
SAMPLE		C
DEPTH	m	14.85
SAMPLE DIAMETER	mm	86.48
SAMPLE HEIGHT	mm	171.74
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.9
TEST DURATION	min.sec	12.51
DATE OF TESTING		01/04/2021
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Unknown
FAILURE LOAD	kN	641.0
UNCONFINED COMPRESSIVE STRENGTH	MPa	109.1
WATER CONTENT (ISRM Suggested Methods)	%	3.3
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.46
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.38



BOREHOLE		BH CLR004A
SAMPLE		C
DEPTH	m	18.00
SAMPLE DIAMETER	mm	86.32
SAMPLE HEIGHT	mm	171.46
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.6
TEST DURATION	min.sec	6.37
DATE OF TESTING		01/04/2021
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
FAILURE LOAD	kN	230.7
UNCONFINED COMPRESSIVE STRENGTH	MPa	39.4
WATER CONTENT (ISRM Suggested Methods)	%	2.4
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.56
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	2.50



BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	
DRY DENSITY (ISRM Suggested Methods)	Mg/m <sup>3</sup>	



Tested in accordance with ASTM D7012 - 14

**SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH**

**Specialist Chemical Testing  
(Tested Externally)**



# DETS

## Certificate of Analysis

*Certificate Number* 21-03042

*Issued:* 10-May-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03042

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 4 Soil samples.

*Date Received* 12-Feb-21

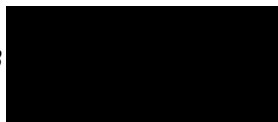
*Date Started* 12-Feb-21

*Date Completed* 10-May-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



2139



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03042

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1801130	1801131	1801132	1801133
Sample ID	TP CLR002	TP CLR002	TP CLR002A	TP CLR003
Depth	1.20	0.35	0.40	0.30
Other ID	6	2	3	3
Sample Type	ES	ES	ES	ES
Sampling Date	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	9.0	7.8	4.9	6.9
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	< 0.2	0.3	0.6	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.2	0.1
Chromium	DETSC 2301#	0.15	mg/kg	13	15	14	13
Chromium III	DETSC 2301*	0.15	mg/kg	13	15	14	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	15	9.5	12
Lead	DETSC 2301#	0.3	mg/kg	21	28	37	27
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	25	7.6	5.2	9.3
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	62	46	42	44
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	3.6	4.8	7.6	4.5
pH	DETSC 2008#		pH	7.3	7.1	6.5	7.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	< 0.1	0.3	1.8	0.6
Organic matter	DETSC 2002#	0.1	%	0.2	0.6	3.2	0.9
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	245	385	802	294

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03042

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1801130	1801131	1801132	1801133
Sample ID	TP CLR002	TP CLR002	TP CLR002A	TP CLR003
Depth	1.20	0.35	0.40	0.30
Other ID	6	2	3	3
Sample Type	ES	ES	ES	ES
Sampling Date	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4		< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4		< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01		< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03042

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1801130	1801131	1801132	1801133
Sample ID	TP CLR002	TP CLR002	TP CLR002A	TP CLR003
Depth	1.20	0.35	0.40	0.30
Other ID	6	2	3	3
Sample Type	ES	ES	ES	ES
Sampling Date	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10		< 0.10	< 0.10
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3



## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03042

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1801130	TP CLR002 6 1.20	SOIL	NAD	none	D Wilkinson
1801132	TP CLR002A 3 0.40	SOIL	NAD	none	D Wilkinson
1801133	TP CLR003 3 0.30	SOIL	NAD	none	D Wilkinson

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 21-03042  
 Client Ref 4322D  
 Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1801130	TP CLR002 1.20 SOIL	10/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1801131	TP CLR002 0.35 SOIL	10/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1801132	TP CLR002A 0.40 SOIL	10/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1801133	TP CLR003 0.30 SOIL	10/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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

End of Report



## Certificate of Analysis

*Certificate Number* 21-06841

*Issued:* 20-Apr-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-06841

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 3 Water samples.

*Date Received* 31-Mar-21

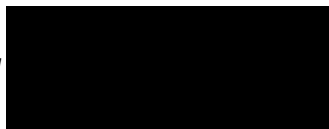
*Date Started* 31-Mar-21

*Date Completed* 20-Apr-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved*



Adam Fenwick  
Contracts Manager



2139



## Summary of Chemical Analysis

### Water Samples

Our Ref 21-06841

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1825755	1825756	1825757
Sample ID	BH CLR003A	SW CLR001	SW CLR002
Depth	0.00-6.00	0.00	0.00
Other ID	100	100	100
Sample Type	EW	EW	EW
Sampling Date	30/03/2021	30/03/2021	30/03/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic, Dissolved	DETSC 2306	0.001	mg/l	0.002	< 0.001	< 0.001
Cadmium, Dissolved	DETSC 2306	0.0001	mg/l	< 0.0001	< 0.0001	< 0.0001
Calcium, Dissolved	DETSC 2306	0.09	mg/l	74	71	71
Chromium III, Dissolved	DETSC 2306*	0.001	mg/l	< 0.001	< 0.001	0.004
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007	< 0.007	< 0.007
Copper, Dissolved	DETSC 2306	0.0004	mg/l	< 0.0004	0.0014	0.0014
Iron, Dissolved	DETSC 2306	0.0055	mg/l	0.093	0.098	0.13
Lead, Dissolved	DETSC 2306	0.0001	mg/l	0.0002	0.0002	0.0003
Mercury, Dissolved	DETSC 2306	0.0001	mg/l	< 0.0001	< 0.0001	< 0.0001
Nickel, Dissolved	DETSC 2306	0.0005	mg/l	0.0014	0.0012	0.0012
Potassium, Dissolved	DETSC 2306	0.08	mg/l	5.1	2.5	2.3
Selenium, Dissolved	DETSC 2306	0.0003	mg/l	0.0004	0.0004	0.0003
Sodium, Dissolved	DETSC 2306	0.07	mg/l	12	18	16
Zinc, Dissolved	DETSC 2306	0.0013	mg/l	0.0076	0.0028	0.0036
<b>Inorganics</b>						
pH	DETSC 2008		pH	7.2	8.0	8.3
Alkalinity as CaCO3 (Automated)	DETSC 2030	10	mg/l	250	170	180
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	6.4	5.2	4.7
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	12	< 10	15
Cyanide, Free	DETSC 2130	0.02	mg/l	< 0.02	< 0.02	< 0.02
Dissolved Organic Carbon	DETSC 2085	2	mg/l	5.4	4.4	5.1
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	243	197	198
Suspended Solids	DETSC 2034	5	mg/l	1200	35	10
Un-Ionised Ammonia	*	0.02	mg/l	< 0.02	< 0.02	< 0.02
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.042	0.027	< 0.015
Chloride	DETSC 2055	0.1	mg/l	11	43	39
Nitrate as NO3	DETSC 2055	0.1	mg/l	0.16	7.8	6.8
Nitrite as NO2	DETSC 2055	0.1	mg/l	0.21	0.32	0.30
Sulphate as SO4	DETSC 2055	0.1	mg/l	14	15	15
Sulphide	DETSC 2208	0.01	mg/l	0.02	0.02	0.01
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C10-C44	DETSC 3072*	1	ug/l	88	140	90
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	3.2	1.5
Aliphatic C16-C21	DETSC 3072*	1	ug/l	40	88	58
Aliphatic C21-C35	DETSC 3072*	1	ug/l	47	51	30
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0

## Summary of Chemical Analysis

### Water Samples

Our Ref 21-06841

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1825755	1825756	1825757
Sample ID	BH CLR003A	SW CLR001	SW CLR002
Depth	0.00-6.00	0.00	0.00
Other ID	100	100	100
Sample Type	EW	EW	EW
Sampling Date	30/03/2021	30/03/2021	30/03/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	5.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	1.2	2.7
Aromatic C16-C21	DETSC 3072*	1	ug/l	19	40	33
Aromatic C21-C35	DETSC 3072*	1	ug/l	13	16	7.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C10-C44	DETSC 3072*	1	ug/l	32	57	42
Ali/Aro C10-C44	DETSC 3072*	1	ug/l	120	200	130
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0
<b>PAHs</b>						
Naphthalene	DETSC 3304	0.05	ug/l	0.09	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.03	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	0.02	< 0.01	0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.03	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.04	0.01	0.01
Pyrene	DETSC 3304	0.01	ug/l	0.03	< 0.01	0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	0.01	< 0.01	0.02
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.01
PAH Total	DETSC 3304	0.2	ug/l	0.27	< 0.20	< 0.20
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130	0.1	mg/l	< 0.1	< 0.1	< 0.1

## Information in Support of the Analytical Results

Our Ref 21-06841

Client Ref 4322D

Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1825755	BH CLR003A 0.00-6.00 WATER	30/03/21	GB 1L x2, GV x2, PB 1L		
1825756	SW CLR001 0.00 WATER	30/03/21	GB 1L x2, GV x2, PB 1L x2		
1825757	SW CLR002 0.00 WATER	30/03/21	GB 1L x2, GV x2, PB 1L x2		

Key: G-Glass P-Plastic B-Bottle V-Vial

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.

### 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

End of Report





# DETS

## Certificate of Analysis

*Certificate Number* 21-05399

*Issued:* 23-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-05399

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* One Soil sample.

*Date Received* 19-Feb-21

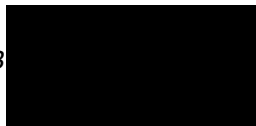
*Date Started* 15-Mar-21

*Date Completed* 23-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



2139

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05399

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

<b>Lab No</b>	1817198
<b>Sample ID</b>	BH CLR003
<b>Depth</b>	1.00
<b>Other ID</b>	8
<b>Sample Type</b>	ES
<b>Sampling Date</b>	15/02/2021
<b>Sampling Time</b>	n/s

Test	Method	LOD	Units	
<b>Inorganics</b>				
Sulphur as S, Total	DETSC 2320	0.01	%	0.01
Sulphate as SO <sub>4</sub> , Total	DETSC 2321#	0.01	%	0.03

## Information in Support of the Analytical Results

Our Ref 21-05399

Client Ref 4322D

Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1817198	BH CLR003 1.00 SOIL	15/02/21	GJ 250ml (250ml)		

Key: G-Glass J-Jar

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

<p>Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.</p> <p>Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.</p> <p>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.</p>
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### Disposal

<p>From the issue date of this test certificate, samples will be held for the following times prior to disposal :-</p> <p>Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months</p>
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End of Report





# DETS

## Certificate of Analysis

*Certificate Number* 21-05254

*Issued:* 01-Apr-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-05254

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 4 Soil samples, 2 Leachate samples.

*Date Received* 12-Mar-21

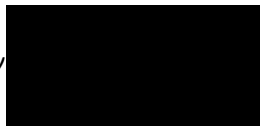
*Date Started* 12-Mar-21

*Date Completed* 01-Apr-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-05254

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP CLR011	2	0.2	1816232	22/03/2021	Brown sandy CLAY
TP CLR010	2	0.2	1816233	22/03/2021	Brown sandy CLAY
TP CLR013	2	0.2	1816234	22/03/2021	Brown sandy CLAY
TP CLR013	5	1	1816235	22/03/2021	Brown sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05254

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1816232	1816233	1816234	1816235
Sample ID	TP CLR011	TP CLR010	TP CLR013	TP CLR013
Depth	0.20	0.20	0.20	1.00
Other ID	2	2	2	5
Sample Type	ES	ES	ES	ES
Sampling Date	10/03/2021	10/03/2021	10/03/2021	10/03/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	5.6	5.0	6.5	5.6
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.4	0.6	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.2	0.4	0.3
Chromium	DETSC 2301#	0.15	mg/kg	12	12	12	11
Chromium III	DETSC 2301*	0.15	mg/kg	12	12	12	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	11	10	15	16
Lead	DETSC 2301#	0.3	mg/kg	31	31	33	20
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	8.4	5.5	13	21
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	56	40	68	57
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	41	6.4	5.1	3.5
pH	DETSC 2008#		pH	7.5	6.9	7.0	7.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.3	1.9	1.3	0.6
Organic matter	DETSC 2002#	0.1	%	2.2	3.4	2.2	1.0
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	40	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	597	604	565	228



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05254

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1816232	1816233	1816234	1816235
Sample ID	TP CLR011	TP CLR010	TP CLR013	TP CLR013
Depth	0.20	0.20	0.20	1.00
Other ID	2	2	2	5
Sample Type	ES	ES	ES	ES
Sampling Date	10/03/2021	10/03/2021	10/03/2021	10/03/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 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
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-05254

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1816232	1816233	1816234	1816235
Sample ID	TP CLR011	TP CLR010	TP CLR013	TP CLR013
Depth	0.20	0.20	0.20	1.00
Other ID	2	2	2	5
Sample Type	ES	ES	ES	ES
Sampling Date	10/03/2021	10/03/2021	10/03/2021	10/03/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	0.04	0.04	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3	< 0.3	< 0.3	< 0.3

# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-05254

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Sample Id TP CLR013 2 0.20

Sample Numbers 1816234 1816236 1816237

Date Analysed 22/03/2021

Test Results On Waste					WAC Limit Values		
Determinand and Method Reference	Units		Result		Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%		1.8		3	5	6
DETSC 2003# Loss On Ignition	%		5.1		n/a	n/a	10
DETSC 3321# BTEX	mg/kg		< 0.04		6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg		< 0.01		1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg		< 10		500	n/a	n/a
DETSC 3301 PAHs	mg/kg		< 1.6		100	n/a	n/a
DETSC2008# pH	pH Units				n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg				n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg				n/a	TBE	TBE

Test Results On Leachate					WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		Limit values for LS10 Leachate		
	2:1	8:1	LS2	LS10	Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.19	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	4.1	2	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.43	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.4	0.49	0.005	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.2	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.25	0.13	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.6	< 1.3	0.005	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	2100	870	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	430	< 100	0.86	0.41	10	150	500
DETSC 2055 Sulphate as SO4	1400	1100	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	19000	< 5000	38	< 50	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	2200	< 2000	< 10	< 50	500	800	1000

Additional Information		
DETSC 2008 pH	5.9	6.1
DETSC 2009 Conductivity uS/cm	26.9	5.7
* Temperature*	19.0	19.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.116
Stage 1	
Volume of Leachant L2*	0.207
Volume of Eluate VE1*	0.11
Stage 2	
Volume of Leachant L8*	0.924
Volume of Eluate VE2*	0.9

TBE - To Be Evaluated		
SNRHW - Stable Non-Reactive		
Hazardous Waste		

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.



## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-05254

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1816232	TP CLR011 2 0.20	SOIL	NAD	none	Michael Kay
1816233	TP CLR010 2 0.20	SOIL	NAD	none	Michael Kay
1816234	TP CLR013 2 0.20	SOIL	NAD	none	Michael Kay

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 21-05254

Client Ref 4322D

Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1816232	TP CLR011 0.20 SOIL	10/03/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1816233	TP CLR010 0.20 SOIL	10/03/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1816234	TP CLR013 0.20 SOIL	10/03/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1816235	TP CLR013 1.00 SOIL	10/03/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1816236	TP CLR013 0.20 LEACHATE	10/03/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1816237	TP CLR013 0.20 LEACHATE	10/03/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-04040

*Issued:* 03-Sep-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-04040

*Client Reference* 4322

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 2 Soil samples, 2 Leachate samples.

*Date Received* 25-Feb-21

*Date Started* 25-Feb-21

*Date Completed* 03-Sep-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-04040

*Client Ref* 4322

*Contract Title* A66 North Trans Pennine Scheme D Section 8

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP CLR020	1	0.2	1807430	04/03/2021	Brown gravelly, sandy CLAY including odd rootlets
TP CLR020	4	1	1807431	04/03/2021	Brown gravelly, sandy CLAY



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04040

Client Ref 4322

Contract Title A66 North Trans Pennine Scheme D Section 8

<b>Lab No</b>	1807430	1807431
<b>Sample ID</b>	TP CLR020	TP CLR020
<b>Depth</b>	0.20	1.00
<b>Other ID</b>	1	4
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	22/02/2021	22/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Metals</b>					
Arsenic	DETSC 2301#	0.2	mg/kg	6.5	7.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.4
Chromium	DETSC 2301#	0.15	mg/kg	29	340
Chromium III	DETSC 2301*	0.15	mg/kg	29	340
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	23
Lead	DETSC 2301#	0.3	mg/kg	70	22
Mercury	DETSC 2325#	0.05	mg/kg	0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	12	25
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	68	70
<b>Inorganics</b>					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	5.0	3.6
pH	DETSC 2008#		pH	6.7	6.7
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.2	0.5
Organic matter	DETSC 2002#	0.1	%	2.1	0.8
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	1940	2310

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04040

Client Ref 4322

Contract Title A66 North Trans Pennine Scheme D Section 8

<b>Lab No</b>	1807430	1807431
<b>Sample ID</b>	TP CLR020	TP CLR020
<b>Depth</b>	0.20	1.00
<b>Other ID</b>	1	4
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	22/02/2021	22/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>Petroleum Hydrocarbons</b>					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-04040

Client Ref 4322

Contract Title A66 North Trans Pennine Scheme D Section 8

<b>Lab No</b>	1807430	1807431
<b>Sample ID</b>	TP CLR020	TP CLR020
<b>Depth</b>	0.20	1.00
<b>Other ID</b>	1	4
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	22/02/2021	22/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
<b>PAHs</b>					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6
<b>Phenols</b>					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-04040

Client Ref 4322

Contract Title A66 North Trans Pennine Scheme D Section 8

Sample Id TP CLR020 1 0.20

Sample Numbers 1807430 1807432 1807433

Date Analysed 03/03/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.9
DETSC 2003# Loss On Ignition	%	5.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	1.9	0.64	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.6	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	1.1	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	0.26	0.076	0.0005	< 0.002
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	1.8	1.1	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	0.26	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	4.8	3.3	0.01	0.034
DETSC 2055 Chloride as Cl	1400	970	< 20	< 100
DETSC 2055* Fluoride as F	220	120	0.44	1.29
DETSC 2055 Sulphate as SO4	1500	1000	< 20	< 100
DETSC 2009* Total Dissolved Solids	14000	6200	28	68.8
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	2500	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.6	6.6
DETSC 2009 Conductivity uS/cm	19.7	8.9
* Temperature*	20.0	20.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.114

### Stage 1

Volume of Leachant L2*	0.203
Volume of Eluate VE1*	0.1

### Stage 2

Volume of Leachant L8*	0.915
Volume of Eluate VE2*	0.84

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-04040

*Client Ref* 4322

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1807430	TP CLR020 1 0.20	SOIL	NAD	none	Keith Wilson

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 21-04040  
 Client Ref 4322  
 Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1807430	TP CLR020 0.20 SOIL	22/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1807431	TP CLR020 1.00 SOIL	22/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1807432	TP CLR020 0.20 LEACHATE	22/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1807433	TP CLR020 0.20 LEACHATE	22/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO <sub>4</sub>	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO <sub>4</sub>	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03909

*Issued:* 01-Apr-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03909

*Client Reference* 4322C

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 7

*Description* 3 Soil samples.

*Date Received* 24-Feb-21

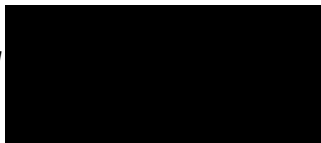
*Date Started* 24-Feb-21

*Date Completed* 01-Apr-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03909

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP CLR015	3	0.4	1806696	03/03/2021	Brown slightly gravelly, sandy CLAY
TP CLR023	3	0.4	1806697	03/03/2021	Brown slightly gravelly, sandy CLAY
TP CLR023	7	1.2	1806698	03/03/2021	Brown slightly gravelly, sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806696	1806697	1806698
Sample ID	TP CLR015	TP CLR023	TP CLR023
Depth	0.40	0.40	1.20
Other ID	3	3	7
Sample Type	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	6.3	6.1	7.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.6	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	12	12	17
Chromium III	DETSC 2301*	0.15	mg/kg	12	12	17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	18	22
Lead	DETSC 2301#	0.3	mg/kg	34	20	21
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	20	18	26
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	97	59	72
<b>Inorganics</b>						
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.8	2.8	3.0
pH	DETSC 2008#		pH	7.4	7.8	7.2
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.2	0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	2.5	0.4	0.4
Organic matter	DETSC 2002#	0.1	%	4.3	0.6	0.6
Sulphide	DETSC 2024*	10	mg/kg	48	120	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	715	857	265

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

Lab No	1806696	1806697	1806698
Sample ID	TP CLR015	TP CLR023	TP CLR023
Depth	0.40	0.40	1.20
Other ID	3	3	7
Sample Type	ES	ES	ES
Sampling Date	19/02/2021	19/02/2021	19/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03909

Client Ref 4322C

Contract Title A66 North Trans Pennine Scheme D Section 7

<b>Lab No</b>	1806696	1806697	1806698
<b>Sample ID</b>	TP CLR015	TP CLR023	TP CLR023
<b>Depth</b>	0.40	0.40	1.20
<b>Other ID</b>	3	3	7
<b>Sample Type</b>	ES	ES	ES
<b>Sampling Date</b>	19/02/2021	19/02/2021	19/02/2021
<b>Sampling Time</b>	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03909

*Client Ref* 4322C

*Contract Title* A66 North Trans Pennine Scheme D Section 7

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1806696	TP CLR015 3 0.40	SOIL	NAD	none	D Wilkinson
1806697	TP CLR023 3 0.40	SOIL	NAD	none	D Wilkinson

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 21-03909  
 Client Ref 4322C  
 Contract A66 North Trans Pennine Scheme D Section 7

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1806696	TP CLR015 0.40 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806697	TP CLR023 0.40 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806698	TP CLR023 1.20 SOIL	19/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03899

*Issued:* 23-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03899

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 3 Soil samples.

*Date Received* 24-Feb-21

*Date Started* 24-Feb-21

*Date Completed* 23-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03899

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
BH CLR010	3	0.2	1806647	03/03/2021	Dark brown sandy CLAY
WS CLR005	2	0.2	1806648	03/03/2021	Dark brown sandy CLAY
BH CLR011	1	0.2	1806649	03/03/2021	Dark brown very sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03899

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1806647	1806648	1806649
Sample ID	BH CLR010	WS CLR005	BH CLR011
Depth	0.20	0.20	0.20
Other ID	3	2	1
Sample Type	ES	ES	ES
Sampling Date	18/02/2021	16/02/2021	17/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	5.6	7.1	6.8
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.9	0.8	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3	0.3
Chromium	DETSC 2301#	0.15	mg/kg	16	13	12
Chromium III	DETSC 2301*	0.15	mg/kg	16	13	12
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	22	18
Lead	DETSC 2301#	0.3	mg/kg	40	39	51
Mercury	DETSC 2325#	0.05	mg/kg	0.05	0.06	0.07
Nickel	DETSC 2301#	1	mg/kg	9.8	13	12
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	76	88	80
<b>Inorganics</b>						
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	8.8	7.6	7.6
pH	DETSC 2008#		pH	6.8	7.3	5.9
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.4	0.3	0.4
Total Organic Carbon	DETSC 2002	0.1	%	2.2	2.2	1.6
Organic matter	DETSC 2002#	0.1	%	3.8	3.9	2.8
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	706	590	587

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03899

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1806647	1806648	1806649
Sample ID	BH CLR010	WS CLR005	BH CLR011
Depth	0.20	0.20	0.20
Other ID	3	2	1
Sample Type	ES	ES	ES
Sampling Date	18/02/2021	16/02/2021	17/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03899

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1806647	1806648	1806649
Sample ID	BH CLR010	WS CLR005	BH CLR011
Depth	0.20	0.20	0.20
Other ID	3	2	1
Sample Type	ES	ES	ES
Sampling Date	18/02/2021	16/02/2021	17/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.18	0.06
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.13	0.05
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06	0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.07	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.07	0.04
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	0.60	0.15
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3	< 0.3	< 0.3

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03899

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1806647	BH CLR010 3 0.20	SOIL	NAD	none	D Wilkinson
1806648	WS CLR005 2 0.20	SOIL	NAD	none	D Wilkinson
1806649	BH CLR011 1 0.20	SOIL	NAD	none	D Wilkinson

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 21-03899

Client Ref 4322D

Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1806647	BH CLR010 0.20 SOIL	18/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1806648	WS CLR005 0.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2	pH + Conductivity (7 days)	
1806649	BH CLR011 0.20 SOIL	17/02/21	GJ 250ml x2, GJ 60ml x2, PT 500ml x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03745

*Issued:* 03-Mar-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03745

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 10 Soil samples, 2 Leachate samples.

*Date Received* 22-Feb-21

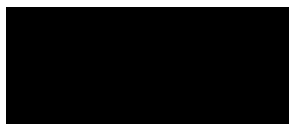
*Date Started* 22-Feb-21

*Date Completed* 03-Mar-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved B*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03745

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP CLR004	3	0.3	1805619	03/03/2021	Brown sandy CLAY
TP CLR004	11	2.2	1805620	03/03/2021	Dark brown very sandy CLAY
TP CLR008	3	0.3	1805621	03/03/2021	Brown very sandy CLAY
TP CLR008	12	2.4	1805622	03/03/2021	Dark grey sandy CLAY
TP CLR009	3	0.3	1805623	03/03/2021	Brown very sandy CLAY
TP CLR009	7	1.2	1805624	03/03/2021	Brown sandy CLAY
BH CLR004	1	0.2	1805625	03/03/2021	Brown sandy CLAY
WS CLR003	1	0.2	1805626	03/03/2021	Brown sandy CLAY
WS CLR001	2	0.2	1805627	03/03/2021	Brown sandy CLAY
WS CLR001	4	1	1805628	03/03/2021	Brown sandy CLAY

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1805619	1805620	1805621	1805622	1805623
Sample ID	TP CLR004	TP CLR004	TP CLR008	TP CLR008	TP CLR009
Depth	0.30	2.20	0.30	2.40	0.30
Other ID	3	11	3	12	3
Sample Type	ES	ES	ES	ES	ES
Sampling Date	17/02/2021	17/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Metals</b>								
Arsenic	DETSC 2301#	0.2	mg/kg	6.7	7.6	6.7	5.8	5.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	0.5	0.3	< 0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.5	0.3	0.2	0.3
Chromium	DETSC 2301#	0.15	mg/kg	12	13	11	9.9	12
Chromium III	DETSC 2301*	0.15	mg/kg	12	13	11	9.9	12
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	15	20	12	19
Lead	DETSC 2301#	0.3	mg/kg	27	30	16	20	14
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	22	14	20	11	18
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	83	63	61	61	56
<b>Inorganics</b>								
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.4	5.3	3.9	2.8	3.4
pH	DETSC 2008#		pH	7.2	6.1	8.1	7.2	8.3
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.1	1.3	1.6	0.6	1.7
Organic matter	DETSC 2002#	0.1	%	1.8	2.2	2.8	1.0	2.9
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	260	365	325	< 100	539

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1805619	1805620	1805621	1805622	1805623
Sample ID	TP CLR004	TP CLR004	TP CLR008	TP CLR008	TP CLR009
Depth	0.30	2.20	0.30	2.40	0.30
Other ID	3	11	3	12	3
Sample Type	ES	ES	ES	ES	ES
Sampling Date	17/02/2021	17/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Petroleum Hydrocarbons</b>								
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 C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	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	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	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



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1805619	1805620	1805621	1805622	1805623
Sample ID	TP CLR004	TP CLR004	TP CLR008	TP CLR008	TP CLR009
Depth	0.30	2.20	0.30	2.40	0.30
Other ID	3	11	3	12	3
Sample Type	ES	ES	ES	ES	ES
Sampling Date	17/02/2021	17/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>PAHs</b>								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.04	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
<b>Phenols</b>								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1805624	1805625	1805626	1805627	1805628
Sample ID	TP CLR009	BH CLR004	WS CLR003	WS CLR001	WS CLR001
Depth	1.20	0.20	0.20	0.20	1.00
Other ID	7	1	1	2	4
Sample Type	ES	ES	ES	ES	ES
Sampling Date	16/02/2021	16/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units	1805624	1805625	1805626	1805627	1805628
<b>Metals</b>								
Arsenic	DETSC 2301#	0.2	mg/kg	6.3	9.5	7.2	6.7	6.1
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.2	< 0.2	0.7	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.6	0.9	0.6	0.3
Chromium	DETSC 2301#	0.15	mg/kg	13	15	11	15	11
Chromium III	DETSC 2301*	0.15	mg/kg	13	15	11	15	11
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	14	25	19	15	15
Lead	DETSC 2301#	0.3	mg/kg	33	26	23	37	25
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	9.9	35	31	12	9.9
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	64	74	75	76	65
<b>Inorganics</b>								
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	6.0	4.6	6.6	7.4	4.3
pH	DETSC 2008#		pH	7.1	7.7	7.2	6.5	7.0
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.7	0.7	0.7	2.1	1.0
Organic matter	DETSC 2002#	0.1	%	2.9	1.1	1.2	3.6	1.7
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	431	< 100	124	712	184

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1805624	1805625	1805626	1805627	1805628
Sample ID	TP CLR009	BH CLR004	WS CLR003	WS CLR001	WS CLR001
Depth	1.20	0.20	0.20	0.20	1.00
Other ID	7	1	1	2	4
Sample Type	ES	ES	ES	ES	ES
Sampling Date	16/02/2021	16/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>Petroleum Hydrocarbons</b>								
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 C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	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	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	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



# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1805624	1805625	1805626	1805627	1805628
Sample ID	TP CLR009	BH CLR004	WS CLR003	WS CLR001	WS CLR001
Depth	1.20	0.20	0.20	0.20	1.00
Other ID	7	1	1	2	4
Sample Type	ES	ES	ES	ES	ES
Sampling Date	16/02/2021	16/02/2021	16/02/2021	16/02/2021	16/02/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
<b>PAHs</b>								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.07	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.05	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.12	< 0.10	< 0.10
<b>Phenols</b>								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03745

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Sample Id TP CLR009 7 1.20

Sample Numbers 1805624 1805629 1805630

Date Analysed 03/03/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	2.0
DETSC 2003# Loss On Ignition	%	6.0
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	1.1	0.61	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	1.8	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	< 0.40	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	1.9	1.3	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	1.8	1.8	0.004	0.018
DETSC 2055 Chloride as Cl	2000	920	< 20	< 100
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1
DETSC 2055 Sulphate as SO4	1500	590	< 20	< 100
DETSC 2009* Total Dissolved Solids	13000	11000	26	113.5
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	7.1	7.0
DETSC 2009 Conductivity uS/cm	19.0	15.2
* Temperature*	20.0	20.0

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.115

### Stage 1

Volume of Leachant L2*	0.204
Volume of Eluate VE1*	0.2

### Stage 2

Volume of Leachant L8*	0.916
Volume of Eluate VE2*	0.88

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03745

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1805619	TP CLR004 3 0.30	SOIL	NAD	none	Rebecca Burgess
1805621	TP CLR008 3 0.30	SOIL	NAD	none	Rebecca Burgess
1805623	TP CLR009 3 0.30	SOIL	NAD	none	Rebecca Burgess
1805625	BH CLR004 1 0.20	SOIL	NAD	none	Rebecca Burgess
1805626	WS CLR003 1 0.20	SOIL	NAD	none	Rebecca Burgess
1805627	WS CLR001 2 0.20	SOIL	NAD	none	Rebecca Burgess

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 21-03745

Client Ref 4322D

Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1805619	TP CLR004 0.30 SOIL	17/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805620	TP CLR004 2.20 SOIL	17/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805621	TP CLR008 0.30 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805622	TP CLR008 2.40 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805623	TP CLR009 0.30 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 500ml x2		
1805624	TP CLR009 1.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 500ml x2		
1805625	BH CLR004 0.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805626	WS CLR003 0.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2, PT 500ml x2		
1805627	WS CLR001 0.20 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805628	WS CLR001 1.00 SOIL	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1805629	TP CLR009 1.20 LEACHATE	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 500ml x2		
1805630	TP CLR009 1.20 LEACHATE	16/02/21	GJ 250ml x2, GJ 60ml x2, PT 500ml x2		

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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



# DETS

## Certificate of Analysis

*Certificate Number* 21-03521

*Issued:* 10-May-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03521

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 7 Soil samples, 2 Leachate samples.

*Date Received* 19-Feb-21

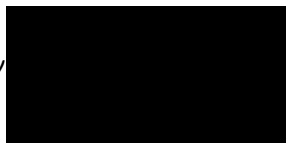
*Date Started* 19-Feb-21

*Date Completed* 10-May-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager



## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03521

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

<b>Sample ID</b>	<b>Other ID</b>	<b>Depth</b>	<b>Lab No</b>	<b>Completed</b>	<b>Matrix Description</b>
TP CLR001	3	0.3	1804423	02/03/2021	Dark brown very sandy CLAY
TP CLR005	4	0.4	1804424	02/03/2021	Brown gravelly, sandy CLAY
TP CLR005	7	1.2	1804425	02/03/2021	Dark brown sandy CLAY
TP CLR006	3	0.3	1804426	02/03/2021	Dark brown sandy CLAY
BH CLR001	1	0.2	1804427	02/03/2021	Dark brown sandy CLAY
BH CLR003	3	0.2	1804428	02/03/2021	Dark brown sandy CLAY
BH CLR003	8	1	1804429	02/03/2021	Dark brown sandy CLAY



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1804423	1804424	1804425	1804426
Sample ID	TP CLR001	TP CLR005	TP CLR005	TP CLR006
Depth	0.30	0.40	1.20	0.30
Other ID	3	4	7	3
Sample Type	ES	ES	ES	ES
Sampling Date	12/02/2021	15/02/2021	15/02/2021	15/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Metals</b>							
Arsenic	DETSC 2301#	0.2	mg/kg	7.3	6.7	5.6	7.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.3	0.5	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.4	0.3	0.4
Chromium	DETSC 2301#	0.15	mg/kg	10	11	9.2	13
Chromium III	DETSC 2301*	0.15	mg/kg	10	11	9.2	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	20	11	17	19
Lead	DETSC 2301#	0.3	mg/kg	38	20	18	26
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	10	16	17	25
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	0.7	0.7
Zinc	DETSC 2301#	1	mg/kg	180	50	65	99
<b>Inorganics</b>							
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	4.6	3.1	2.7	3.4
pH	DETSC 2008#		pH	6.6	7.4	7.9	7.0
Cyanide, Free	DETSC 2130#	0.1	mg/kg	0.3	0.1	0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	1.3	0.7	0.6	0.6
Organic matter	DETSC 2002#	0.1	%	2.3	1.2	1.1	1.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l				
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	531	295	458	275

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1804423	1804424	1804425	1804426
Sample ID	TP CLR001	TP CLR005	TP CLR005	TP CLR006
Depth	0.30	0.40	1.20	0.30
Other ID	3	4	7	3
Sample Type	ES	ES	ES	ES
Sampling Date	12/02/2021	15/02/2021	15/02/2021	15/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>Petroleum Hydrocarbons</b>							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 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
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 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
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1804423	1804424	1804425	1804426
Sample ID	TP CLR001	TP CLR005	TP CLR005	TP CLR006
Depth	0.30	0.40	1.20	0.30
Other ID	3	4	7	3
Sample Type	ES	ES	ES	ES
Sampling Date	12/02/2021	15/02/2021	15/02/2021	15/02/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
<b>PAHs</b>							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.08	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.17	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	0.12	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.07	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.06	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.55	< 0.10	< 0.10	< 0.10
<b>Phenols</b>							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section

Lab No	1804427	1804428	1804429
Sample ID	BH CLR001	BH CLR003	BH CLR003
Depth	0.20	0.20	1.00
Other ID	1	3	8
Sample Type	ES	ES	ES
Sampling Date	15/02/2021	15/02/2021	15/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	6.9	6.6	9.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	0.8	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.4	0.4
Chromium	DETSC 2301#	0.15	mg/kg	12	15	15
Chromium III	DETSC 2301*	0.15	mg/kg	12	15	15
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	14	22
Lead	DETSC 2301#	0.3	mg/kg	31	40	24
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	7.7	8.6	25
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	65	87	70
<b>Inorganics</b>						
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	7.8	6.5	3.6
pH	DETSC 2008#		pH	5.9	6.6	7.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg	1.2	0.3	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	2.9	2.1	0.7
Organic matter	DETSC 2002#	0.1	%	4.9	3.6	1.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l			< 10
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	925	743	202



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section

Lab No	1804427	1804428	1804429
Sample ID	BH CLR001	BH CLR003	BH CLR003
Depth	0.20	0.20	1.00
Other ID	1	3	8
Sample Type	ES	ES	ES
Sampling Date	15/02/2021	15/02/2021	15/02/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Petroleum Hydrocarbons</b>						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01

## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section

<b>Lab No</b>	1804427	1804428	1804429
<b>Sample ID</b>	BH CLR001	BH CLR003	BH CLR003
<b>Depth</b>	0.20	0.20	1.00
<b>Other ID</b>	1	3	8
<b>Sample Type</b>	ES	ES	ES
<b>Sampling Date</b>	15/02/2021	15/02/2021	15/02/2021
<b>Sampling Time</b>	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	< 0.3	< 0.3

# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-03521

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Sample Id TP CLR005 7 1.20

Sample Numbers 1804425 1804430 1804431

Date Analysed 26/02/2021

Test Results On Waste		
Determinand and Method Reference	Units	Result
DETSC 2084# Total Organic Carbon	%	1.3
DETSC 2003# Loss On Ignition	%	2.7
DETSC 3321# BTEX	mg/kg	< 0.04
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10
DETSC 3301 PAHs	mg/kg	< 1.6
DETSC2008# pH	pH Units	
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg	
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg	

WAC Limit Values		
Inert Waste	SNRHW	Hazardous Waste
3	5	6
n/a	n/a	10
6	n/a	n/a
1	n/a	n/a
500	n/a	n/a
100	n/a	n/a
n/a	>6	n/a
n/a	TBE	TBE
n/a	TBE	TBE

Test Results On Leachate				
Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg	
	2:1	8:1	LS2	LS10
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01
DETSC 2306 Barium as Ba	< 0.26	< 0.26	< 0.02	< 0.1
DETSC 2306 Cadmium as Cd	< 0.030	< 0.030	< 0.004	< 0.02
DETSC 2306 Chromium as Cr	< 0.25	< 0.25	< 0.02	< 0.1
DETSC 2306 Copper as Cu	< 0.40	< 0.40	< 0.004	< 0.02
DETSC 2306 Mercury as Hg	< 0.010	< 0.010	< 0.0004	< 0.002
DETSC 2306 Molybdenum as Mo	4	4.7	< 0.02	< 0.1
DETSC 2306 Nickel as Ni	< 0.50	< 0.50	< 0.02	< 0.1
DETSC 2306 Lead as Pb	< 0.090	< 0.090	< 0.01	< 0.05
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03
DETSC 2306 Zinc as Zn	2.1	5.8	0.004	0.052
DETSC 2055 Chloride as Cl	1700	1200	< 20	< 100
DETSC 2055* Fluoride as F	< 100	130	< 0.02	1.08
DETSC 2055 Sulphate as SO4	1400	1900	< 20	< 100
DETSC 2009* Total Dissolved Solids	19000	29000	38	272.9
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1
DETSC 2085 Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50

WAC Limit Values		
Limit values for LS10 Leachate		
Inert Waste	SNRHW	Hazardous Waste
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15,000	25,000
10	150	500
1000	20,000	50,000
4000	60,000	100,000
1	n/a	n/a
500	800	1000

### Additional Information

DETSC 2008 pH	6.9	6.3
DETSC 2009 Conductivity uS/cm	27.4	40.8
* Temperature*	18.0	19.0

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.117

### Stage 1

Volume of Leachant L2*	0.22
Volume of Eluate VE1*	0.2

### Stage 2

Volume of Leachant L8*	0.933
Volume of Eluate VE2*	0.9

TBE - To Be Evaluated  
SNRHW - Stable Non-Reactive  
Hazardous Waste

**Disclaimer:** The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-03521

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1804423	TP CLR001 3 0.30	SOIL	NAD	none	D Wilkinson
1804424	TP CLR005 4 0.40	SOIL	NAD	none	D Wilkinson
1804426	TP CLR006 3 0.30	SOIL	NAD	none	D Wilkinson
1804427	BH CLR001 1 0.20	SOIL	NAD	none	D Wilkinson
1804428	BH CLR003 3 0.20	SOIL	NAD	none	D Wilkinson

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 21-03521  
 Client Ref 4322D  
 Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1804423	TP CLR001 0.30 SOIL	12/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804424	TP CLR005 0.40 SOIL	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804425	TP CLR005 1.20 SOIL	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804426	TP CLR006 0.30 SOIL	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804427	BH CLR001 0.20 SOIL	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804428	BH CLR003 0.20 SOIL	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804429	BH CLR003 1.00 SOIL	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804430	TP CLR005 1.20 LEACHATE	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1804431	TP CLR005 1.20 LEACHATE	15/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

End of Report



## Certificate of Analysis

*Certificate Number* 21-03209

*Issued:* 22-Feb-21

*Client* Allied Exploration & Geotechnics Limited  
Unit 25  
Stella Gill Industrial Estate  
Pelton Fell  
DH2 2RG

*Our Reference* 21-03209

*Client Reference* 4322D

*Order No* (not supplied)

*Contract Title* A66 North Trans Pennine Scheme D Section 8

*Description* 2 Soil samples.

*Date Received* 16-Feb-21

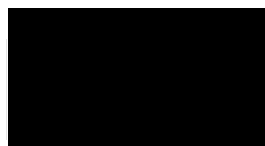
*Date Started* 16-Feb-21

*Date Completed* 22-Feb-21

*Test Procedures* Identified by prefix DETSn (details on request).

*Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

*Approved By*



Adam Fenwick  
Contracts Manager





## Summary of Chemical Analysis

### Matrix Descriptions

*Our Ref* 21-03209

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
TP CLR007	6	1.2	1802364	22/02/2021	Dark brown gravelly, sandy CLAY including some rootlets
TP CLR012	3	0.4	1802365	22/02/2021	Dark brown gravelly, sandy CLAY including some rootlets

# Summary of Chemical Analysis

## Soil Samples

Our Ref 21-03209

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

Lab No	1802364	1802365
Sample ID	TP CLR007	TP CLR012
Depth	1.20	0.40
Other ID	6	3
Sample Type	ES	ES
Sampling Date	11/02/2021	11/02/2021
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
<b>Metals</b>					
Arsenic	DETSC 2301#	0.2	mg/kg	6.2	6.0
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.2	0.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3
Chromium	DETSC 2301#	0.15	mg/kg	11	12
Chromium III	DETSC 2301*	0.15	mg/kg	11	12
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	16
Lead	DETSC 2301#	0.3	mg/kg	18	36
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	18	9.7
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	59	70
<b>Inorganics</b>					
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	3.2	4.8
pH	DETSC 2008#		pH	8.1	6.8
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.5	1.3
Organic matter	DETSC 2002#	0.1	%	0.8	2.3
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10
Sulphate as SO4, Total	DETSC 2321#	100	mg/kg	490	614
<b>Petroleum Hydrocarbons</b>					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01

## Summary of Chemical Analysis Soil Samples

Our Ref 21-03209

Client Ref 4322D

Contract Title A66 North Trans Pennine Scheme D Section 8

<b>Lab No</b>	1802364	1802365
<b>Sample ID</b>	TP CLR007	TP CLR012
<b>Depth</b>	1.20	0.40
<b>Other ID</b>	6	3
<b>Sample Type</b>	ES	ES
<b>Sampling Date</b>	11/02/2021	11/02/2021
<b>Sampling Time</b>	n/s	n/s

Test	Method	LOD	Units		
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01
<b>PAHs</b>					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.09
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.20
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.15
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	0.06
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	0.09
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	0.62
<b>Phenols</b>					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

## Summary of Asbestos Analysis Soil Samples

*Our Ref* 21-03209

*Client Ref* 4322D

*Contract Title* A66 North Trans Pennine Scheme D Section 8

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1802364	TP CLR007 6 1.20	SOIL	NAD	none	Keith Wilson
1802365	TP CLR012 3 0.40	SOIL	NAD	none	Keith Wilson

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 21-03209

Client Ref 4322D

Contract A66 North Trans Pennine Scheme D Section 8

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
1802364	TP CLR007 1.20 SOIL	11/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1802365	TP CLR012 0.40 SOIL	11/02/21	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

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 SO <sub>4</sub>	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 SO <sub>4</sub>	%	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.

End of Report

**Archaeology Monitoring Report  
(Tested Externally)**







## GI MONITORING REPORT

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## A66 NTP BOWES TO SCOTCH CORNER GEOTECHNICAL INVESTIGATIONS ARCHAEOLOGICAL MONITORING REPORT

prepared for  
Allied Exploration and Geotechnics  
Ltd

on behalf of  
Amey

Project No.: 2092  
Text: Holly Drinkwater  
Illustrations: Dawn Knowles

QUALITY ASSURANCE	
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 Location                             NZ 21504 05295 to NY 98675 13527  
 Dates of Fieldwork               1 February 2021 – 10 March 2021

# A66 NTP BOWES TO SCOTCH CORNER GEOTECHNICAL INVESTIGATIONS

## ARCHAEOLOGICAL MONITORING REPORT

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### FIGURES

Figure 1: A66 Bowes to Scotch Corner: general location of ground investigations.

Figure 2: A66 Bowes to Scotch Corner: location of test pits, Bowes Bypass.

Figure 3: A66 Bowes to Scotch Corner: location of test pits, Cross Lanes to Rokeby.

Figure 4: A66 Bowes to Scotch Corner: location of test pits, Stephen Bank to Carkin Moor (north-west).

Figure 5: A66 Bowes to Scotch Corner: location of test pits, Stephen Bank to Carkin Moor (south-east).

### PLATES

Plate 1: TP BB006 through the Bowes railway cutting. Stone, clay and cinder deposit **12** can be seen at the southern edge of the pit.

Plate 2: prominent ridge-and-furrow earthworks in the vicinity of TP BB008, looking south-east.

Plate 3: cobble wall foundation **05** in TP SBC012, looking south.

Plate 4: pits **02** (top) and **04** (bottom) in TP SBC018.

Plate 5: overview of sandstone trackway **11** in TP SBC041.

Plate 6: feature **06** in TP SBC042, showing sandstone fragments (**08**) along the western edge and area of metalling to the south-east corner.





# **A66 NTP BOWES TO SCOTCH CORNER GEOTECHNICAL INVESTIGATIONS**

## **ARCHAEOLOGICAL MONITORING REPORT**

### **Summary**

*NAA conducted a scheme of archaeological monitoring in conjunction with Ground Investigation (GI) works along the eastern stretch of the A66, from Bowes to Scotch Corner, as part of an assessment to inform proposed upgrades to the existing carriageway.*

*The route of the A66 passes through a corridor of significant Roman archaeology, intersecting the Scheduled Monument of Carkin Moor Roman Fort and close to further scheduled forts at Greta Bridge and Bowes. Excavations in recent years have highlighted substantial Iron Age and early Roman occupation at Scotch Corner (Fell 2020, NAA 2020) as well as a Roman roadside settlement to the west of Carkin Moor (NAA in prep.) and have demonstrated that widening of the existing routeway has the potential to encounter considerable archaeological remains dating from the early Prehistoric through to the post-medieval period (Zant and Howard-Davis 2013).*

*In total, 74 GI interventions were monitored during the current scheme. Most of the archaeological remains were recorded across the area from Stephen Bank to Carkin Moor in the east, within four trial pits. In addition, an impressive suite of ridge and furrow was encountered near Bowes.*

*Two potential stone trackways were recorded in the vicinity of Carkin Moor. The first, in trial pit (TP) SBC041 had a surface constructed entirely of angular sandstone slabs, while the second in TP SBC042, appeared to have a kerb of large stones flanking a metalled surface, potentially constructed atop an earlier hollow-way. Only the edges of the features were revealed in their respective trial pits and no finds were recovered; however, they both appeared to run along a north-east to south-west alignment, perpendicular to the route of the A66 and, significantly, both were recorded in an area of known Roman archaeology. The potential trackway in TP SBC042 was located directly to the south of the roadside settlement excavated in 2016 (NAA in prep.).*

*The remaining archaeological features were encountered to the west, in the vicinity of West Layton. In a field directly to the south-west of West Layton Manor, TP SBC012 exposed a cobble foundation for an earthen bank or hedgerow, that probably defined an east-to-west field boundary parallel to the old Roman Road. To the east, two irregular-shaped pits containing charcoal and burnt daub were excavated in TP SBC018. They potentially belonged to a larger pit grouping or structure that was near a kiln or hearth, from which the burnt material likely originated, and which could still survive in the surrounding field.*

*Although none of the archaeological features contained diagnostic finds, the presence of remains confirms the potential archaeological significance of the stretch of road from Stephen Bank to Carkin Moor, highlighted in earlier work. Despite negative results within the GI interventions, the significance of the remainder of the proposed route cannot be discounted owing to the prevalence of known historic sites along its alignment that include a large number of listed buildings and scheduled monuments.*





## **1.0 INTRODUCTION**

- 1.1 Amey was commissioned by Highways England to undertake the Project Control Framework (PCF) Stage 3 design and assessment of proposed upgrades to the A66 between Junction 40 of the M6 at Penrith and the A1(M) at Scotch Corner. As part of the assessment programme, Ground Investigation (GI) works were carried out along parts of the proposed scheme. This report presents the results of a programme of archaeological monitoring during GI works in four areas along the eastern part of the A66 route between Bowes and Scotch Corner (NGR: c.NY 9865 1350 to c.NZ 2165 0525; Fig. 1).
- 1.2 The report has been produced by Northern Archaeological Associates (NAA) for Allied Exploration and Geotechnics Ltd, on behalf of Amey. The results of the work will be used to inform the Stage 3 Cultural Heritage Assessment for the project (NAA in prep.).

## **2.0 LOCATION, GEOLOGY AND TOPOGRAPHY**

### **Location**

- 2.1 Groundworks were proposed in four separate areas along the A66 route (Fig. 1), although monitoring was ultimately not required at the eastern section around Scotch Corner. The monitored sections comprised: a c.2.6km stretch where the current A66 passes to the north of Bowes village (Bowes Bypass section, 14 trial pits); a c.3.3km stretch to the south of Barnard Castle between Cross Lanes and Rokeby (17 trial pits); and c.5km between New Road (to the south of Hutton Magna) and Carkin Moor (Stephen Bank to Carkin Moor section, 43 trial pits).

### **Geology**

- 2.2 In the area of the proposed works at Bowes, the solid geology is primarily mudstones, siltstones and sandstones of the Stainmore formation, although immediately to the east of the village the route crosses an area of Carboniferous limestone (part of the Great Limestone Member formation). The second area, Cross Lanes to Greta Bridge, overlies the same Carboniferous limestone. In the area of Carkin Moor and extending east to Scotch Corner, the solid geology consists of limestone and sandstone of the Alston Formation. In all three areas the bedrock is covered by superficial deposits of Devensian Diamicton Till (BGS 2021).

### **Topography and land use**

- 2.3 The majority of the trial pits were excavated on farmland within arable fields or those set to pasture. Two trial pits were excavated along the line of the South Durham and Lancashire Union Railway near Bowes.

## **3.0 SUMMARY ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

- 3.1 There have been surprisingly few prehistoric sites identified along the Scotch Corner to Bowes section of the A66. However, investigations during previous upgrading of the road from Carkin Moor to Scotch Corner identified a scatter of sites of Late Mesolithic/Early Neolithic to Iron Age date (Zant and Howard-Davis 2013).
- 3.2 Known archaeological remains directly relevant to the current works date almost entirely to the Roman period. For much of the route between Scotch Corner and Bowes, the A66 closely follows the line of the Roman road running westwards from Dere Street (the modern A1(M)) towards the Stainmore Pass, which passes the Pennines *en route* to Carlisle (Margary road 82 (Margary 1973, 433–6).
- 3.3 The Roman road junction at Scotch Corner was the site of a substantial Late Iron Age and early Roman settlement, part of which was excavated and surveyed during recent A1 improvements (Fell 2020). Although the site has not yet been granted statutory designation, the archaeological remains are considered by Historic England to be of at least national, and probably international, significance.
- 3.4 Military installations were spaced along the Roman road. Passing westwards from Scotch Corner, the A66 bisects the scheduled Roman fort and prehistoric or Romano-British enclosed settlement 400m west of Carkin Moor Farm (National Heritage List No. 1015418; Zant and Howard-Davis 2013). In 2016, during construction of a water pipeline at the southern side of the A66 immediately to the west of Carkin Moor Roman fort, excavations identified extensive remains of a Roman roadside settlement extending westwards towards Mainsgill Bridge on the south side of the Roman road (NAA 2016 and in prep.). Finds included elements of the Roman Road, seven roadside enclosures (two of which had been walled), cobbled surfaces, the footings of a possible building, refuse dumps and a pottery kiln.
- 3.5 To the west, the route passes a probable Roman camp at Rokeby Park and the scheduled Roman Fort and vicus at Greta Bridge (National Heritage List No. 1019074). At Bowes there lies another scheduled Roman fort (*Lavatrae*), part of which was reused as a

medieval castle (National Heritage List Nos 1002316 and 1002318; Frere and Fitts 2009). The modern A66 bypasses the village to the north, although the Roman road passes through the modern settlement, which is built over the vicus associated with the fort.

- 3.6 Detailed comparison of the proposed trial-pit locations against other known archaeological evidence suggested that the GI works would have no impact upon them. However, there was still the possibility of encountering previously unknown archaeological features and deposits. The potential presence of previously undetected prehistoric evidence has been noted above. The modern A66 does not, in all areas, precisely follow the alignment of the Roman road (where it is known) and the recent excavations to the west of the Carkin Moor fort have demonstrated that remains of the Roman route can survive below the modern verge or within adjacent fields. Peripheral features such as Roman quarry pits (for road materials) have been recognised further to the west, and may also be present on the current part of the route, while some Roman roads may have been flanked at a distance by parallel boundaries as has been recognised on the route leading northwards from Bowes to Barnard Castle (Margary road 82 (Margary 1973, 437); Ambrey *et al.* 2017, 105–6).
- 3.7 None of the trial-pit locations impacted directly upon any recorded sites of medieval or post-medieval significance.

### **Geophysical survey**

- 3.8 Geophysical survey was conducted in advance of the current work (Headland Archaeology unpublished) in addition to an extensive survey of the route between Scotch Corner and Greta Bridge carried out as part of the earlier widening along the A66 (GeoQuest Associates 1999).

## **4.0 AIMS AND OBJECTIVES**

- 4.1 The aim of the archaeological monitoring was to identify the presence and location of archaeological remains within the area of development. The objectives of the monitoring were to:
- establish the presence, nature, extent, preservation and significance of any archaeological remains within the area of the proposed road improvements;
  - provide a detailed record of any such archaeological remains;

- recover and assess any associated structural, artefactual and environmental evidence, where safe to do so;
- undertake a programme of investigation that meets with national and regional standards (Historic England 2015a; ClfA 2014b–d; South Yorkshire Archaeology Service 2018); and
- prepare an illustrated report on the results of the archaeological monitoring to be deposited with Durham County Council Historic Environment Record (HER).

## **5.0 METHODOLOGY**

- 5.1 The trial pits were excavated down to natural geology or archaeological deposits using a tracked excavator fitted with a toothless bucket and measured 2m by 2.5–4m. Borehole starter pits were excavated by hand. Where structures, features, deposits or finds of archaeological interest were exposed, mechanical excavation ceased to allow the investigating archaeologist to assess and record the remains. Once archaeological observations were complete, the monitoring archaeologist allowed mechanical operations to recommence. A toothed bucket was used to excavate the trial pit down to the specified depth, which varied between 3m and 6m.
- 5.2 Where archaeological features extended beyond the limits of the trial pits, as in TP SBC12, TP SBC41 and TP SBC42, the exposed remains were cleaned and recorded and the pit moved. In this way, the presence of archaeology was noted and an interpretation made, but it is possible to preserve the remains in situ until full excavation of the features can be undertaken.
- 5.3 Archaeological designations for each intervention conform to those used by the GI contractors (AEG). A full record (written, graphic and photographic, as appropriate) was made for all work, using pro-forma record sheets and text descriptions appropriate to the work. The location of each intervention was surveyed by the GI contractors.
- 5.4 A photographic record of all contexts was taken in digital format and include a clearly visible, graduated metric scale where possible. A register of all photographs will be kept. The digital photographs will be submitted to the Archaeology Data Service (ADS) for long-term archive storage.
- 5.5 No finds of archaeological interest were recovered.



5.6 Upon discussion between the contractor and the monitoring archaeologist, it became clear the trial pits to be excavated at Scotch Corner were within areas of made ground previously subjected to archaeological excavation (Fell 2020), and therefore monitoring of these interventions was not required.

## **6.0 RESULTS**

6.1 Monitoring of the GI works revealed very little archaeological evidence. The majority of trial pits did not contain archaeological features, deposits or finds; those that were present probably related to known nearby Roman-period settlement or post-medieval agricultural regimes.

6.2 Only the trial pits that revealed potential archaeological remains will be discussed in detail here. An inventory of archaeological contexts recorded is listed in Appendix A, while a tabulated inventory of all trial pits, their deposit depths and characteristics are listed in Appendix B.

### **TP BB006**

6.3 The trial pit was located north of the A66, within the footprint of the old South Durham & Lancashire Union Railway cutting (Fig. 2).

6.4 Beneath a thin topsoil layer was revealed a 0.2m-thick layer of compacted stone and black cinders that is likely to have formed the bedding material for the rail tracks (12, Plate 1). The trackway material had been laid upon natural mid-brownish grey boulder clay, which turned increasingly grey and stony towards the base of the trial pit, at a depth of 4.5m.



*Plate 1: TP BB006 through the Bowes railway cutting. Stone, clay and cinder deposit 12 can be seen at the southern edge of the pit.*

#### **TP BB008 and BB009**

- 6.5 The trial pit was located to the north of the A66 in a field that contained large and prominent ridge and furrow, aligned north to south (Plate 2, Fig. 2).
- 6.6 The pit was excavated through a plough ridge, revealing it to be made up of a 0.45m-thick mixed plough-soil of mid-greyish brown silty clay and redeposited yellow natural clay (13). No finds were recovered to enable potential dating of the ridge-and-furrow earthworks. TP BB009 was located in the field directly to the east, which also contained large ridge and furrow earthworks, presumably of the same regimen. A comparable mixed plough-soil horizon was also recorded in this pit.



*Plate 2: prominent ridge-and-furrow earthworks in the vicinity of TP BB008, looking south-east.*

#### **TP CLR007**

- 6.7 The trial pit was located immediately north of the A66 in the vicinity of Cross Lanes (Fig. 3). Stripping of topsoil revealed a concentration of large stones (**14**) along the southern edge of the pit. The accumulation of stones perhaps related to field clearance and distribution along a boundary, but there was a possibility they could also be associated with the alignment of the Roman Road. No further exploration was conducted, and to avoid disturbing the remains further at this stage, the decision was made to move the pit c.0.7m to the north where no potential archaeological remains were present.

#### **TP SBC012**

- 6.8 The trial pit was located on the north side of the A66, to the south-east of West Layton Manor. The pit was situated in the south-eastern corner of a field set out to pasture, in proximity to its western, tree-lined boundary (Fig. 4).
- 6.9 Removal of a c.0.5m-thick turf and topsoil layer revealed the remnants of a cobble foundation (**05**) running roughly east to west at the southern end of the pit (Plate 3). Foundation **05** was a rubble construction of large, natural limestone cobbles and small,



sub-angular sandstone fragments within a matrix of grey clayey-silt, that could indicate that it was originally the foundation for an earthen bank. The rubble construction appeared to be sat directly atop the natural yellow clay, although it is possible that it could have been situated within a shallow construction cut. The width of **05** within the pit was 0.6m; however, it extended into the southern Limit of Excavation (L.O.E) and its full dimensions remain unknown. No earthworks were visible on the surface of the field to give any further indication of the extent or orientation of wall **05** and no finds were recovered during cleaning that could provide any dating evidence.

- 6.10 Aside from an initial surface clean for photographing, no further excavation of wall **05** was conducted. The trial pit was subsequently moved c.2m to the north to avoid any further disturbance to the in situ archaeological remains.



Plate 3: cobble wall foundation **05** in TP SBC012, looking south.

#### TP SBC018

- 6.11 The trial pit was located to the north of the A66, in an arable field opposite the junction with Waitlands Lane (Fig. 4).
- 6.12 Removal of a 0.5m-thick topsoil layer revealed the natural yellow clay into which were cut two irregular pits (**02**, **04**). Pit **02** was the smaller of the two, measuring 0.5m wide



by 0.12m in depth, with shallow sloping sides culminating in a flat but uneven base. It had been backfilled with a single deposit (**01**) of mid-brownish grey silty clay that contained patches of burnt orange clay and frequent flecks of charcoal. Pit **04** was located 0.6m east of **02** and was 0.6m wide by 0.13m deep. It displayed a similar shallow, irregular profile to pit **02** and had been backfilled with a comparable deposit of mid-brownish grey silty clay with burnt clay and charcoal inclusions (**03**). Neither pit demonstrated evidence of in situ burning, indicating the backfill material had been redeposited from elsewhere. No finds or diagnostic material was recovered from either feature to help ascertain a potential date or function.

- 6.13 Pits **02** and **04** were fully excavated and recorded before recommencement of the GI works.



Plate 4: pits **02** (top) and **04** (bottom) in TP SBC018.

#### TP SBC041

- 6.14 The trial pit was excavated into the roadside verge to the south of Warrener Lane, close to the junction with an unnamed lane leading to Pond Dale Farm (Fig. 5).

- 6.15 Removal of an initial thin (0.1m) layer of turf and topsoil and 0.4m of underlying subsoil revealed the edge of what appeared to be a sandstone trackway (**11**), running north-east to south-west at the eastern LOE of the pit.
- 6.16 The upper surface comprised medium to large, angular sandstone slabs of up to 0.5m in width, which appeared to be laid atop smaller and more irregular sandstone fragments within a matrix of mid-orange-brown silty clay. The western edge of **11** was defined by a series of orthostatic sandstone pieces. It was unclear whether the stonework had been situated within a cut or had merely sunk into the natural sandy clay. No further excavation was conducted. The trench was backfilled to preserve the archaeology in situ and the trial pit moved to the east to prevent further disturbance.



Plate 5: overview of sandstone trackway **11** in TP SBC041.

#### **TP SBC042**

- 6.17 The trial pit was located to the south of the A66 within an arable field to the east of Mainsgill Farm Shop and within the vicinity of the 2016 NAA excavations (Fig. 5, NAA 2016 and in prep.).



- 6.18 Removal of a 0.3m-thick topsoil layer exposed the natural yellow clay, which was cut at the north-eastern end of the pit by feature **06** (Plate 6). The feature was visible in plan over a span of 2.5m and extended into the eastern LOE of the pit. It had been infilled with a mid-greyish brown deposit of clayey silt (**09**), into which had slumped a layer of rounded and sub-angular sandstone fragments (**08**), of various widths up to a maximum of 0.4m. The larger stones were concentrated along the edge of cut **06**, indicating that the feature was potentially linear and ran along a north-north-east to south-south-west alignment. An area of smaller sandstone fragments (**10**) was recorded in the south-eastern corner of the pit and could represent the remnants of a metallised surface above deposit **09**.
- 6.19 Feature **06** was cleaned and recorded in plan but was not investigated or disturbed further, the trial pit being moved to the north-west where no archaeological remains were present. No diagnostic finds were recovered and without additional excavation, the form and function of **06** are unclear. However, the concentration of stone and apparent linear form suggests a trackway, potentially belonging to the Roman roadside settlement previously identified in excavations directly to the north (NAA 2016 and in prep.). The degree of slumping of stone deposit (**08**) along the edge of **06** could indicate that the cut is of fairly substantial depth and therefore belongs to an initial ditch or hollow-way that was later capped with a stone track.



Plate 6: feature **06** in TP SBC042, showing sandstone fragments (**08**) along the western edge and area of metalling to the south-east corner.

## 7.0 DISCUSSION

- 7.1 Only seven of the 74 trial pits excavated for Geotechnical Investigations exposed archaeological remains. This may be considered a surprisingly sparse result considering the historical importance of the trans-Pennine corridor and the prevalence of known archaeological sites distributed along the A66.
- 7.2 The majority of the trial pits were excavated in pasture or arable fields and in some places the plough horizon and resulting topsoil layer was in excess of 0.5m thick. This intensive cultivation resulting from post-medieval farming practices has potentially erased many shallower, negative archaeological features, as well as levelling any extant earthworks. Several trial pits were also located in the verge along the current A66, the construction of which would also likely have resulted in significant truncation to any archaeological remains in the corridor. However, the 2016 excavations to the west of Carkin Moor Roman Fort demonstrate that there are areas where the creation of the verge has helped to preserve archaeological remains beneath (NAA 2016 and in prep.).
- 7.3 Aside from ephemeral remnants of the 19th-century South Durham & Lancashire Union Railway in TP BB006 and the impressive ridge and furrow earthworks recorded to the west of Low Broats Farm (TP BB008/BB009, Plate 2), all further archaeological remains were encountered along the stretch from Stephen Bank to Carkin Moor. Unfortunately, no finds were recovered to date these features and the small footprint of the trial pits (2m wide by 2.5–4m in length) precluded confident interpretation.
- 7.4 Shallow pits **02** and **04** within TP SBC018 contained similar charcoal rich fills that indicated they had been backfilled contemporaneously. The fills included heat-affected clay, potentially burnt daub perhaps originating from a nearby kiln or hearth/oven. Without further excavation, it is unclear whether these features represent an isolated pit cluster or belong to a wider, potentially structural, group of features. The extensive truncation appears to preclude the survival of archaeological occupation horizons; however, there is the possibility that the bases of related features still survive in the surrounding field.
- 7.5 The remainder of the archaeological features encountered were apparently linear, each extending beyond the LOE of their respective trial pits, meaning their full forms and



extents were unclear, but enough of the features were visible to inform ideas about their functions. None of the features can be related to any documented previously on historic mapping of the area, implying that they could pre-date the mid-19th century.

- 7.6 Cobble and stone construction **05** in TP SBC012 probably provided a foundation for a wall or earthen bank or hedgerow that defined a former field boundary. It ran from east to west, roughly parallel to the line of the current A66 and perhaps reflected the line of the old routeway, still visible to the west.
- 7.7 Excavation of a Roman period roadside settlement along the southern verge of the A66 to the west of Mainsgill Farm (NAA 2016 and in prep.) revealed a series of partial enclosures set out perpendicular to the road. Located to the south of that excavation area, it is probable that feature **06** in TP SBC042 represents a trackway relating to the roadside settlement. The stonework on top of deposit **09** perhaps represented formalisation of an earlier hollow-way with an outer kerb (**08**) and metalled surface (**10**). Recent excavations of Pre-Roman and Roman settlement at Scotch Corner (Fell 2020; NAA 2020; Zant and Howard-Davis 2013) demonstrated that such trackways often defined the boundaries between distinct enclosures and often connected the areas of occupation with an agricultural hinterland beyond and this is likely the case with feature **06**.
- 7.8 A second potential trackway (**11**) was uncovered in TP SBC041. Like **06**, the upper surface was of large angular sandstone slabs, set upon a deposit of mid brown silty-clay that could represent the infill of an earlier hollow-way. There was also a possible kerb of on-edge sandstone blocks pressed into the lower deposit along the western edge. There was no evidence of a metalled surface and it is likely the entirety of the trackway surface was made up of angular sandstone slabs, the gaps being infilled with rubble. The south-western orientation of the track points directly towards Pond Dale Farm to the south and it is plausible that feature **11** was an original packhorse track leading to the farm when it was initially constructed.
- 7.9 There is also the possibility that feature **11** is much older and potentially Roman in date. Sandstone has been a favoured local building material from at least the 1st century AD due to its availability. It was used for walls, floors and road surfaces of early Roman date at Carkin Moor (NAA in prep.) and Scotch Corner (Fell 2020). It has been extensively quarried in the surrounding area up to the present day, with a large modern quarry still active along the A66 at Gatherley Moor. The location of the feature within a hinterland

of known Roman archaeology, directly to the north-west around the fort at Carkin Moor, is also a contributing factor, along with its orientation towards the main trans-Pennine thoroughfare of the Stainmore Pass to the north (Margary road 82; Margary 1973, 433–6).

- 7.10 The linear nature of features **5**, **6** and **11** means that there is potential for continuations of these features to be revealed and studied during future work when it may be possible to ascertain dates of construction and a more comprehensive interpretation of their functions and contexts.
- 7.11 Results of the archaeological monitoring of the GI works have demonstrated significant archaeological potential to exist within the stretch between Stephen Bank and Carkin Moor. This area was largely untouched by the previous A66 widening scheme, aside from three test pits excavated within the Scheduled Monument of Carkin Moor Roman Fort (Zant and Howard-Davis 2013, 17–18), only one of which, sited over the defensive ditch, encountered archaeological remains (*ibid.*, Trench 13). However, the discovery of a substantial Roman settlement along the southern verge of the A66, to the west of the fort (NAA 2016 and in prep.), serves to confirm that the surrounding area is likely to be rich in surviving subterranean archaeological remains.
- 7.12 The previous A66 widening scheme also demonstrated that archaeological remains were encountered less frequently to the west of Stephen Bank, the area westwards to Greta Bridge being found to be largely devoid of archaeological remains aside from post-medieval ridge and furrow (GBA12) and a post-medieval quarry (GBA21; Zant and Howard-Davis 2013, 14). An earlier geophysical survey carried out along the same stretch (GeoQuest Associates 1999) did, however, highlight areas of archaeological potential outside the development corridor; therefore, the presence of archaeological remains should not be entirely discounted based on the negative results of the current GI works between Cross Lanes and Rokeby.
- 7.13 A number of trial pits in the vicinity of Greta Bridge were excluded from the works described here (TP CLR016–019, TP CLR021–022). As the location of a Roman fort and associated *vicus*, this area arguably holds significant archaeological potential. Previous excavations within the scheduled area revealed a well-preserved section of the Roman road and demonstrated that the *vicus* extended to the north of the fort, both to the east and west, for a considerable distance, with remains also surviving beneath the existing carriageway of the A66 (Casey 1998). The full extent of the *vicus* and hinterland of the

fort at Greta Bridge is unknown and therefore any further work in the area as part of the carriageway upgrade could provide valuable information regarding the potential western limit of Roman occupation in this area.

- 7.14 Aside from an assemblage of large stones in CLR007 that could potentially relate to an archaeological feature, no further remains were encountered in the trial pits between Bowes and Rokeby. Even so, the historical and archaeological potential of the area cannot be discounted owing to the number of scheduled monuments and known historical sites distributed along the route of the A66. The course of the routeway is one which has funnelled human traffic through the trans-Pennine corridor for millennia and therefore the presence of multi-period archaeology should be anticipated during the execution of future works.

## **8.0 ARCHIVE DEPOSITION**

- 8.1 The full digital archive from the archaeological investigations is to be deposited online in the Archaeology Data Service website.

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**APPENDIX A**  
**CONTEXT CATALOGUE**

<b>Context Number</b>	<b>Description</b>	<b>Trial Pit</b>
1	Fill of pit <b>02</b>	TP SBC018
2	Cut of pit	TP SBC018
3	Fill of pit <b>04</b>	TP SBC018
4	Cut of pit	TP SBC018
5	Wall foundation	TP SBC012
6	Cut of ditch/trackway	TP SBC042
7	Alluvial clay deposit	TP SBC035
8	Stone 'trackway' surface in <b>06</b>	TP SBC042
9	Brownish-grey fill of <b>06</b>	TP SBC042
10	Metalled surface on <b>09</b>	TP SBC042
11	Sandstone farm track	TP SBC041
12	Stone, clay and cinder bedding material of railway	TP BB006
13	Mixed plough-soil of furrow	TP BB008/BB009
14	Assemblage of large stones	TP CLR007



**APPENDIX B**  
**TRIAL PIT DEPOSIT MODELS**

The values given in the table below relate to the depths of the deposits within each GI intervention. Where bedrock was reached, the depth at which it was encountered is given.

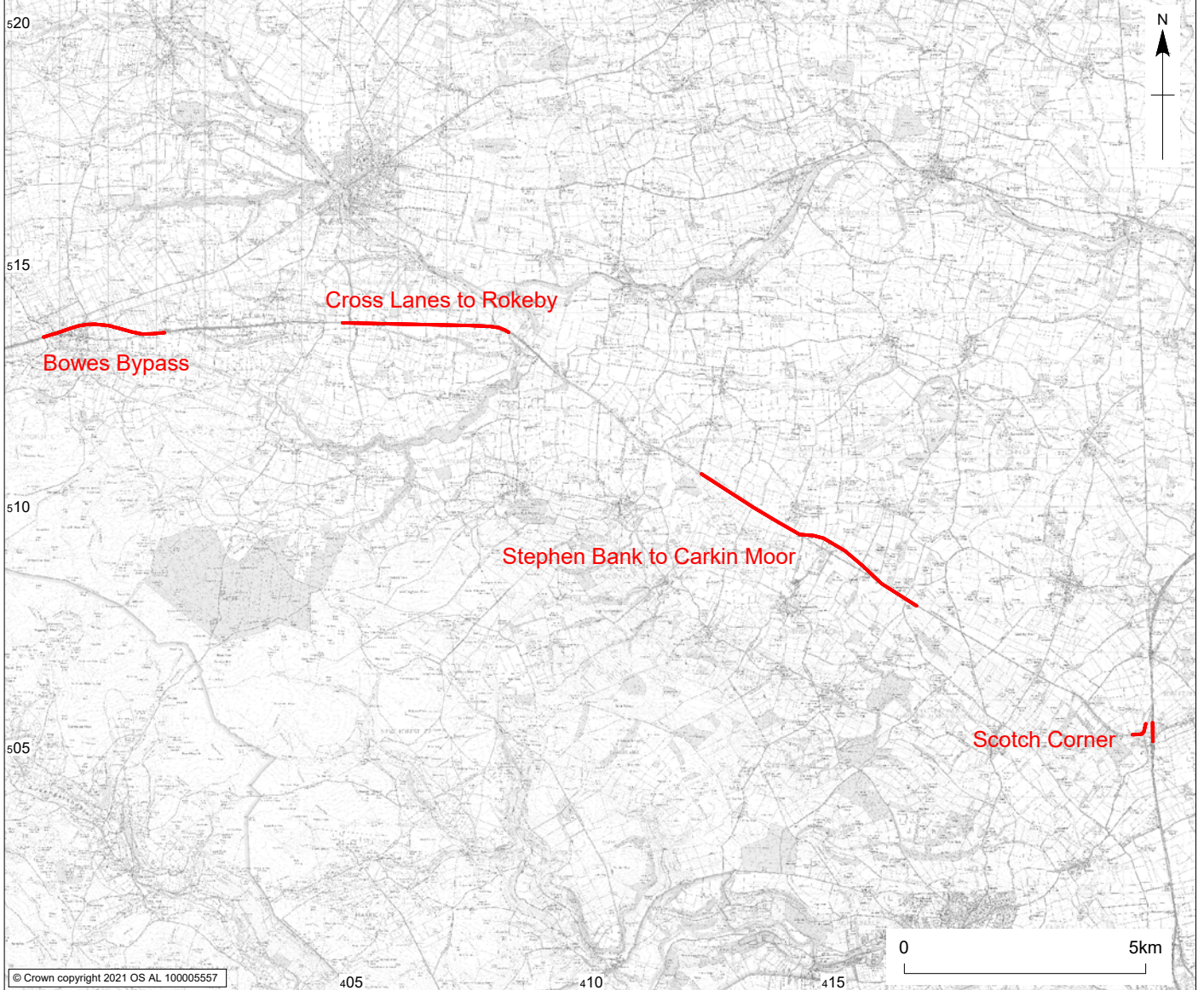
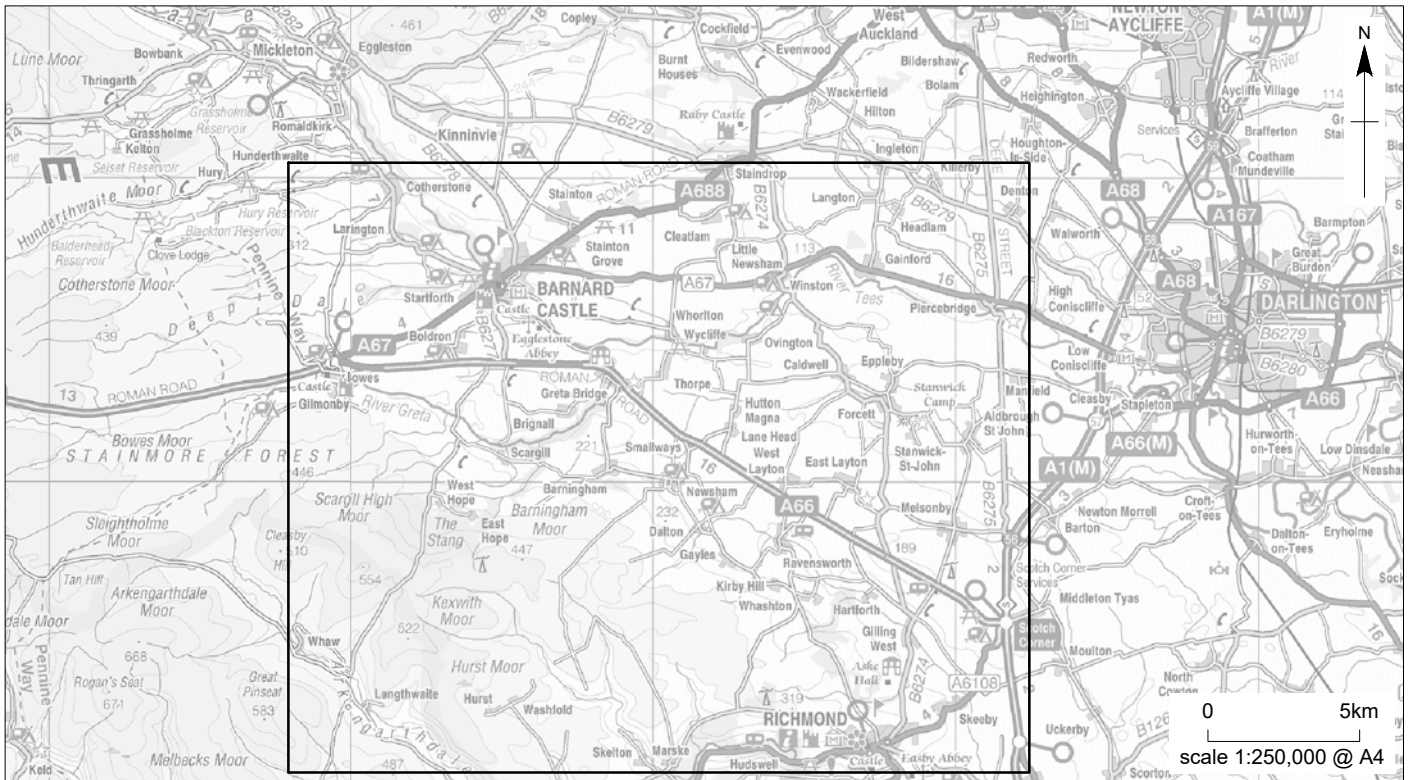
<b>Trial Pit</b>	<b>Deposit Sequence</b>
<b>Bowes Bypass</b>	
TP BB001	0.3m Topsoil 0.3–0.6m Subsoil 0.6–3.1m Natural Yellow Clay
TP BB002	0.2m Topsoil 0.2–0.5m Subsoil 0.5–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB003	0.2m Topsoil 0.2–0.5m Subsoil 0.5m–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB004	0.2m Topsoil 0.2–0.5m Subsoil 0.5–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB005	0.2m Topsoil 0.2–1m Modern Backfill of Service Trench 1–4.5m Natural Yellowish-Brown Sandy Clay 4.5m+ Limestone Bedrock
TP BB006	0.2m Topsoil 0.2–0.4m Mixed stone, clay and cinders <b>12</b> 0.4–4.5m Mid Brown to Dark Grey Boulder Clay
TP BB007	0.15m Topsoil 0.15–0.35m Subsoil 0.35–2.5m Natural Yellow Clay to Dark Grey Boulder Clay 2.5–4.5m Mudstone
TP BB008	0.15m Topsoil 0.15–0.6m Mixed plough-soil of ridge <b>13</b> 0.6–1.7m Natural Mid Orange-Grey Gravelly Clay 1.7m+ Sandstone Bedrock
TP BB009	0.15m Topsoil 0.15–0.6m Mixed plough-soil of ridge <b>13</b> 0.6–1.9m Natural Mid Orange-Grey Gravelly Clay 1.9m+ Sandstone Bedrock
TP BB010	0.2m Topsoil 0.2–1.5m Natural Yellow Clay 1.5–3.1m Natural Dark Grey Sandy Silt and Gravel – Riverine?
TP BB011	0.3m Topsoil 0.3–0.5m Subsoil 0.5–2.5 Natural Yellow Clay to Dark Grey Boulder Clay 2.5+ Mudstone
TP BB012	0.2m Topsoil 0.2–0.3m Subsoil 0.3–4m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB013	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP BB014	0.15m Topsoil 0.15–0.3m Subsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
<b>Cross Lanes to Rokeby</b>	
TP CLR001	0.25m Topsoil 0.25–0.65m Subsoil 0.65–2m Natural Yellow Clay and Gravel 2.0–3.7m Natural Dark Grey Boulder Clay
TP CLR002	0.3m Topsoil (N-S plough-scars visible in clay beneath)

<b>Trial Pit</b>	<b>Deposit Sequence</b>
	0.3–2m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR002a	0.3m Topsoil (E-W plough-scars visible in clay beneath) 0.3–2.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR003	0.3m Topsoil 0.3–2m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR004	0.25m Topsoil 0.25–4.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR005	0.2m Topsoil 0.2–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
TP CLR006	0.2m Topsoil 0.2–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
TP CLR007	0.25m Topsoil 0.25–0.55m Subsoil overlying stones <b>14</b> 0.55–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR008	0.2m Topsoil 0.2–0.4m Subsoil 0.4–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR009	0.2m Topsoil 0.2–0.4m Subsoil 0.4–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP CLR010	0.25m Topsoil 0.25–0.7m Natural Yellow Clay 0.7–4m Dark Grey Boulder Clay
TP CLR011	0.3m Topsoil 0.3–0.8m Natural Yellow Clay 0.8–4.5m Dark Grey Boulder Clay
TP CLR012	0.25m Topsoil 0.25–0.55m Subsoil 0.55–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR013	0.25m Topsoil 0.25–0.35m Subsoil 0.35–3m Natural Brownish-Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR015	0.3m Topsoil 0.3–0.4m Subsoil 0.4–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP CLR020	0.15m Topsoil 0.15–0.45m Subsoil 0.45–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
TP CLR023	0.2m Topsoil 0.2–0.45m Subsoil 0.45–4.5m Natural Orange-brown Gravelly Clay to Dark Grey Boulder Clay
<b>Stephen Bank to Carkin Moor</b>	
TP SBC001	0.25m Topsoil 0.25–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC002	0.15m Topsoil 0.15–2.5m Natural Orange-brown Stony, Gravelly Clay to Dark Grey Boulder Clay
TP SBC003	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC004	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC005	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Brownish-Yellow Clay to Dark Grey Boulder Clay
TP SBC006	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3m Natural Brownish-Yellow Clay to Dark Grey Boulder Clay
TP SBC007	0.15m Topsoil 0.15–0.5m Subsoil 0.5–3.5m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC008	0.15m Topsoil 0.15–2m Natural Yellow Stony Clay to Dark Grey Boulder Clay

Trial Pit	Deposit Sequence
	2–5.5m Mudstone
TP SBC009	0.1m Topsoil 0.1–0.2m Subsoil 0.2–1.2m Natural Light-Yellow Clay 1.2–3.5m Dark Grey Boulder Clay
TP SBC010	0.2m Topsoil 0.2–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC011	0.2m Topsoil 0.2–3m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC012	0.4m Topsoil 0.4–0.8m Natural Yellow Stony Clay 0.8–3m Dark Grey Boulder Clay
TP SBC013	0.25m Topsoil 0.25–0.35m Subsoil 0.35–0.8m Natural Yellow Stony Clay 0.8–3m Dark Grey Boulder Clay
TP SBC014	0.3m Topsoil 0.3–0.7m Gravelly Subsoil 0.7–1.5m Natural Brownish-Yellow Stony Clay 1.5m Water table encountered
TP SBC015	0.25m Topsoil 0.25–0.35m Subsoil 0.35–0.8m Natural Brownish-Yellow Clay 0.8–3m Dark Grey Boulder Clay
TP SBC016	0.3m Topsoil 0.3–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC017	0.4m Topsoil 0.3–0.7m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC018	0.5m Topsoil <b>01, 03</b> – Fills of pits <b>02</b> and <b>04</b> <b>02, 04</b> – Cuts of pits 0.5–0.8m Natural Yellow Clay 0.8–3.5m Dark Grey Boulder Clay
TP SBC019	0.4m Topsoil 0.4–1m Natural Yellow Clay 1–3m Dark Grey Boulder Clay
TP SBC020	0.3m Topsoil 0.3–3m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC021	0.3m Topsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay Sandstone Bedrock outcrop at c.1m at northern edge.
TP SBC022	0.30m Topsoil 0.3–0.70m Natural Yellow Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC023	0.3m Topsoil 0.3–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC024	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Stony Clay to Dark Grey Boulder Clay
TP SBC025	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC026	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC027	0.2m Topsoil 0.2–0.3m Subsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC028	0.3m Topsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC029	0.2m Topsoil

Trial Pit	Deposit Sequence
	0.2–0.6m Natural Yellow Clay 0.6–3.5m Dark Grey Boulder Clay
TP SBC030	0.3m Topsoil 0.3–0.6m Natural Yellow Clay 0.6–1.6m Yellowish-Brown Sandy Clay 1.6–3.5m Dark Grey Boulder Clay
TP SBC031	0.2m Topsoil 0.2–3.2m Natural Yellow Clay to Dark Grey Boulder Clay
TP SBC032	0.3m Topsoil 0.3–0.8m Natural Yellow Clay 0.8–3.5m Dark Grey Boulder Clay
TP SBC033	0.4m Topsoil 0.4–1m Natural Yellow Clay 1–3m Dark Grey Boulder Clay
TP SBC034	0.25m Topsoil 0.25–0.70m Natural Yellow Sandy Clay 0.7–3.5m Dark Grey Boulder Clay.
TP SBC035	0.3m Topsoil 0.3–0.5m Subsoil 0.5–0.7m Natural Yellow Clay with lens of Bluish Grey Clay 0.7–1.2m Natural Yellow Sandy Clay 1.2–3.5m Dark Grey Boulder Clay
TP SBC036	0.3m Topsoil 0.3–0.70m Natural Yellow Stony Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC038	0.4m Topsoil 0.4–0.60m Subsoil 0.6–1.2m Natural Yellow Stony Clay 1.2 – 3.5m Dark Grey Boulder Clay
TP SBC039	0.3m Topsoil 0.3–0.70m Natural Yellow Stony Clay 0.7–3.5m Dark Grey Boulder Clay
TP SBC040	0.0.25m Topsoil 0.25–0.55m Subsoil 0.55–1.2m Natural Orange-Grey Sandy Clay 1.2-3.5m Dark Grey Boulder Clay
TP SBC041	0.2m Topsoil 0.2–3m Natural Yellowish-Brown Sandy Clay to Dark Grey Boulder Clay
TP SBC042	0.3m Topsoil 0.3–3.5m Natural Yellow Clay to Dark Grey Boulder Clay 3.5m+ Laminated Sandstone Bedrock
TP SBC043	0.3m Topsoil 0.3–1.2m Natural Brownish-Yellow Sandy Clay 1.2-3.5m Dark Grey Boulder Clay
TP SBC044	0.0.25m Topsoil 0.25–0.55m Subsoil 0.55–1.2m Natural Brownish-Yellow Sandy Clay 1.2-3.5m Dark Grey Boulder Clay





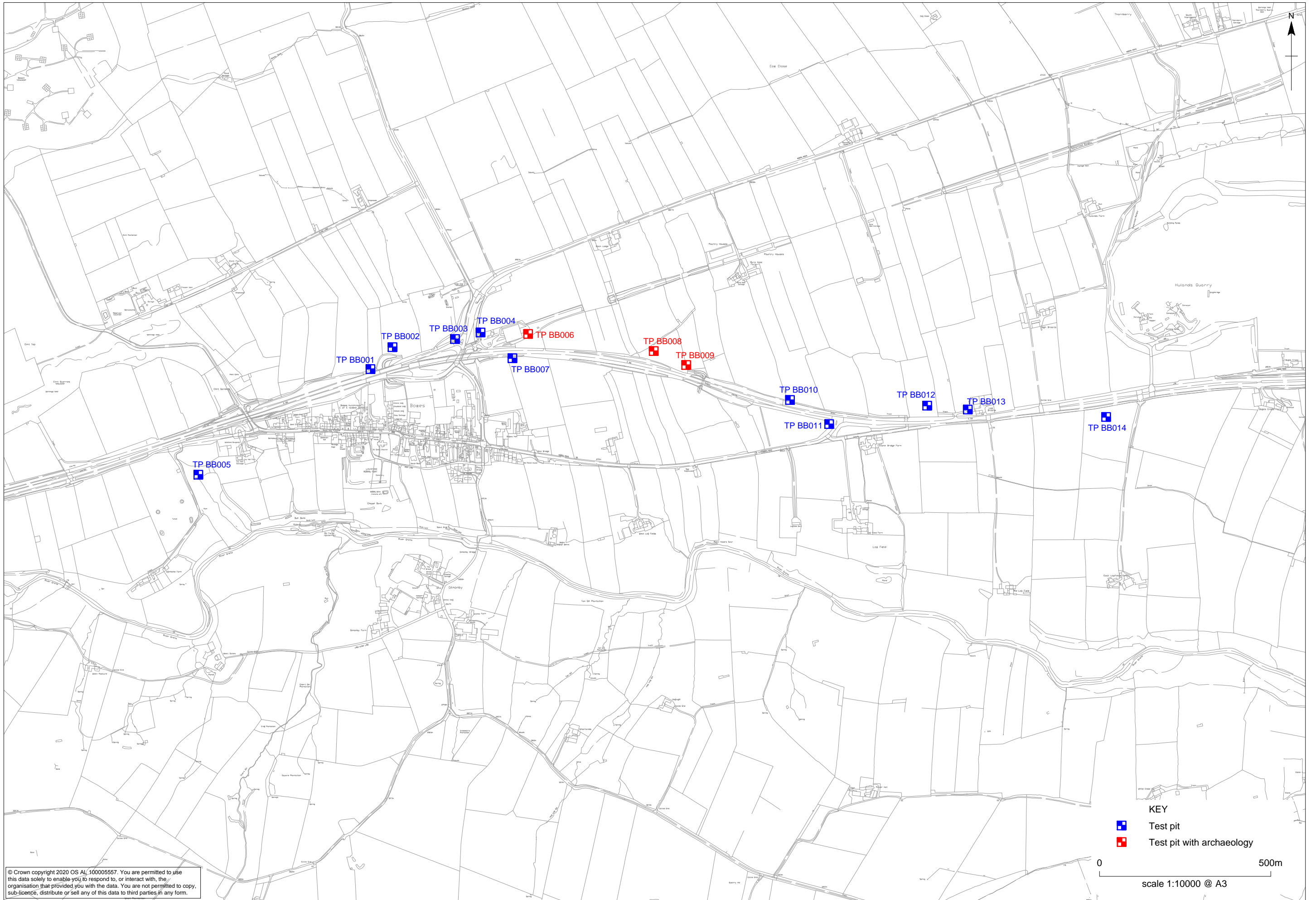
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A66 Bowes to Scotch Corner: general location of ground investigations

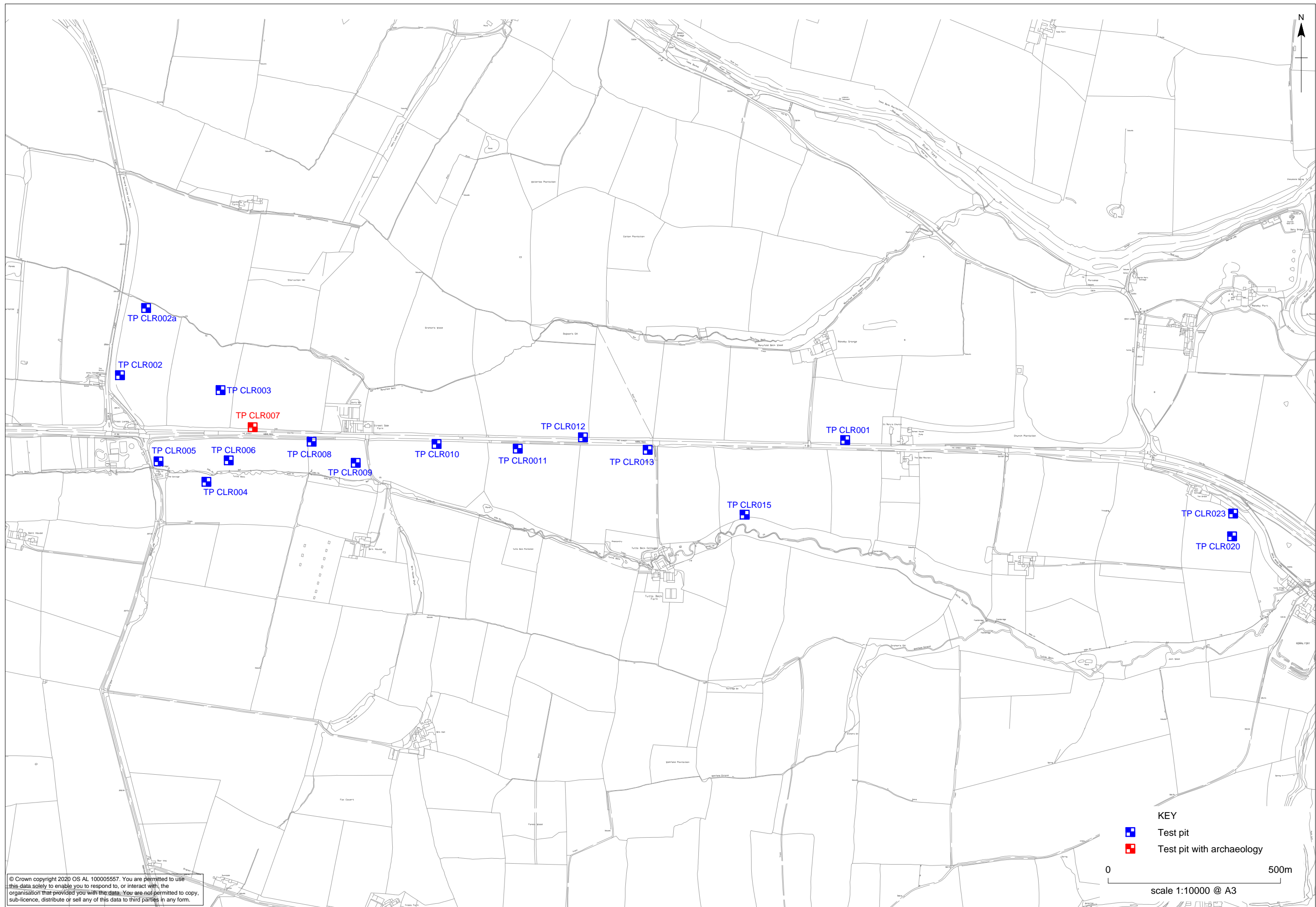
Figure 1





A66 Boves to Scotch Corner: location of test pits, Boves Bypass

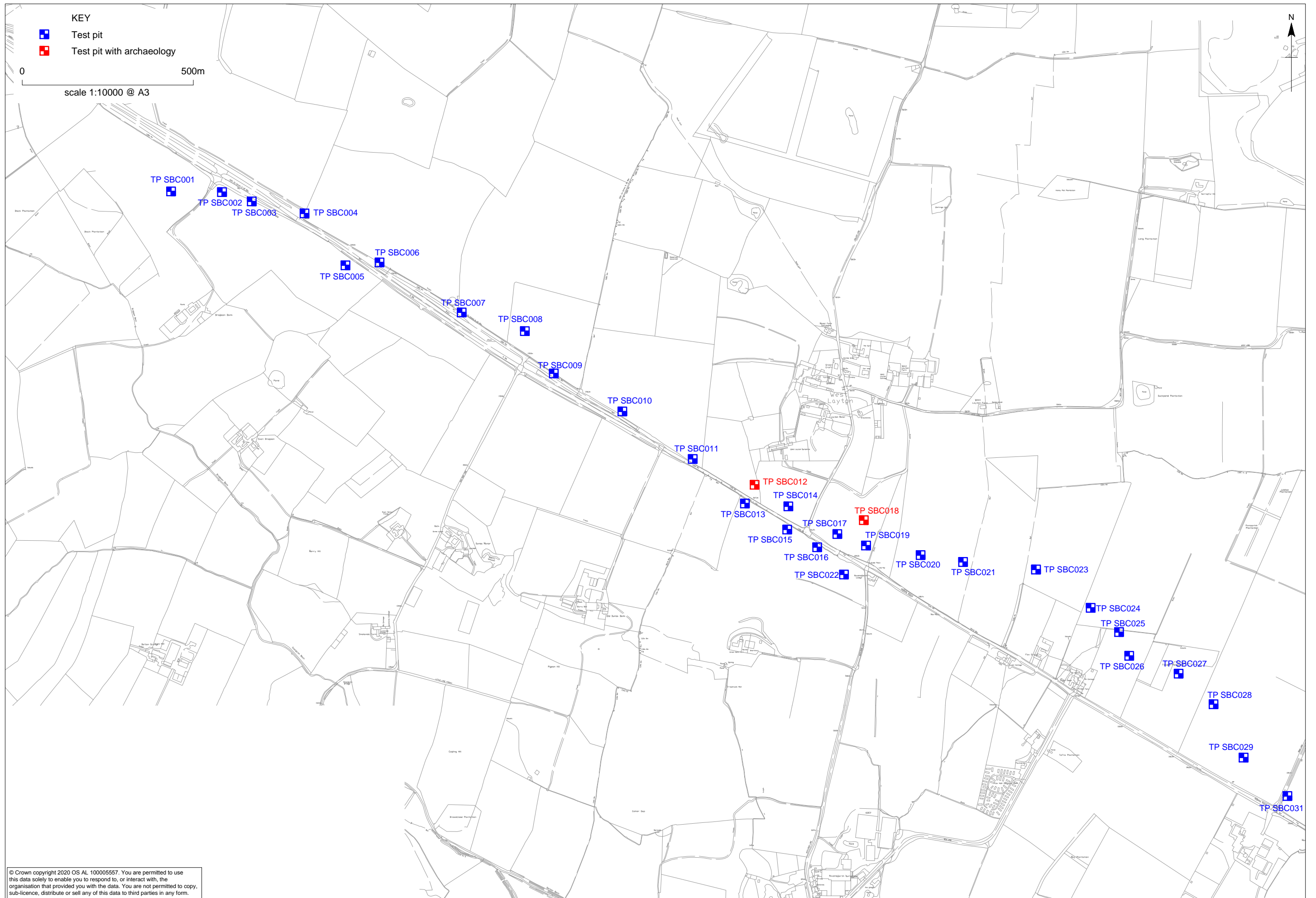
Figure 2



A66 Bowes to Scotch Corner: location of test pits, Cross Lanes to Rokeby

Figure 3



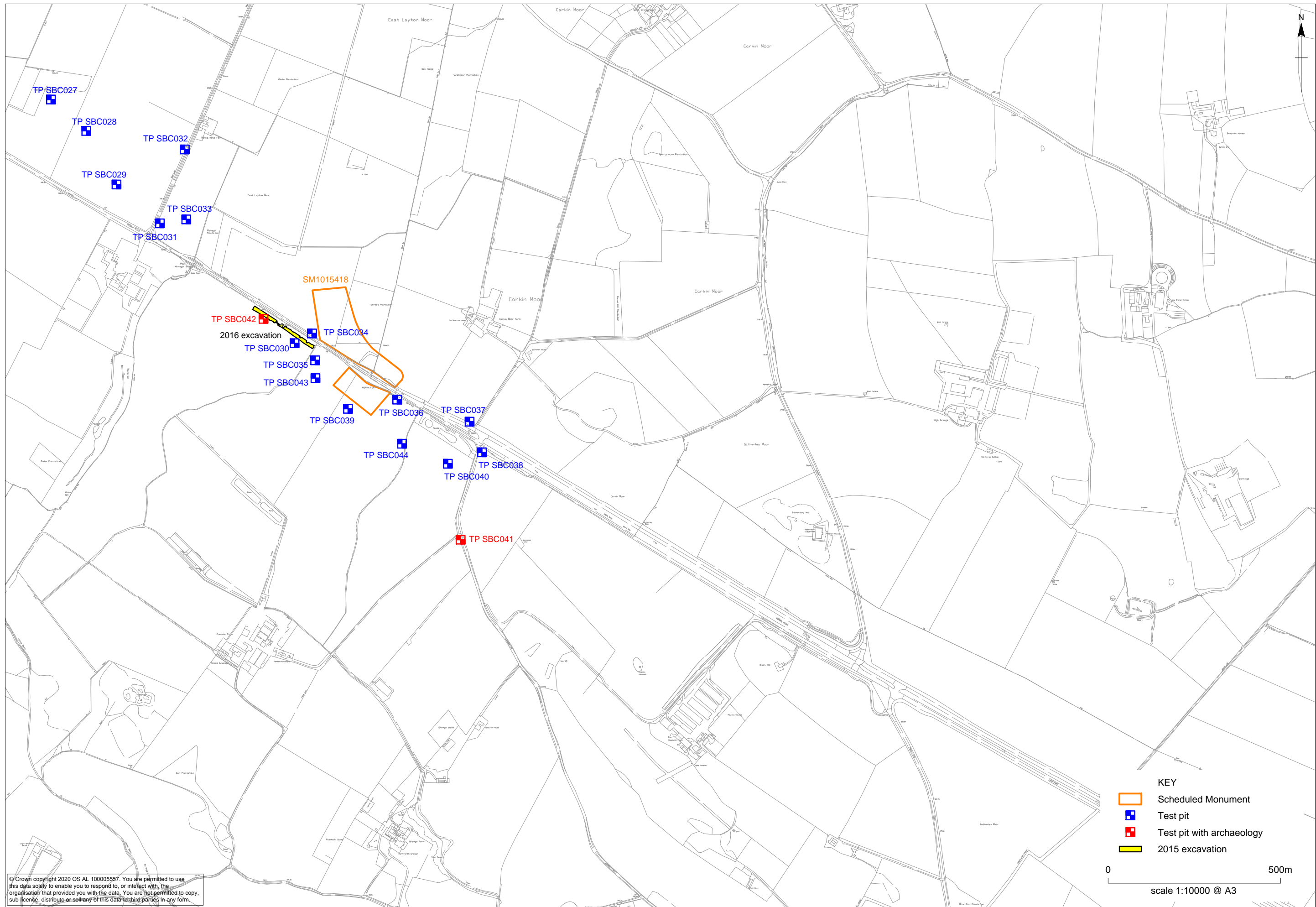


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A66 Bowes to Scotch Corner: location of test pits, Stephen Bank to Carkin Moor (north-west)

Figure 4





A66 Bowes to Scotch Corner: location of test pits, Stephen Bank to Carkin Moor (south-east)

Figure 5