



Laboratory Report



Contract Number: 72545

Client Ref: **5151**
Client PO: **24127**

Date Received: **26-04-2024**
Date Completed: **18-05-2024**
Report Date: **18-05-2024**

Client: **PJA Civil Engineering Limited**

This report has been checked and approved by:

Contract Title: **Swansea Bay**
For the attention of: **Liam Clark**

Brendan Evans
Office Administrator

Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	9
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	9
Particle Density (Gas Jar) BS 1377:1990 - Part 2 : 8.2 - * UKAS	9
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	9
Dry Den/MC (2.5kg Rammer Method 1 litre mould/CBR Mould) BS 1377:1990 - Part 4 : 3.4 - * UKAS	9
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

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 test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (HR & HSE Manager)

**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)**

Contract Number	72545	
Project Name	Swansea Bay	
Date Tested	14/05/2024	
	DESCRIPTIONS	

[illegible]

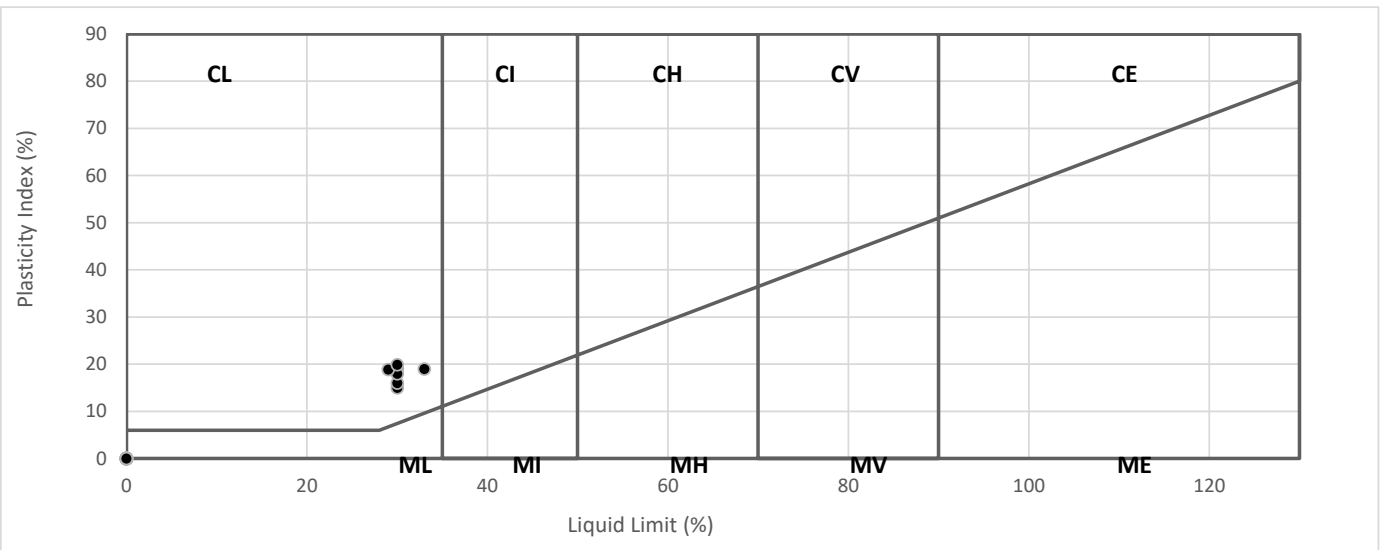
Operator
Aaron Hodge

Contract Number	72545	
Project Name	Swansea Bay	
Date Tested	14/05/2024	

[illegible]

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION BS 5930:2015+A1:2020



Operator
Aaron Hodge

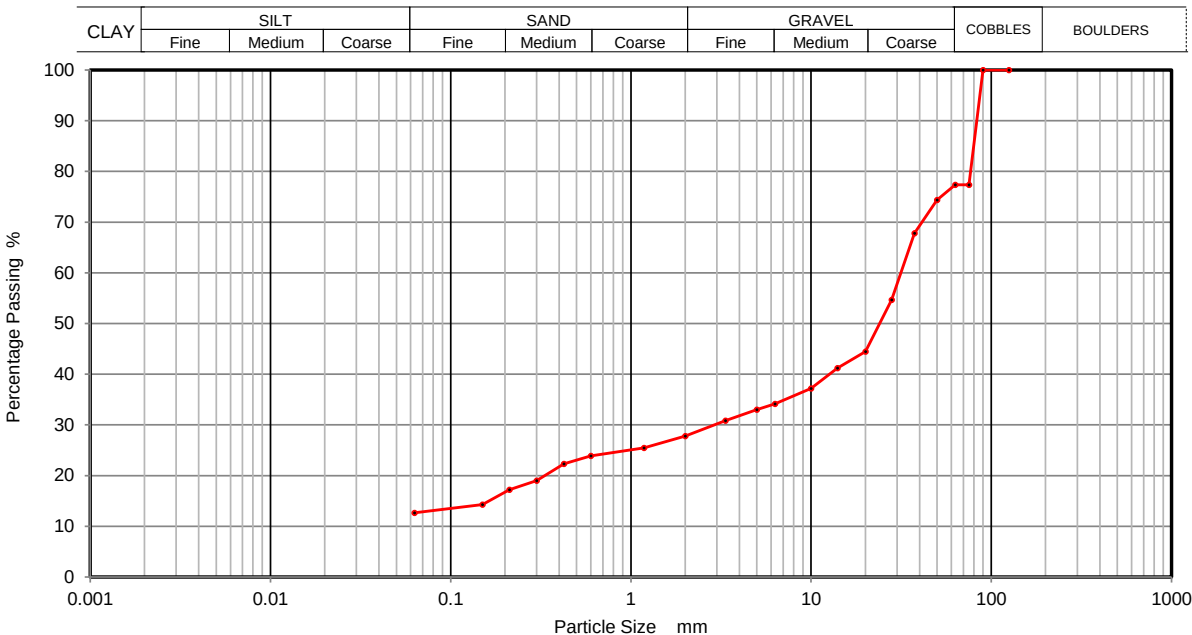




PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number	72545
Borehole/Pit No.	Stockpile D - Sample A
Sample No.	1
Depth Top	0.00
Depth Base	
Sample Type	B

Project Name	Swansea Bay
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
Date Tested	15/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	77		
63	77		
50	74		
37.5	68		
28	55		
20	44		
14	41		
10	37		
6.3	34		
5	33		
3.35	31		
2	28		
1.18	25		
0.6	24		
0.425	22		
0.3	19		
0.212	17		
0.15	14		
0.063	13		

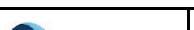
Sample Proportions	% dry mass
Cobbles	23
Gravel	49
Sand	15
Silt and Clay	13

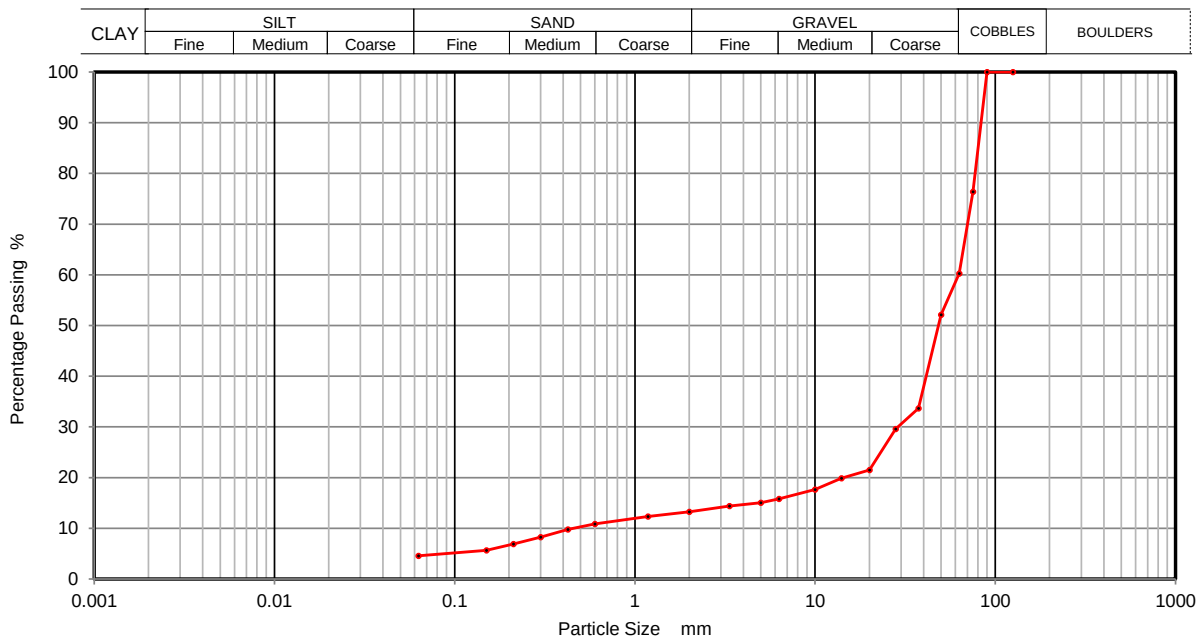
Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas



**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

 GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	72545
		Borehole/Pit No.	Stockpile E - Sample A
Project Name	Swansea Bay	Sample No.	2
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.00
		Depth Base	
Date Tested	15/05/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	76		
63	60		
50	52		
37.5	34		
28	30		
20	22		
14	20		
10	18		
6.3	16		
5	15		
3.35	14		
2	13		
1.18	12		
0.6	11		
0.425	10		
0.3	8		
0.212	7		
0.15	6		
0.063	5		

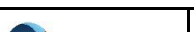
Sample Proportions	% dry mass
Cobbles	40
Gravel	47
Sand	8
Silt and Clay	5

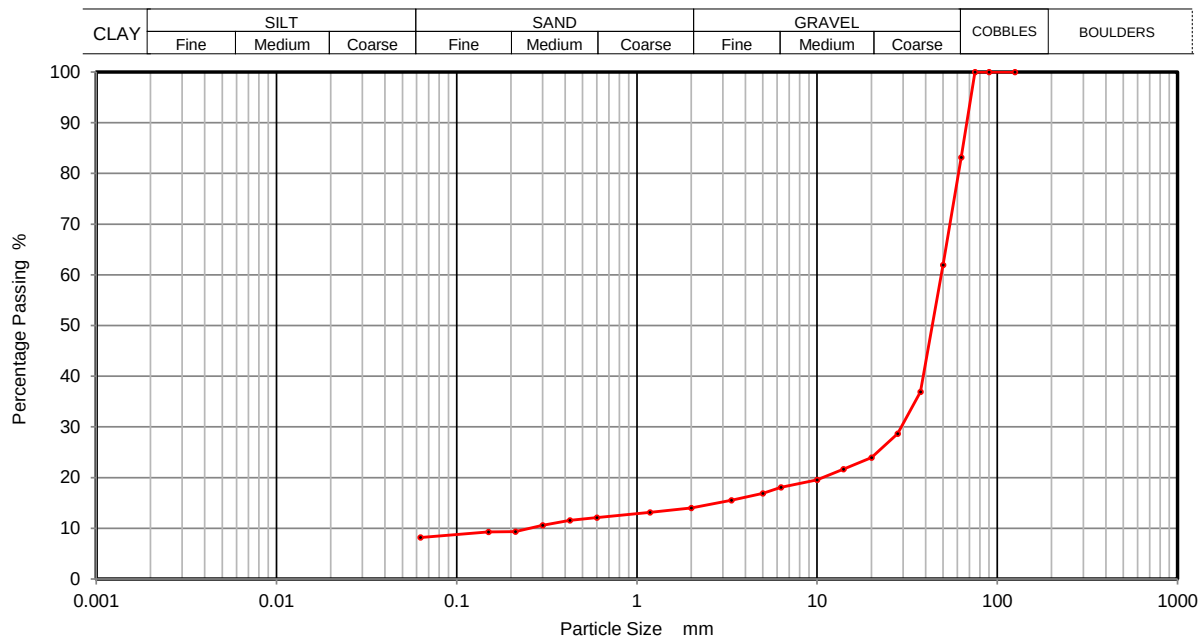
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas

**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

 GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	72545
		Borehole/Pit No.	Stockpile E - Sample B
Project Name	Swansea Bay	Sample No.	3
Soil Description	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (with cobbles)	Depth Top	0.00
		Depth Base	
Date Tested	15/05/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	83		
50	62		
37.5	37		
28	29		
20	24		
14	22		
10	20		
6.3	18		
5	17		
3.35	16		
2	14		
1.18	13		
0.6	12		
0.425	12		
0.3	11		
0.212	9		
0.15	9		
0.063	8		

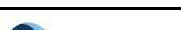
Sample Proportions	% dry mass
Cobbles	17
Gravel	69
Sand	6
Silt and Clay	8

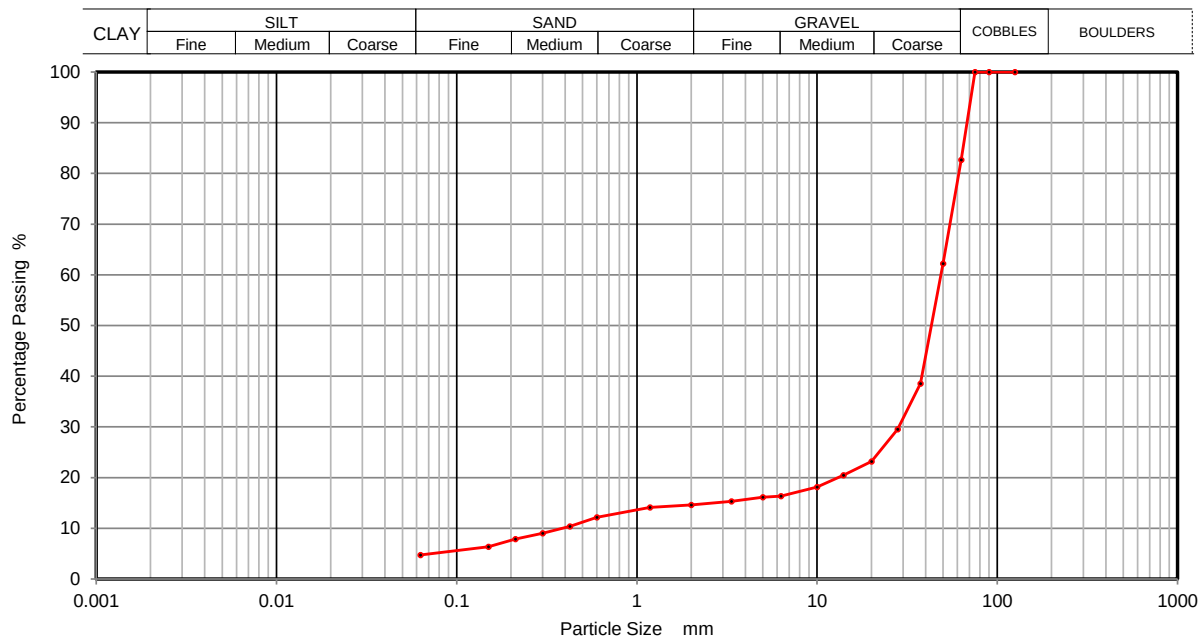
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas

**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

 GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	72545
		Borehole/Pit No.	Stockpile F - Sample A
Project Name	Swansea Bay	Sample No.	4
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.00
		Depth Base	
Date Tested	15/05/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	83		
50	62		
37.5	39		
28	30		
20	23		
14	20		
10	18		
6.3	16		
5	16		
3.35	15		
2	15		
1.18	14		
0.6	12		
0.425	10		
0.3	9		
0.212	8		
0.15	6		
0.063	5		

Sample Proportions	% dry mass
Cobbles	17
Gravel	68
Sand	10
Silt and Clay	5

Remarks

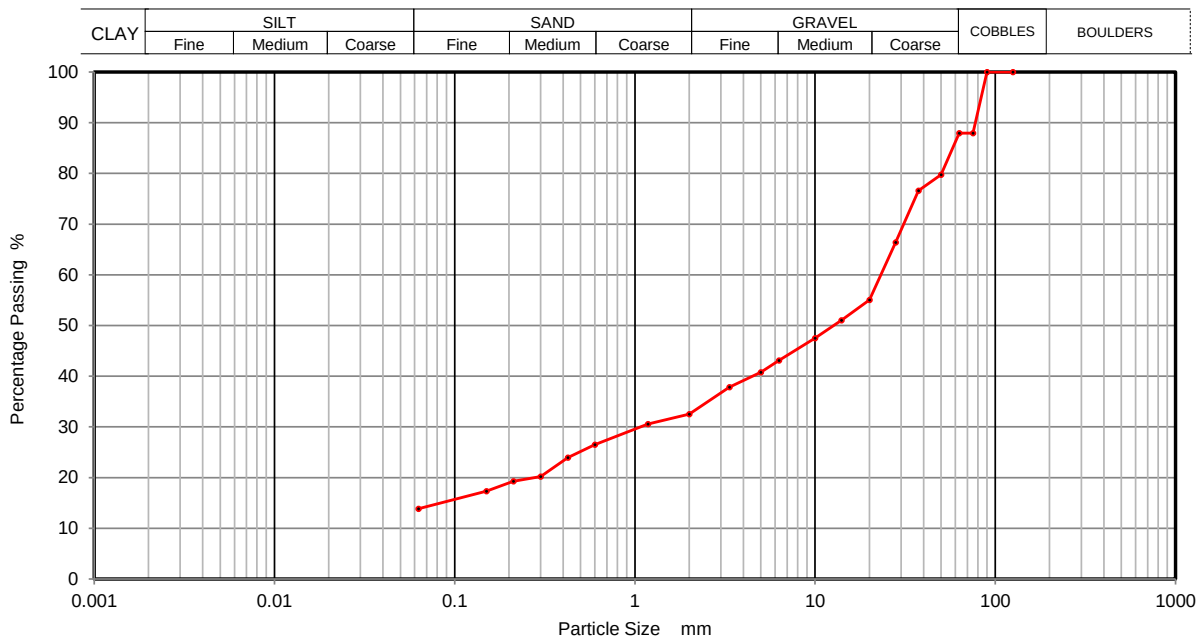
Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas

**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number	72545
Borehole/Pit No.	Stockpile F - Sample B
Sample No.	5
Depth Top	0.00
Depth Base	
Sample Type	B

Project Name	Swansea Bay
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
Date Tested	15/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	88		
63	88		
50	80		
37.5	77		
28	66		
20	55		
14	51		
10	47		
6.3	43		
5	41		
3.35	38		
2	32		
1.18	31		
0.6	27		
0.425	24		
0.3	20		
0.212	19		
0.15	17		
0.063	14		

Sample Proportions	% dry mass
Cobbles	12
Gravel	56
Sand	18
Silt and Clay	14

Remarks
Preparation and testing in accordance with BS1377 unless noted below

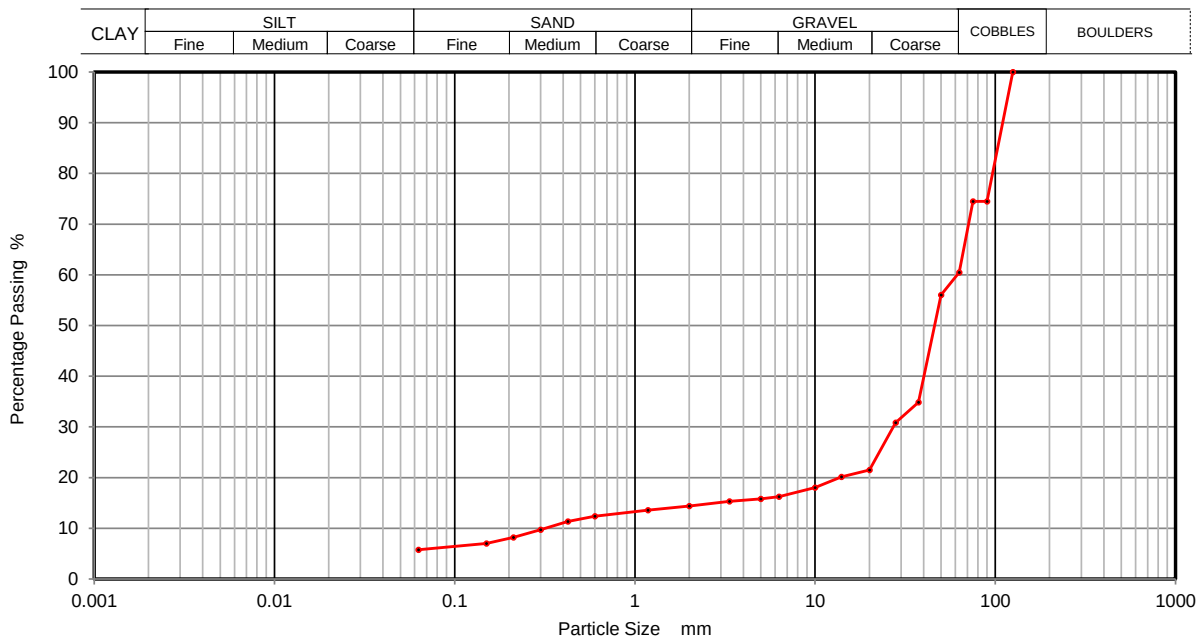
Operator
Cameron Thomas



PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2

Contract Number	72545
Borehole/Pit No.	Stockpile F - Sample C
Sample No.	6
Depth Top	0.00
Depth Base	
Sample Type	B

Project Name	Swansea Bay
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
Date Tested	15/05/2024



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	74		
75	74		
63	60		
50	56		
37.5	35		
28	31		
20	22		
14	20		
10	18		
6.3	16		
5	16		
3.35	15		
2	14		
1.18	14		
0.6	12		
0.425	11		
0.3	10		
0.212	8		
0.15	7		
0.063	6		

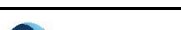
Sample Proportions	% dry mass
Cobbles	40
Gravel	46
Sand	8
Silt and Clay	6

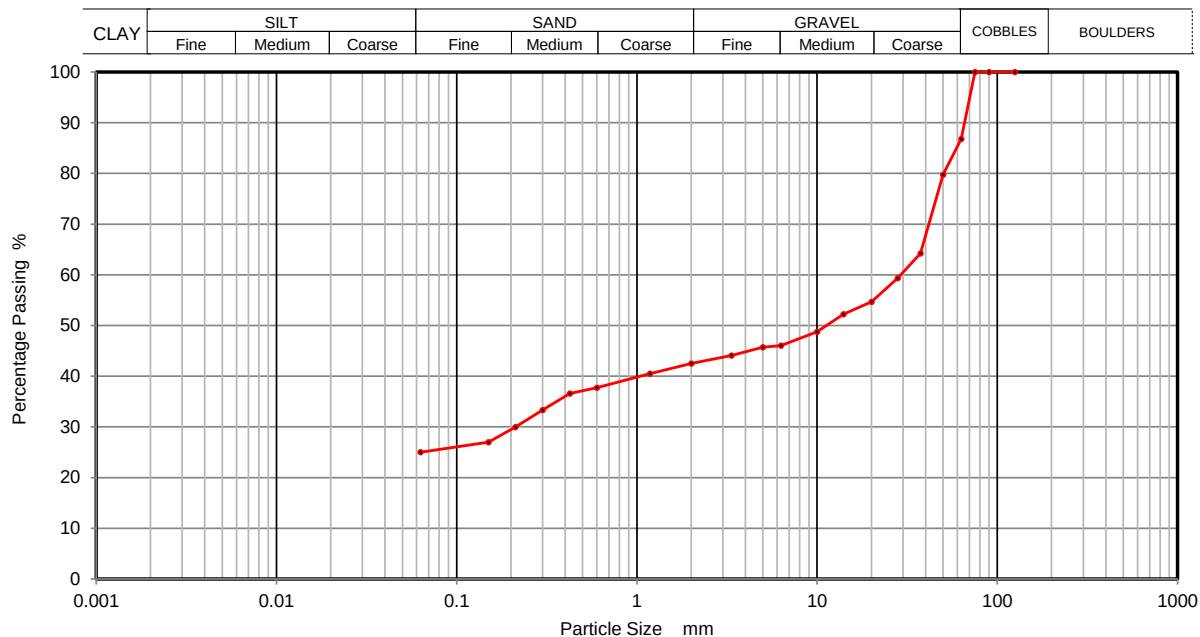
Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas



**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

 GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	72545
		Borehole/Pit No.	Stockpile F - Sample D
Project Name	Swansea Bay	Sample No.	7
Soil Description	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (with cobbles)	Depth Top	0.00
		Depth Base	
Date Tested	15/05/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	87		
50	80		
37.5	64		
28	59		
20	55		
14	52		
10	49		
6.3	46		
5	46		
3.35	44		
2	42		
1.18	41		
0.6	38		
0.425	37		
0.3	33		
0.212	30		
0.15	27		
0.063	25		

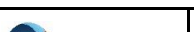
Sample Proportions	% dry mass
Cobbles	13
Gravel	45
Sand	17
Silt and Clay	25

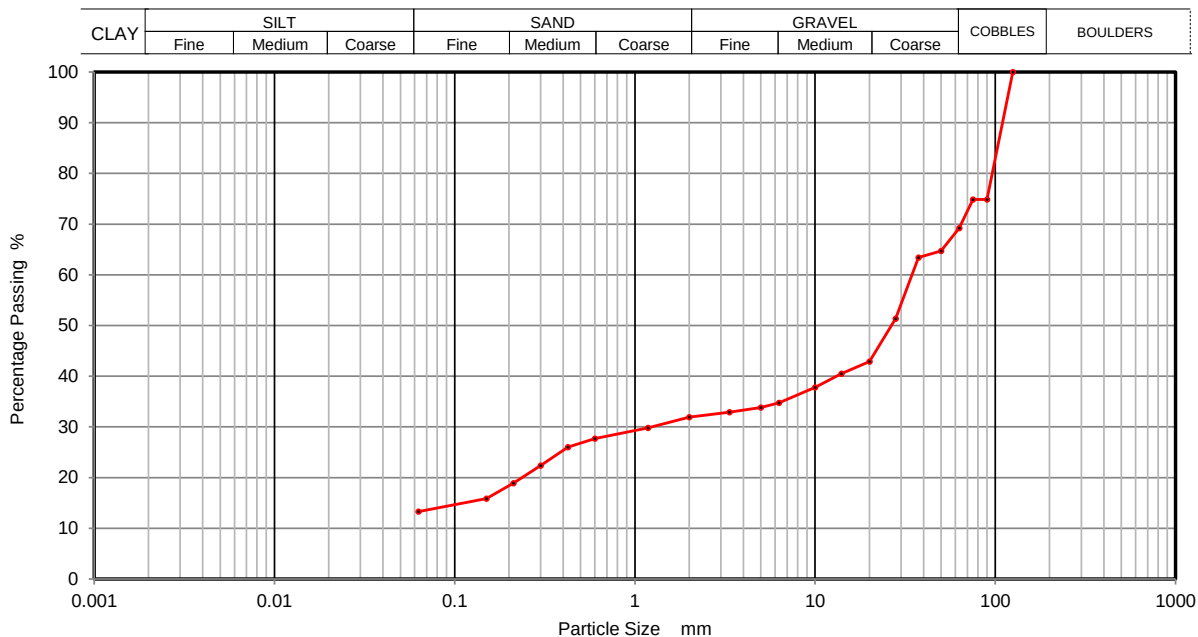
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas

**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

 GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	72545
		Borehole/Pit No.	Stockpile G - Sample A
Project Name	Swansea Bay	Sample No.	8
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.00
		Depth Base	
Date Tested	15/05/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	75		
75	75		
63	69		
50	65		
37.5	63		
28	51		
20	43		
14	41		
10	38		
6.3	35		
5	34		
3.35	33		
2	32		
1.18	30		
0.6	28		
0.425	26		
0.3	22		
0.212	19		
0.15	16		
0.063	13		

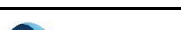
Sample Proportions	% dry mass
Cobbles	31
Gravel	37
Sand	19
Silt and Clay	13

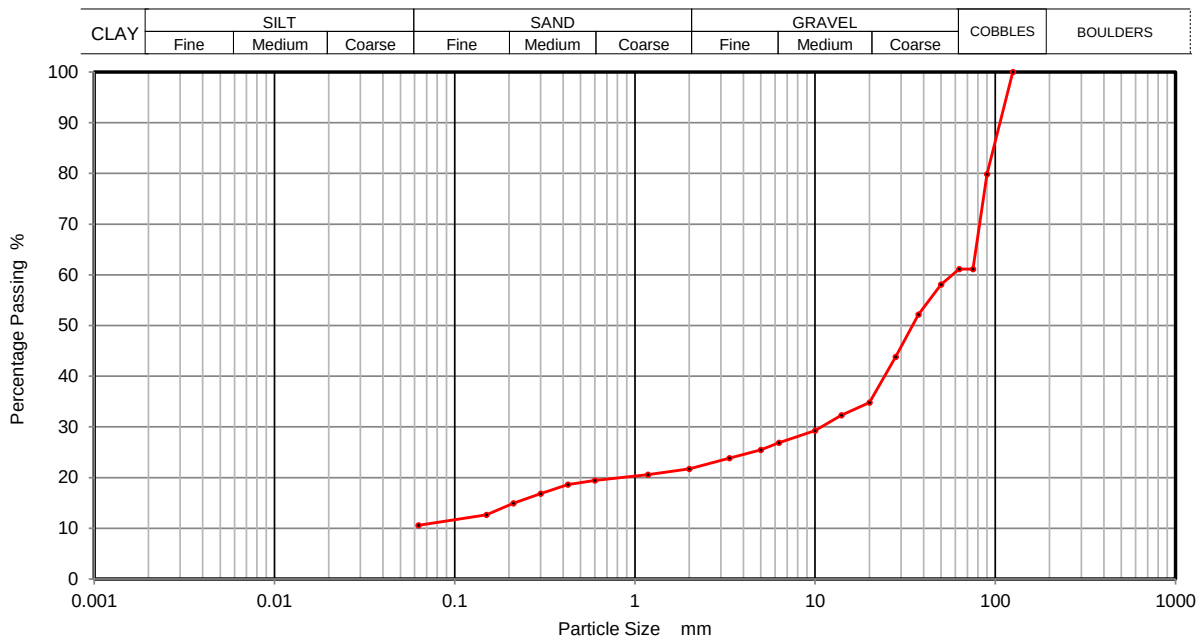
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas

**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

 GEOTECHNICAL SITE & TESTING LABORATORIES	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	72545
		Borehole/Pit No.	Stockpile G - Sample B
Project Name	Swansea Bay	Sample No.	9
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.00
		Depth Base	
Date Tested	15/05/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	80		
75	61		
63	61		
50	58		
37.5	52		
28	44		
20	35		
14	32		
10	29		
6.3	27		
5	25		
3.35	24		
2	22		
1.18	21		
0.6	19		
0.425	19		
0.3	17		
0.212	15		
0.15	13		
0.063	11		

Sample Proportions	% dry mass
Cobbles	39
Gravel	39
Sand	11
Silt and Clay	11

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator
Cameron Thomas

PARTICLE DENSITY BY GAS JAR (BS 1377 : PART 2 : 8.2 : 1990)

Contract Number	72545	
Project Name	Swansea Bay	
Date Tested	15/05/2024	

[illegible]

Key	Reported As
Moisture Content	%
Bulk Density	Mg/m ³
Dry Density	Mg/m ³
Particle Density	Mg/m ³
Air Voids	%

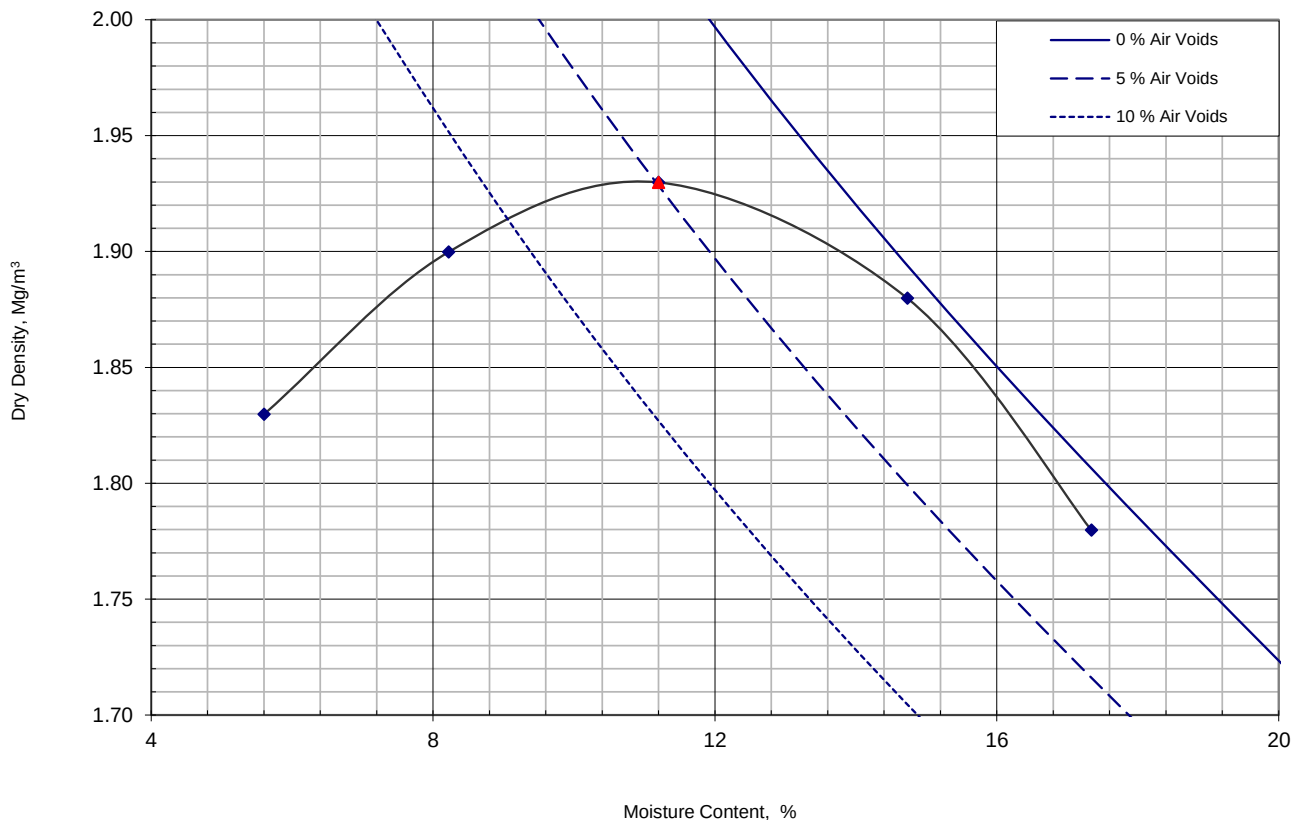
Operator
Conal Aliffe



**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile D - Sample A
Sample No	1
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	5.6	8.2	11	15	17							
Bulk Density	1.93	2.06	2.15	2.16	2.09							
Dry Density	1.83	1.90	1.93	1.88	1.78							

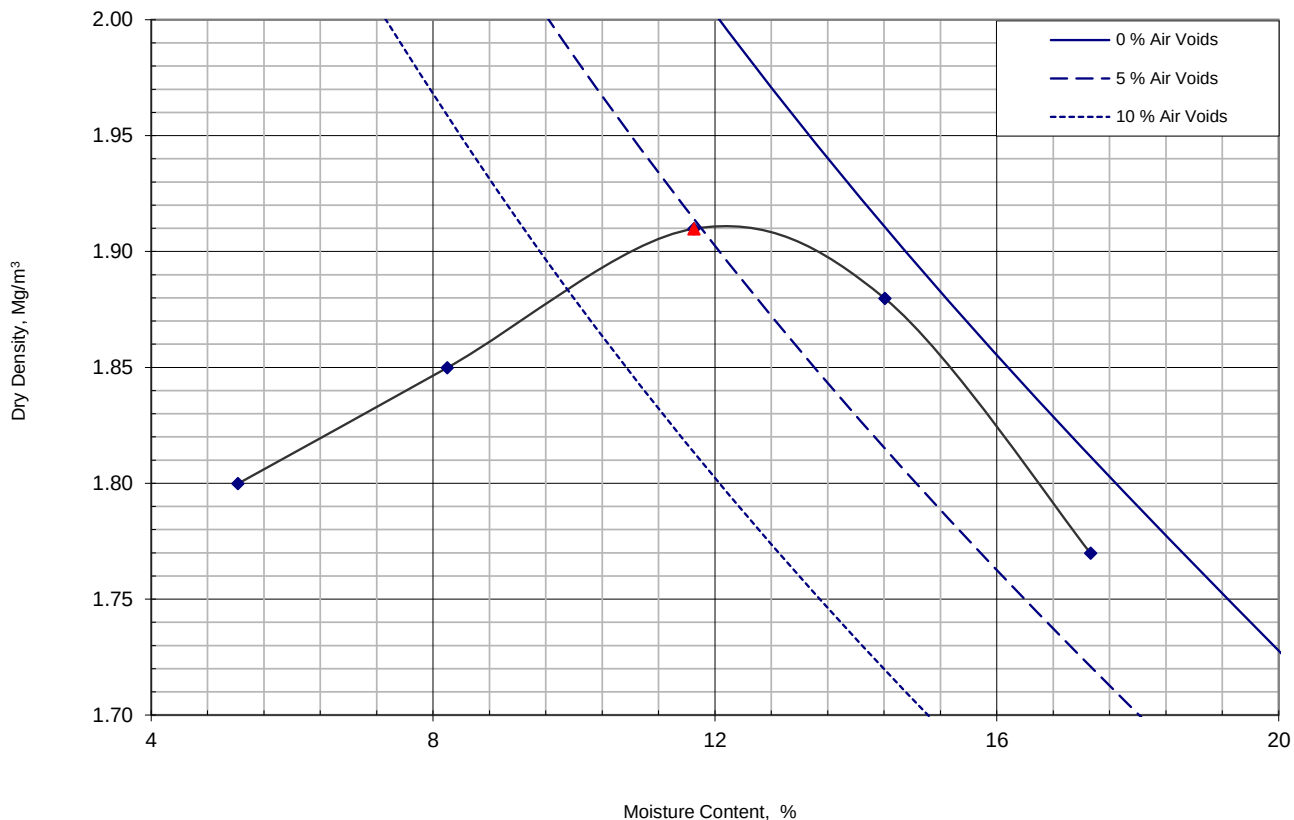
Initial Moisture Content	15	%
Maximum Dry Density	1.93	Mg/m ³
Optimum Moisture Content	11	%
Particle Density	2.63 Measured	Mg/m ³
Material Retained 37.5mm	32	%
Material Retained 20mm	24	%

Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile E - Sample A
Sample No	2
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	5.2	8.2	12	14	17							
Bulk Density	1.89	2.00	2.13	2.15	2.08							
Dry Density	1.80	1.85	1.91	1.88	1.77							

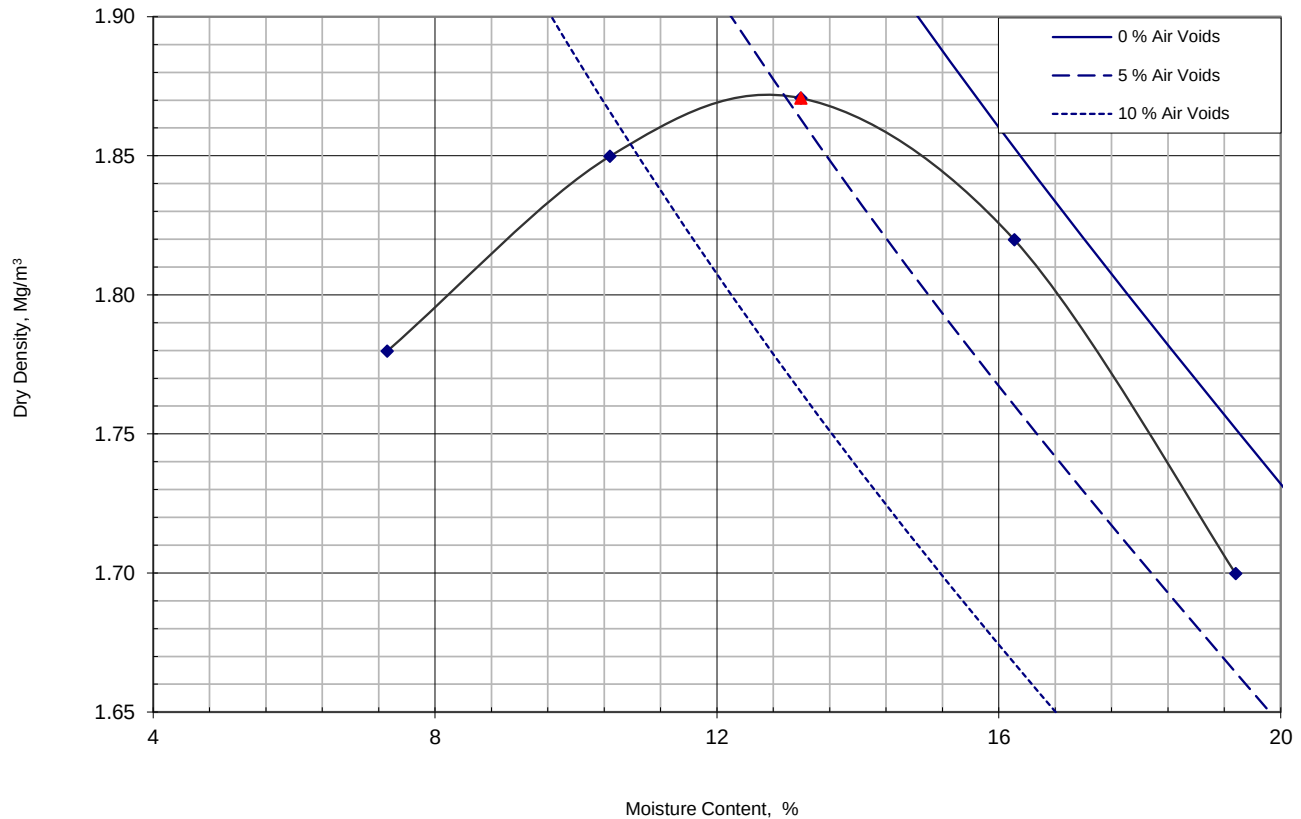
Initial Moisture Content	12	%
Maximum Dry Density	1.91	Mg/m ³
Optimum Moisture Content	12	%
Particle Density	2.64 Measured	Mg/m ³
Material Retained 37.5mm	66	%
Material Retained 20mm	12	%

Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile E - Sample B
Sample No	3
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (withcobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	7.3	10	13	16	19							
Bulk Density	1.91	2.04	2.12	2.11	2.03							
Dry Density	1.78	1.85	1.87	1.82	1.70							

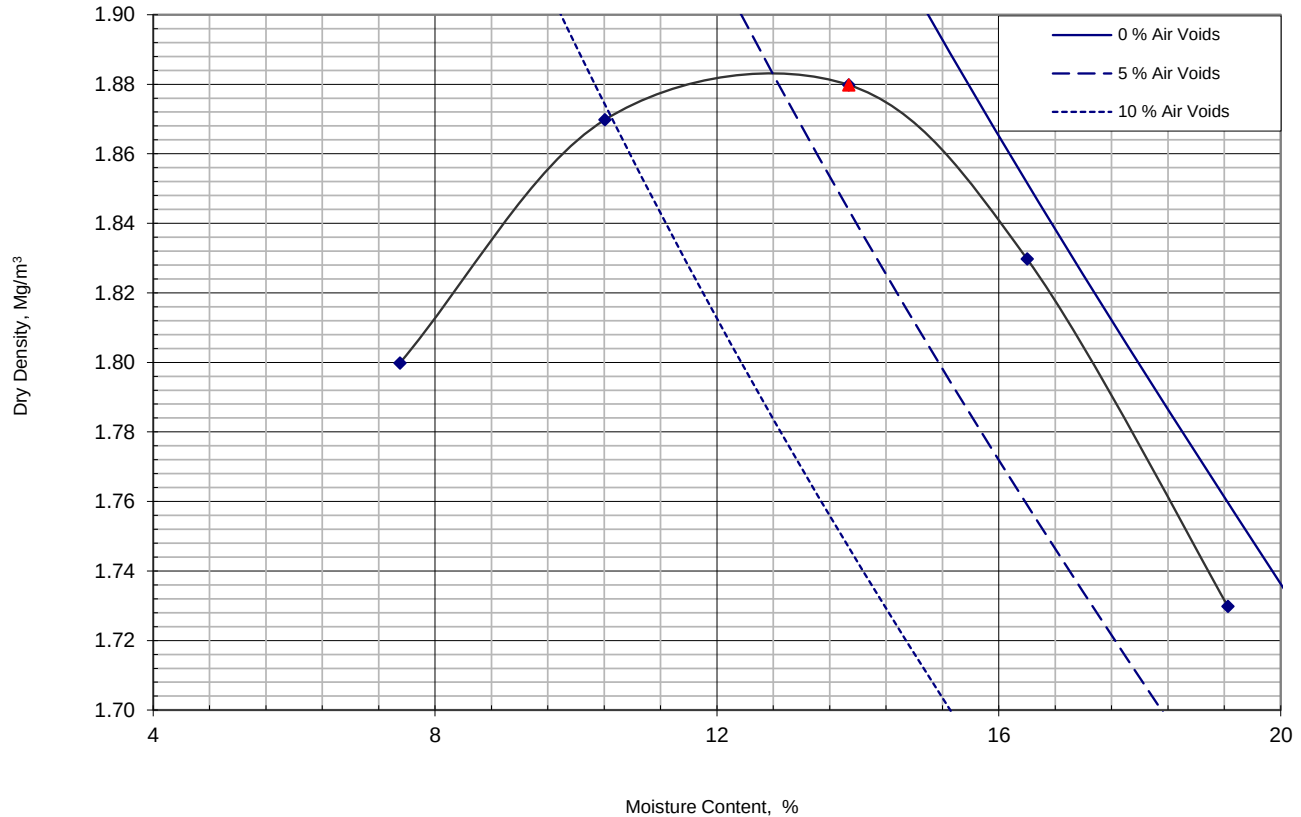
Initial Moisture Content	13	%
Maximum Dry Density	1.87	Mg/m3
Optimum Moisture Content	13	%
Particle Density	2.65 Measured	Mg/m3
Material Retained 37.5mm	63	%
Material Retained 20mm	13	%

Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile F - Sample A
Sample No	4
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (withcobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	7.5	10	14	16	19							
Bulk Density	1.93	2.06	2.14	2.13	2.06							
Dry Density	1.80	1.87	1.88	1.83	1.73							

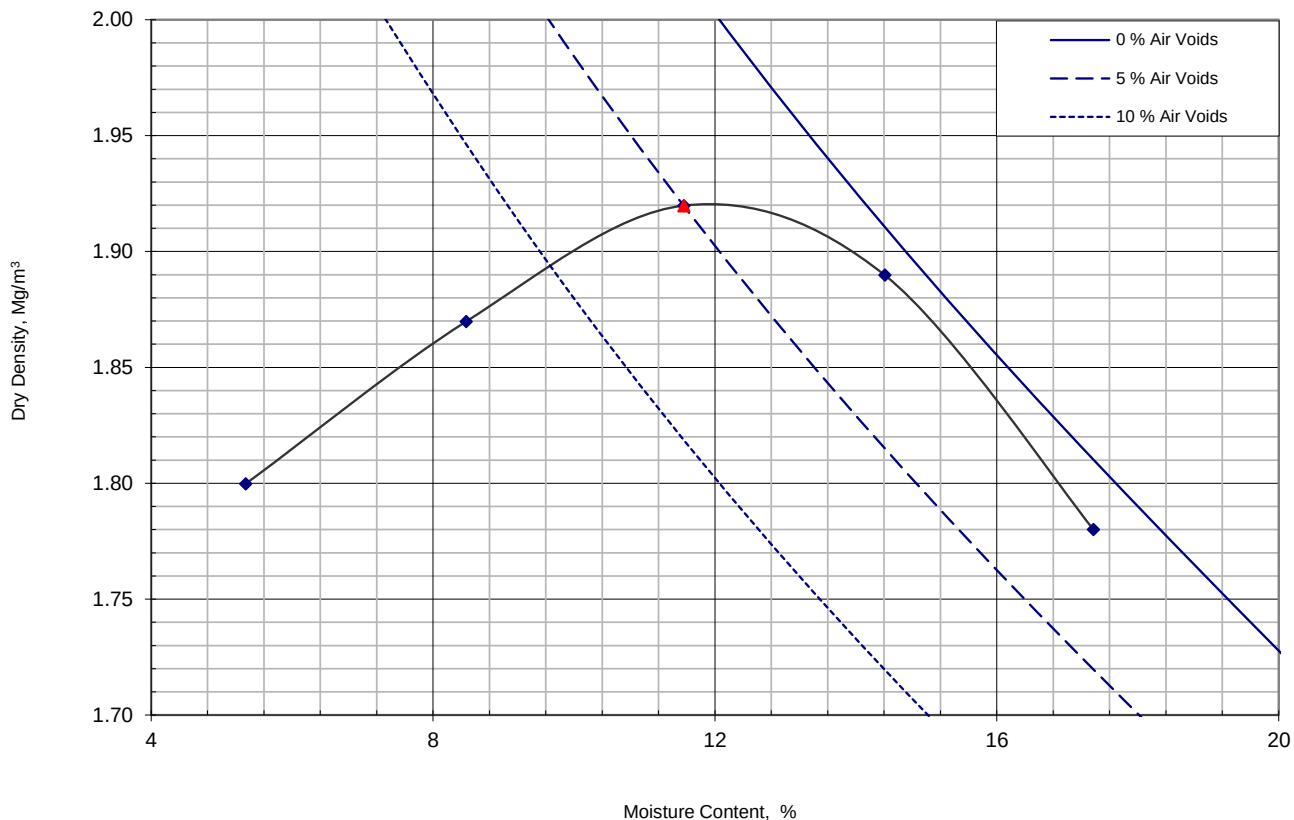
Initial Moisture Content	14	%
Maximum Dry Density	1.88	Mg/m3
Optimum Moisture Content	14	%
Particle Density	2.66 Measured	Mg/m3
Material Retained 37.5mm	61	%
Material Retained 20mm	16	%

Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile F - Sample B
Sample No	5
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	5.3	8.5	12	14	17							
Bulk Density	1.90	2.03	2.14	2.16	2.09							
Dry Density	1.80	1.87	1.92	1.89	1.78							

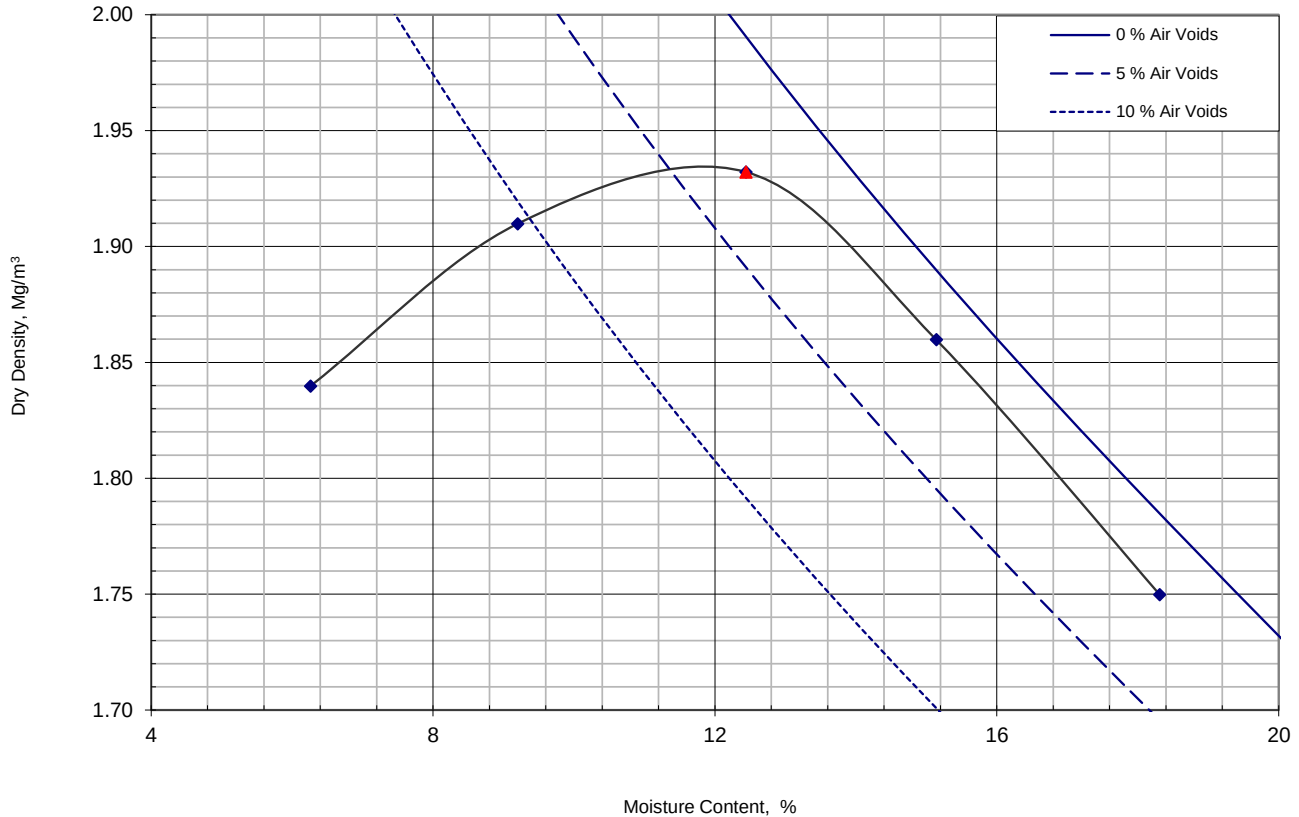
Initial Moisture Content	12	%
Maximum Dry Density	1.92	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.64 Measured	Mg/m3
Material Retained 37.5mm	23	%
Material Retained 20mm	22	%

Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile F - Sample C
Sample No	6
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	6.3	9.2	12	15	18							
Bulk Density	1.95	2.09	2.17	2.14	2.07							
Dry Density	1.84	1.91	1.93	1.86	1.75							

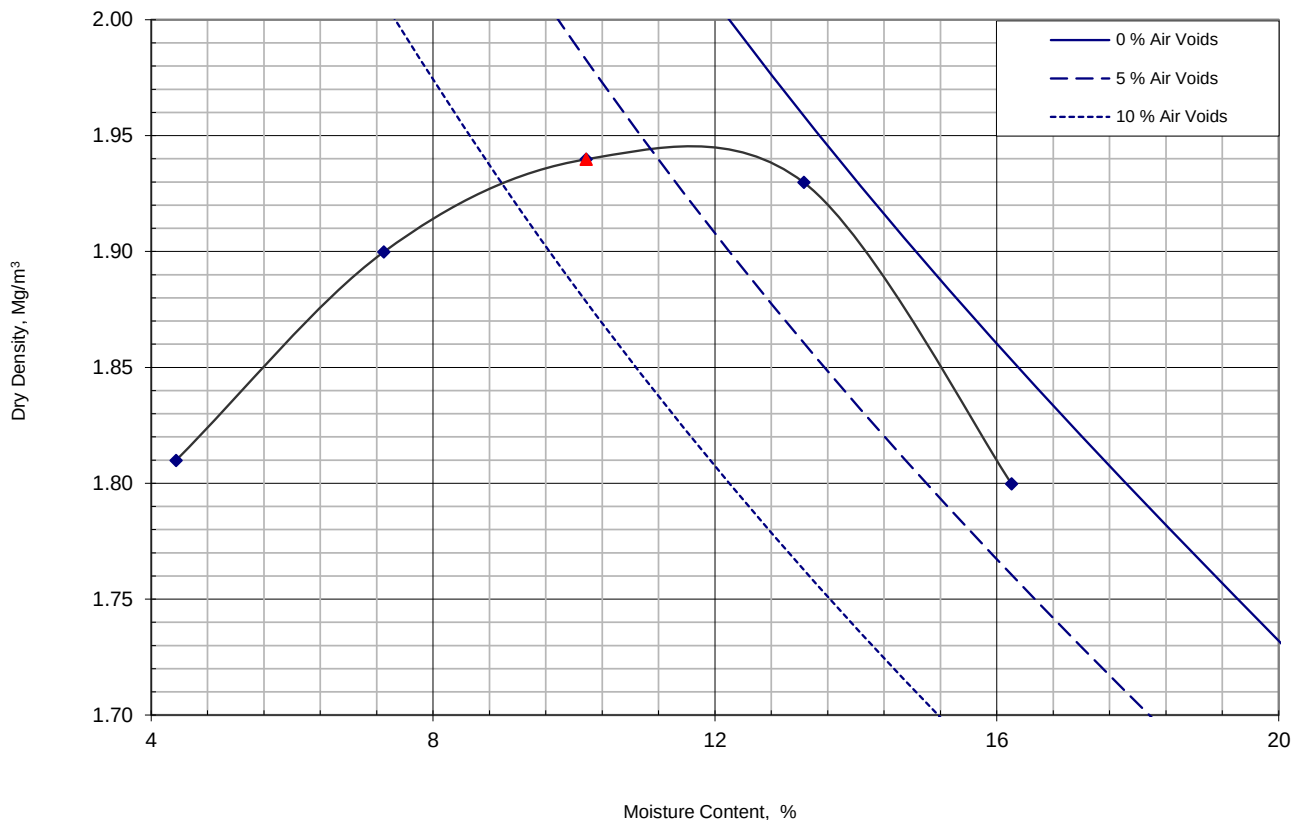
Initial Moisture Content	12	%
Maximum Dry Density	1.93	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.65 Measured	Mg/m3
Material Retained 37.5mm	65	%
Material Retained 20mm	13	%

Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile F - Sample D
Sample No	7
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (with cobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	4.4	7.3	10	13	16							
Bulk Density	1.89	2.04	2.14	2.19	2.09							
Dry Density	1.81	1.90	1.94	1.93	1.80							

Initial Moisture Content	13	%
Maximum Dry Density	1.94	Mg/m ³
Optimum Moisture Content	10	%
Particle Density	2.65 Measured	Mg/m ³
Material Retained 37.5mm	36	%
Material Retained 20mm	9	%

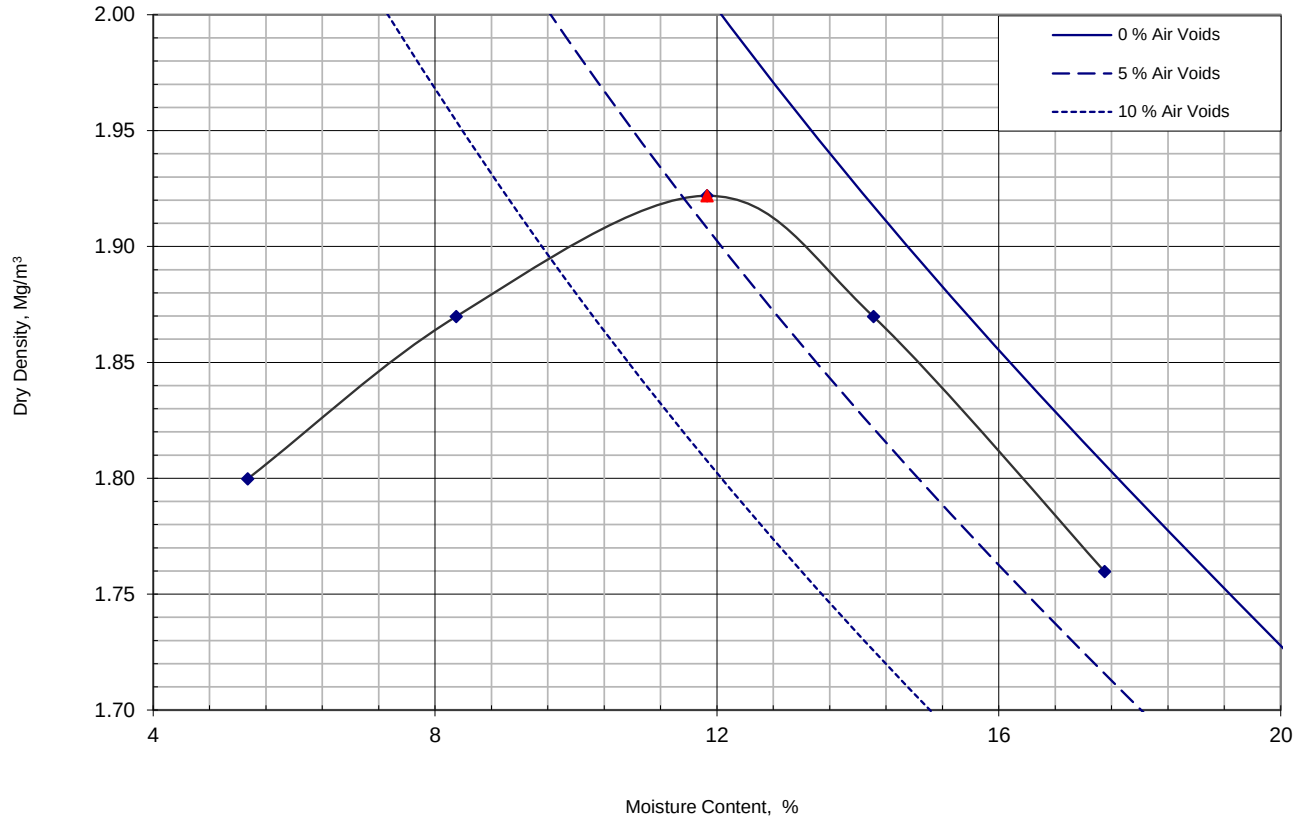
Operator
Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number 72545

Borehole / Pit No Stockpile G - Sample A

Project Name	Swansea Bay	Sample No	8
Date Tested	15/05/2024	Depth Top	0.00
Compaction Method	2.5 Kg Rammer	Depth Base	
Compaction Clause	BS1377:Part 4:1990, Clause 3.3	Sample Type	B
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (withcobbles)	Single or Separate Sample Used	Single



Compaction Point	1	2	3	4	5							
Moisture Content	5.3	8.3	12	14	18							
Bulk Density	1.90	2.02	2.15	2.14	2.07							
Dry Density	1.80	1.87	1.92	1.87	1.76							

Initial Moisture Content	12	%
Maximum Dry Density	1.92	Mg/m ³
Optimum Moisture Content	12	%
Particle Density	2.64 Measured	Mg/m ³
Material Retained 37.5mm	37	%
Material Retained 20mm	20	%

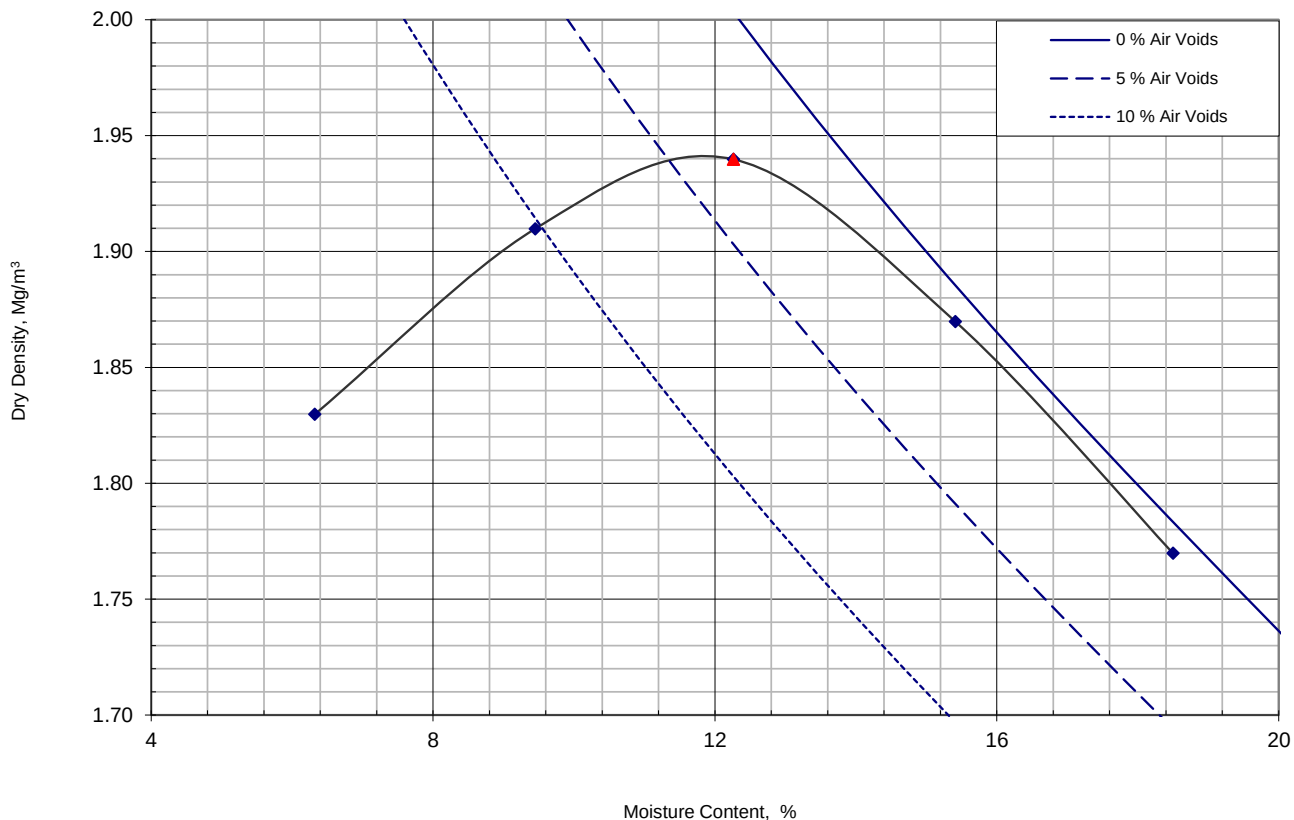
Operator

Conor

**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	72545
Borehole / Pit No	Stockpile G - Sample B
Sample No	9
Depth Top	0.00
Depth Base	
Sample Type	B
Single or Separate Sample Used	Single

Project Name	Swansea Bay
Date Tested	15/05/2024
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.3
Sample Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (withcobbles)



Compaction Point	1	2	3	4	5							
Moisture Content	6.3	9.5	12	15	19							
Bulk Density	1.95	2.09	2.18	2.16	2.10							
Dry Density	1.83	1.91	1.94	1.87	1.77							

Initial Moisture Content	12	%
Maximum Dry Density	1.94	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.66 Measured	Mg/m3
Material Retained 37.5mm	48	%
Material Retained 20mm	17	%

Operator
Conor