

PLASTICITY INDEX FOR SOILS TEST REPORT

ENVIRONMENT CANTERBURY

APPROVED

SUBJECT TO CONDITIONS

TO BE KEPT ON SITE

21 DECEMBER 2021

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8 NOV 2011



Project : WIL Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 10 October 2011
Sampling method : Not Advised
Sample description : Clayey Silty SAND, trace gravel
Sample condition : Damp as received

Project No : 6-JROON.11/006LC
Lab Ref No : 6384
Client Ref No : 20851

Test Results	
Sample Location:	Test Pit 4
Liquid Limit :	28
Plastic Limit :	19
Plasticity Index :	9
Natural Water Content :	21.8

Test Methods	Notes
Liquid Limit	NZS 4402 : 1986, Test 2.2
Plastic Limit	NZS 4402 : 1986, Test 2.3
Plasticity Index	NZS 4402 : 1986, Test 2.4
	Materials used: Whole Sampling is outside the laboratory's scope of accreditation

Date tested : 28 October 2011
Date reported : 2 October 2011

Sampling is not covered by IANZ Accreditation. Results apply only to samp
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IANZ Approved Signatory 

Designation : Senior Civil Engineering Technician
Date : 2 October 2011



Tests indicated as
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outside the scope
of the laboratory's
accreditation

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Project : WIL Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 10 October 2011
Sampling method : Not Advised
Sample description : Gravelly SILT, some clay, minor sand
Sample condition : Damp as received

Project No : 6-JROON.11/006LC
Lab Ref No : 6388
Client Ref No : 20851

Test Results

Sample Location:	Test Pit 10
Liquid Limit :	41
Plastic Limit :	24
Plasticity Index :	17
Natural Water Content :	11

Test Methods

Liquid Limit	NZS 4402 : 1986, Test 2.2
Plastic Limit	NZS 4402 : 1986, Test 2.3
Plasticity Index	NZS 4402 : 1986, Test 2.4

Notes

Materials used: Whole
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PF-LAB-101 (18/12/2010)

Page 2 of 2

Opus International Consultants Ltd
Christchurch Lab
Quality Management Systems Certified to ISO 9001

52C Hayton Rd Wigram
PO Box 1482 Christchurch Mail Centre
Christchurch 8140, New Zealand

Telephone +64 3 343 0739
Facsimile +64 3 343 0737
Website www.opus.co.nz

PLASTICITY INDEX FOR SOILS TEST REPORT

Project : WIL Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 10 October 2011
Sampling method : Not Advised
Sample description : Clayey SILT, some sand
Sample condition : Damp as received

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Project No : 6-JROON.11/006LC
Lab Ref No : 6392
Client Ref No : 20851

Test Results

Sample Location:	Test Pit 15
Liquid Limit :	30
Plastic Limit :	19
Plasticity Index :	11
Natural Water Content :	22.3
All to Gerard Please	

Test Methods	Notes
Liquid Limit	NZS 4402 : 1986, Test 2.2
Plastic Limit	NZS 4402 : 1986, Test 2.3
Plasticity Index	NZS 4402 : 1986, Test 2.4
Materials used: Whole Sampling is outside the laboratory's scope of accreditation	

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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

TEST REPORT

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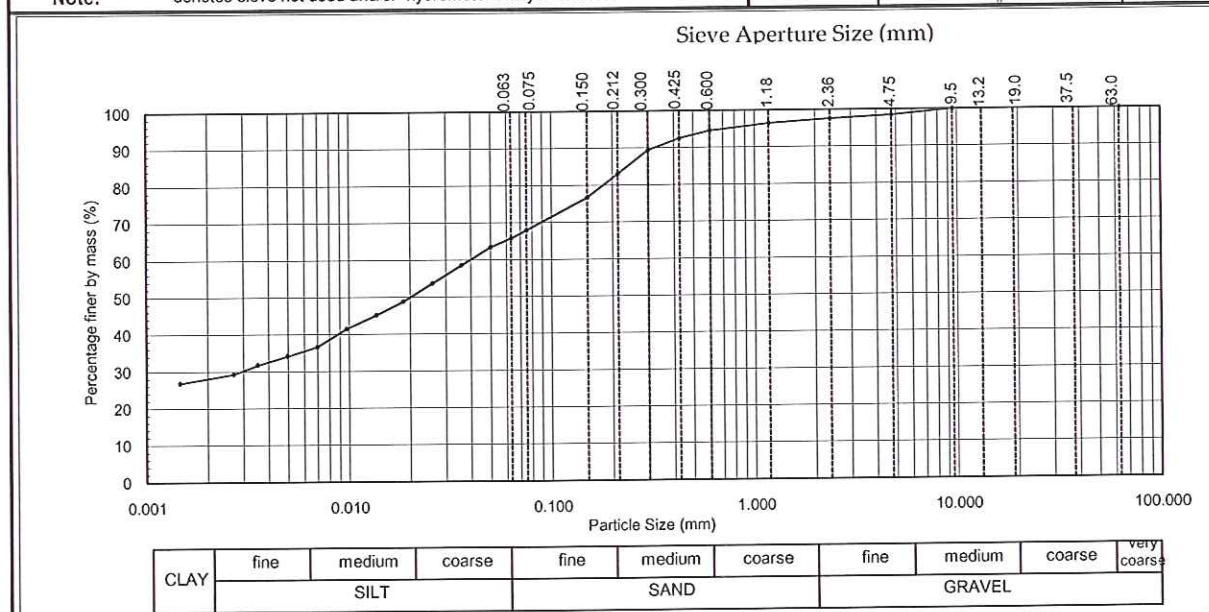
Project : WIL Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Client/Sample Ref : 20851
Contractor : Rooney Earthmoving Limited
Test pit No : 4 Depth :
Sampled by : Gerard Richardson
Date received : 10 October 2011
Sampling method : Not Advised
Sample condition : Damp as received
Sample description : Clayey Silty SAND, trace gravel
Solid Particle Density (t/m^3): 2.68 Assumed
Water Content (as received): 21.8 %

Project No: 6-JROON.11/006LC

Lab Ref No: 6384

Client Ref: 20851

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	98	0.300	89	0.0501	63	0.0070	37
37.5	--	2.36	98	0.212	83	0.0359	59	0.0050	34
19.0	--	1.18	96	0.150	77	0.0258	54	0.0035	32
13.2	--	0.600	95	0.075	68	0.0185	49	0.0027	29
9.5	100	0.425	93	0.063	66	0.0136	45	0.0015	27
Note: "--" denotes sieve not used and/or hydrometer analysis not tested						0.0097	41		



Test Methods

Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)

Notes

pH of suspension : 7.0 (Whatmans Full Range pH Indicator paper)

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Date Tested: 28 October 2011

Date Reported: 2 November 2011

IANZ Approved Signatory
Designation : Senior Civil Engineering Technician
Date : 2 November 2011



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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

TEST REPORT

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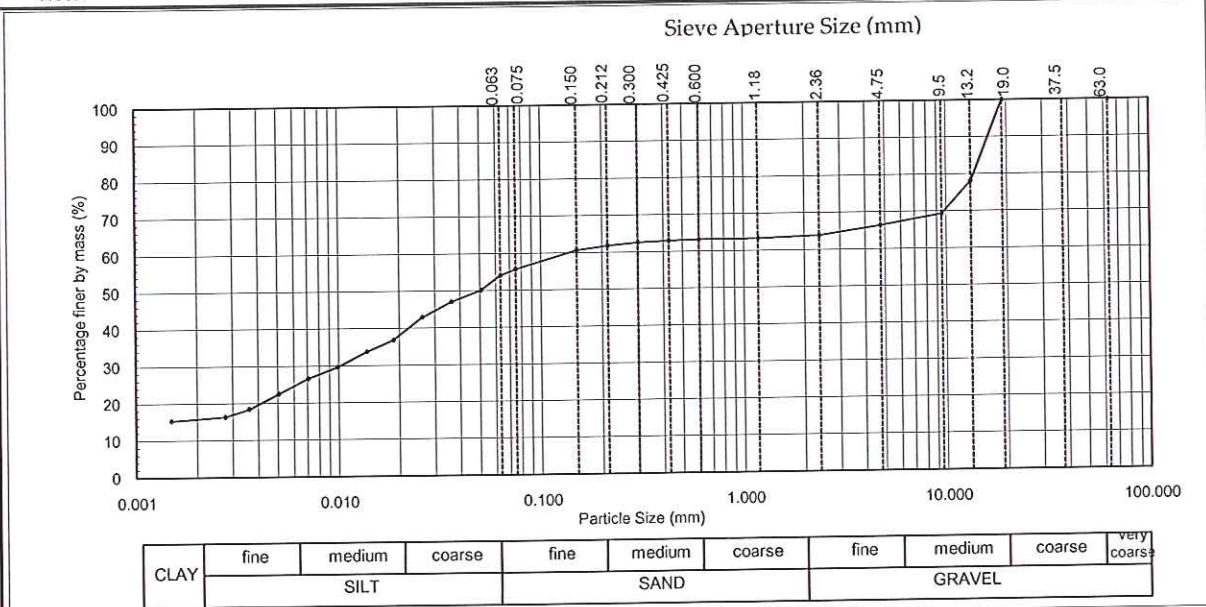


Project : WIL Storage Ponds
 Location : Waimakariri River, Eyrewell, North Canterbury
 Client : Rooney Earthmoving Limited
 Client/Sample Ref : 20851
 Contractor : Rooney Earthmoving Limited
 Test pit No : 10 Depth :
 Sampled by : Gerard Richardson
 Date received : 10 October 2011
 Sampling method : Not Advised
 Sample condition : Damp as received
 Sample description : Gravelly SILT, some clay, minor sand
 Solid Particle Density (t/m^3): 2.68 Assumed
 Water Content (as received): 10.8 %

Project No: 6-JROON.11/006LC
 Lab Ref No: 6388
 Client Ref: 20851

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	66	0.300	63	0.0506	50	0.0070	27
37.5	--	2.36	64	0.212	62	0.0362	47	0.0050	22
19.0	100	1.18	63	0.150	61	0.0259	43	0.0036	18
13.2	78	0.600	63	0.075	56	0.0187	37	0.0027	16
9.5	69	0.425	63	0.063	54	0.0138	34	0.0015	15
						0.0099	30		

Note: "--" denotes sieve not used and/or hydrometer analysis not tested



Test Methods

Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)

Notes

pH of suspension : 7.0 (Whatmans Full Range pH Indicator paper)
 Sampling is outside the laboratory's scope of accreditation

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Date Tested: 28 October 2011

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IANZ Approved Signatory *[Signature]*
 Designation : Senior Civil Engineering Technician
 Date : 2 November 2011



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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

TEST REPORT

ENVIRONMENT CANTEBURY

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21 DECEMBER 2011

- 8 NOV 2011



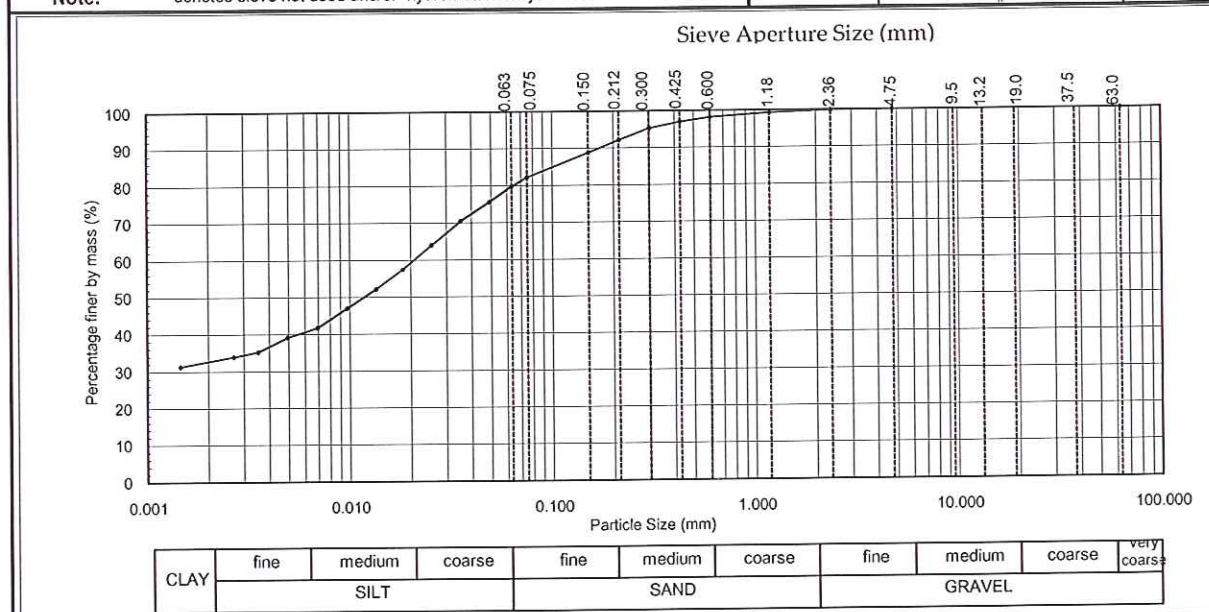
Project : WIL Storage Ponds
 Location : Waimakariri River, Eyrewell, North Canterbury
 Client : Rooney Earthmoving Limited
 Client/Sample Ref : 20851
 Contractor : Rooney Earthmoving Limited
 Test pit No : 15 Depth:
 Sampled by : Gerard Richardson
 Date received : 10 October 2011
 Sampling method : Not Advised
 Sample condition : Damp as received
 Sample description : Clayey SILT, some sand

Solid Particle Density (t/m^3): 2.68 Assumed
 Water Content (as received): 22.3 %

Project No: 6-JROON.11/006LC
 Lab Ref No: 6392
 Client Ref: 20851

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	100	0.300	95	0.0490	76	0.0069	42
37.5	--	2.36	100	0.212	92	0.0352	70	0.0049	39
19.0	--	1.18	99	0.150	89	0.0253	64	0.0035	35
13.2	--	0.600	98	0.075	82	0.0182	57	0.0027	34
9.5	--	0.425	97	0.063	80	0.0135	52	0.0014	31
						0.0097	47		

Note: "--" denotes sieve not used and/or hydrometer analysis not tested



Test Methods

Particle Size Analysis: NZS 4402:1986: Test 2.8.4 (Washed Grading & Hydrometer Method)

Notes

pH of suspension : 7.0 (Whatmans Full Range pH Indicator paper)
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Date Tested: 28 October 2011

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Date Reported: 2 November 2011

IANZ Approved Signatory
 Designation : Senior Civil Engineering Technician
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DRY DENSITY / WATER CONTENT RELATIONSHIP COMPACTION

ENVIRONMENT CANTEBURY

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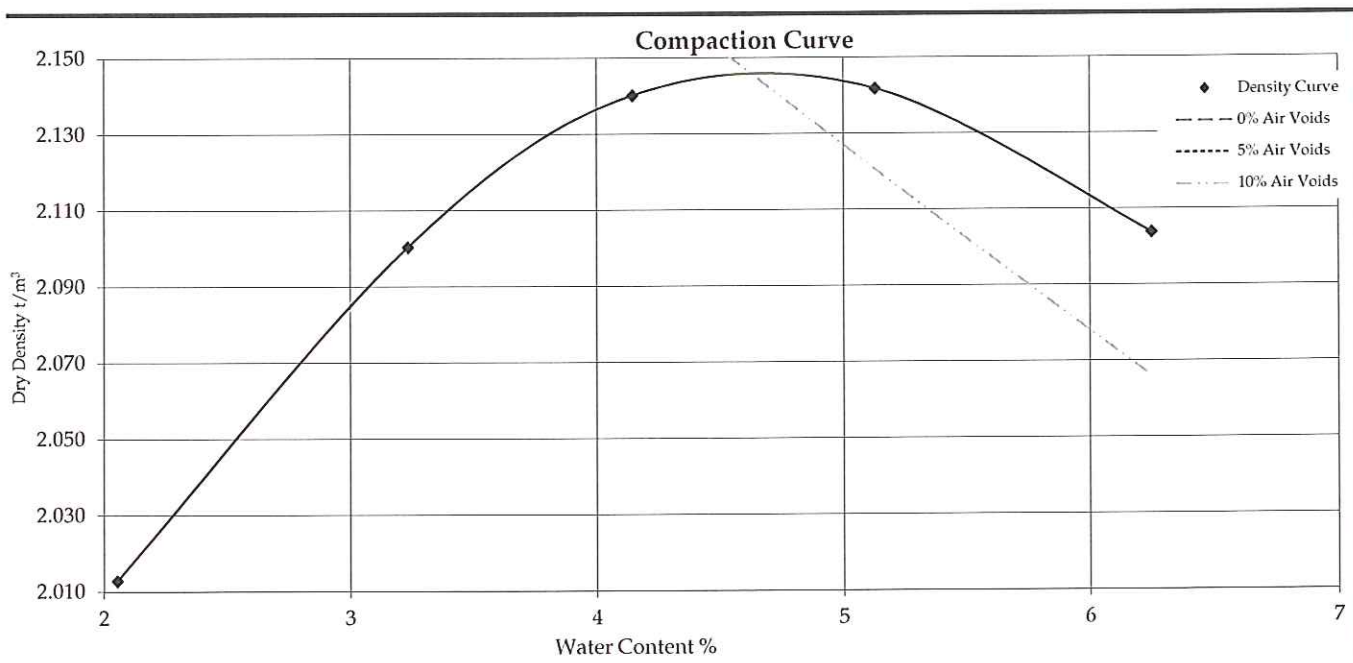
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Project : Wil Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy Gravel
Sample condition : Damp as received
Solid density : 2.68 t/m³ (Assumed)
Source : Test Pit 2

Project No : 6-JROON.11/006LC
Lab Ref No : 6382
Client Ref No : 20851

Test Results							
Maximum dry density	2.15	t/m³	Natural water content		-	%	
Optimum water content	4.8	%	Fraction tested		Passing 19mm Test Sieve		
Sample ID	+2%	+3%	+4%	+5%	+6%		
Bulk density t/m³	2.054	2.168	2.229	2.252	2.235		
Water content %	2.1	3.2	4.1	5.1	6.2		
Dry density t/m³	2.013	2.100	2.140	2.142	2.104		
Sample condition	Dry Loose	Damp Firm	Moist Firm	Moist Hard	Wet Fines Lost		



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	Sampling is outside the laboratory's scope of accreditation

Date tested : 7 November 2011
Date reported : 8 November 2011

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IANZ Approved Signatory *[Signature]*

Designation : Senior Civil Engineering Technician
Date : 8 November 2011



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DRY DENSITY / WATER CONTENT RELATIONSHIP COMPACTION

ENVIRONMENT CANTEBURY

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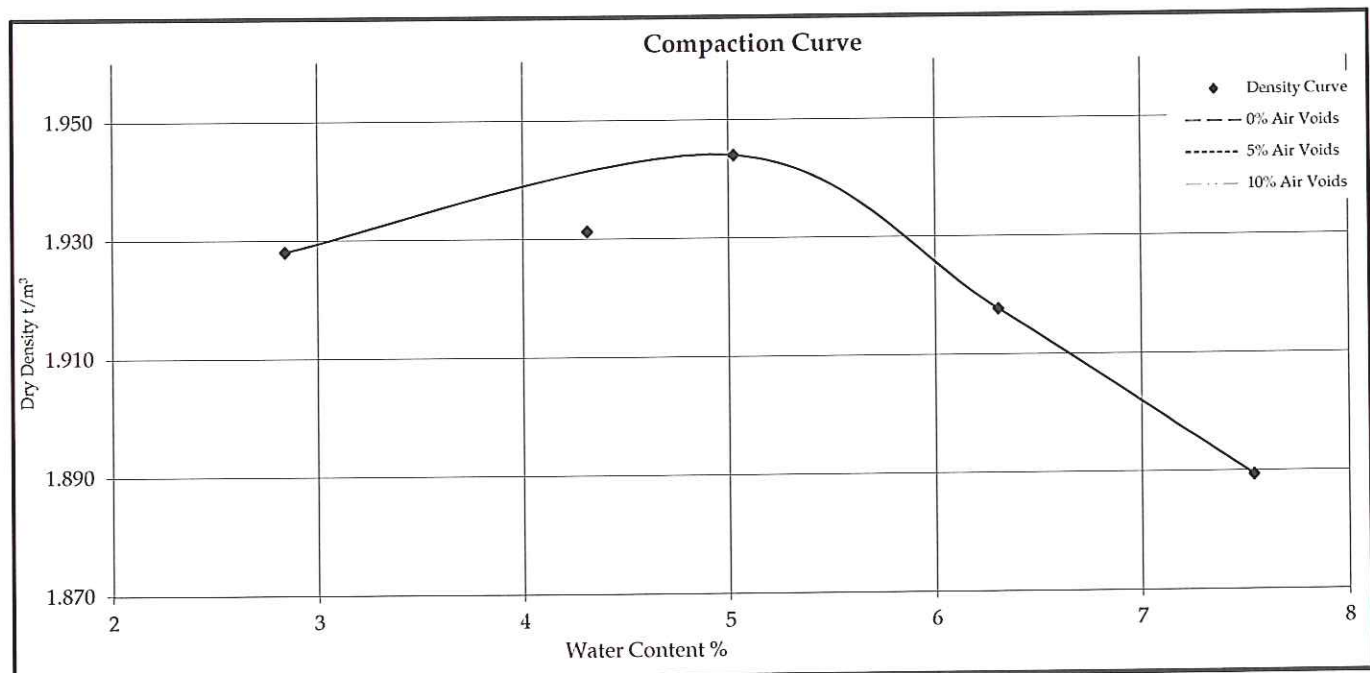


Project : Wil Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy Gravel
Sample condition : Damp as received
Solid density : 2.68 t/m³ (Assumed)
Source : Test Pit 3

Project No : 6-JROON.11/006LC
Lab Ref No : 6383
Client Ref No : 20851

Test Results

Maximum dry density	1.94	t/m ³	Natural water content	-	%
Optimum water content	5	%	Fraction tested	Passing 19mm Test Sieve	
Sample ID	+2%	+3%	+4%	+5%	+6%
Bulk density t/m ³	1.983	2.015	2.042	2.039	2.032
Water content %	2.8	4.3	5.0	6.3	7.5
Dry density t/m ³	1.928	1.931	1.944	1.918	1.889
Sample condition	Dry Loose	Damp Firm	Moist Hard	Wet Firm	Saturated Fines Lost



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	Sampling is outside the laboratory's scope of accreditation

Date tested : 3 November 2011
Date reported : 4 November 2011

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IANZ Approved Signatory

Designation : Senior Civil Engineering Technician
Date : 4 November 2011



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DRY DENSITY / WATER CONTENT RELATIONSHIP

COMPACTION

ENVIRONMENT CANTEBURY

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17 DECEMBER 2021

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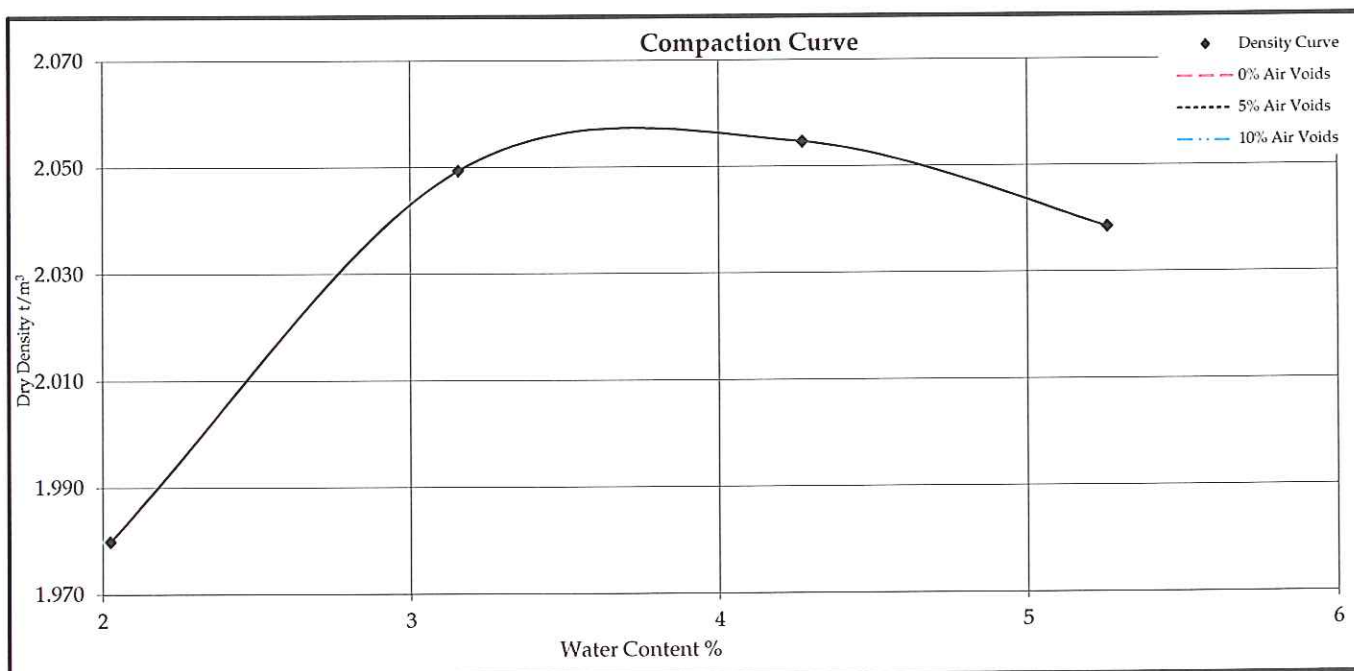


Project : Wil Storage Ponds
 Location : Waimakariri River, Eyrewell, North Canterbury
 Client : Rooney Earthmoving Limited
 Contractor : Rooney Earthmoving Limited
 Sampled by : Gerard Richardson
 Date sampled : 4 October 2011
 Sampling method : Not Advised
 Sample description : Sandy Gravel
 Sample condition : Damp as received
 Solid density : 2.68 t/m³ (Assumed)
 Source : Test Pit 5

Project No : 6-JROON.11/006LC
 Lab Ref No : 6385
 Client Ref No : 20851

Test Results

Maximum dry density	2.06	t/m ³	Natural water content	-	%
Optimum water content	3.6	%	Fraction tested	Passing 19mm Test Sieve	
Sample ID	+2%	+3%	+4%	+5%	
Bulk density t/m ³	2.020	2.114	2.142	2.146	
Water content %	2.0	3.2	4.3	5.3	
Dry density t/m ³	1.980	2.049	2.055	2.039	
Sample condition	Dry Loose	Damp Firm	Moist Hard	Wet Fines Lost	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	Sampling is outside the laboratory's scope of accreditation

Date tested : 3 November 2011
 Date reported : 4 November 2011

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Designation : Senior Civil Engineering Technician
 Date : 4 November 2011



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DRY DENSITY / WATER CONTENT RELATIONSHIP COMPACTION

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15 DECEMBER 2021

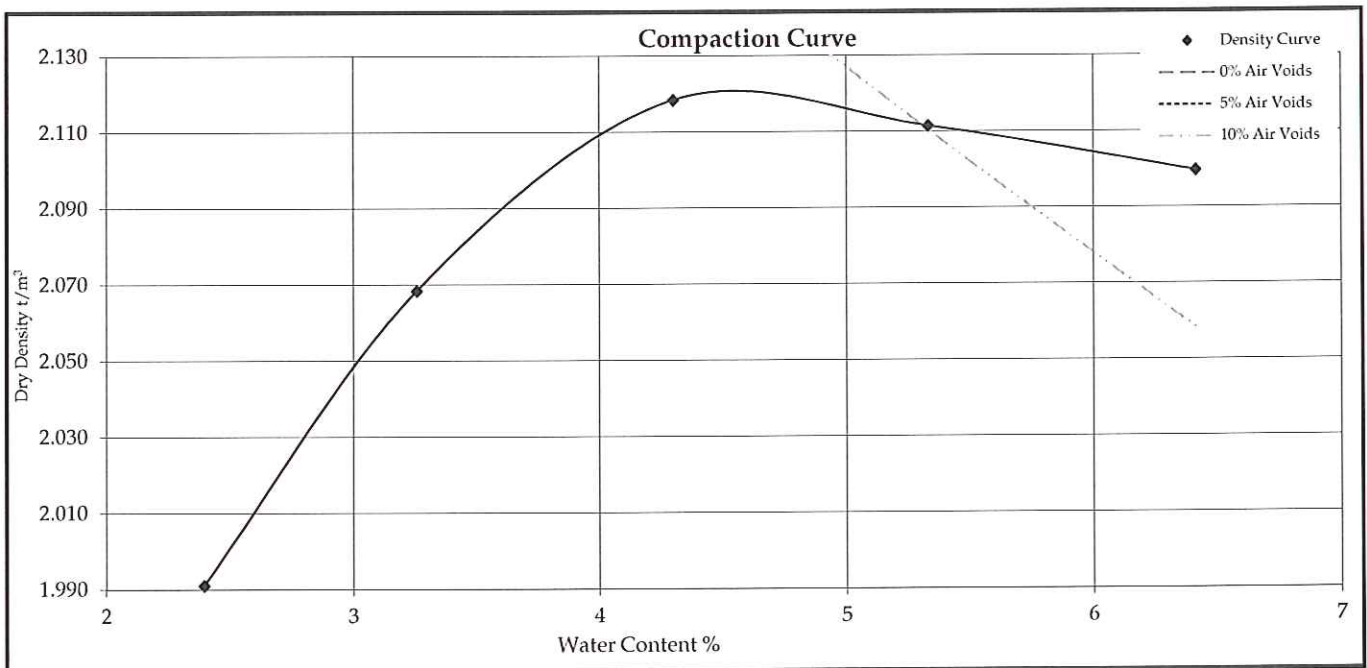
10 NOV 2011



Project : Wil Storage Ponds
Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy Gravel
Sample condition : Damp as received
Solid density : 2.68 t/m³ (Assumed)
Source : Test Pit 7

Project No : 6-JROON.11/006LC
Lab Ref No : 6386
Client Ref No : 20851

Test Results							
Maximum dry density	2.12	t/m ³	Natural water content		-	%	
Optimum water content	4.6	%	Fraction tested		Passing 19mm Test Sieve		
Sample ID	+2%	+3%	+4%	+5%	+6%		
Bulk density t/m ³	2.039	2.136	2.209	2.224	2.234		
Water content %	2.4	3.3	4.3	5.3	6.4		
Dry density t/m ³	1.991	2.068	2.118	2.111	2.100		
Sample condition	Dry Loose	Damp Firm	Moist Hard	Wet Firm	Saturated Fines Lost		



Test Methods	Notes
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DRY DENSITY / WATER CONTENT RELATIONSHIP

COMPACTION

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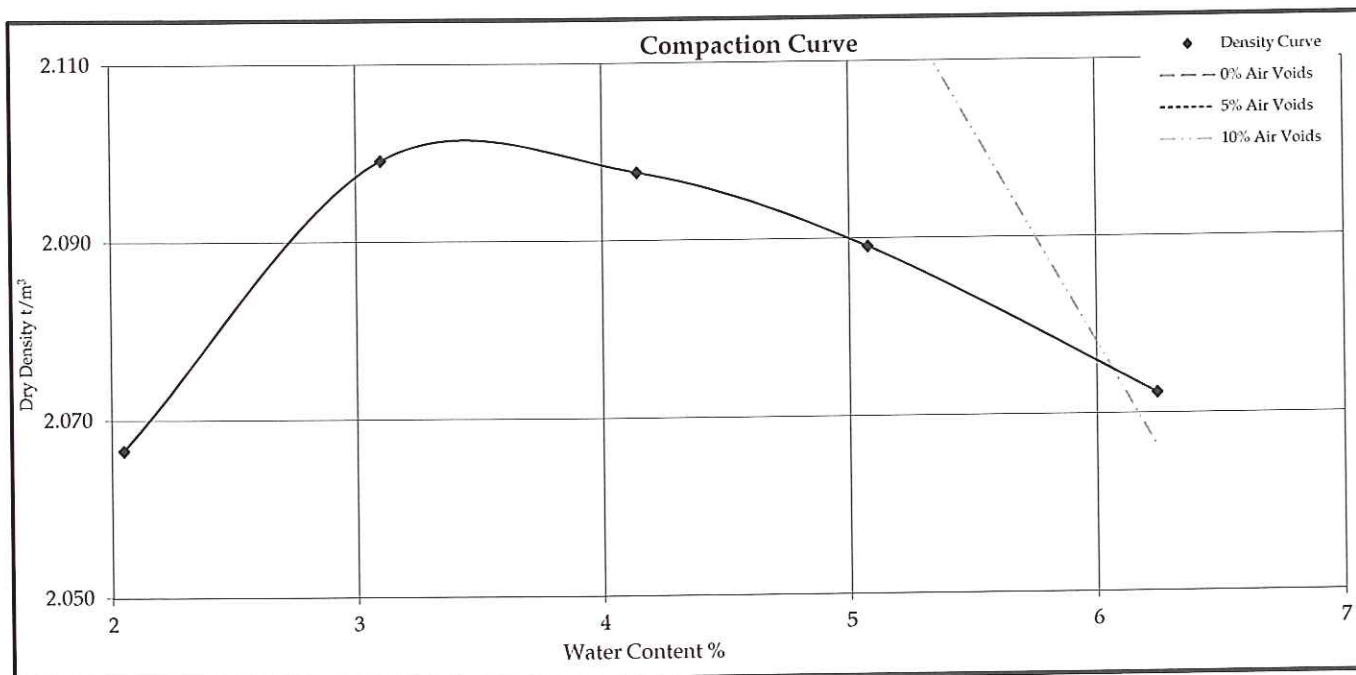
10 DECEMBER 2021



Project : Wil Storage Ponds
 Location : Waimakariri River, Eyrewell, North Canterbury
 Client : Rooney Earthmoving Limited
 Contractor : Rooney Earthmoving Limited
 Sampled by : Gerard Richardson
 Date sampled : 3 October 2011
 Sampling method : Not Advised
 Sample description : Sandy Gravel
 Sample condition : Damp as received
 Solid density : 2.68 t/m³ (Assumed)
 Source : Test Pit 9

Project No : 6-JROON.11/006LC
 Lab Ref No : 6387
 Client Ref No : 20851

Test Results							
Maximum dry density	2.10	t/m³	Natural water content		-	%	
Optimum water content	3.4	%	Fraction tested		Passing 19mm Test Sieve		
Sample ID	+2%	+3%	+4%	+5%	+6%		
Bulk density t/m³	2.109	2.164	2.185	2.195	2.202		
Water content %	2.0	3.1	4.1	5.1	6.2		
Dry density t/m³	2.067	2.099	2.098	2.089	2.072		
Sample condition	Dry Loose	Damp Firm	Moist Hard	Wet Firm	Saturated Fines Lost		



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	Sampling is outside the laboratory's scope of accreditation

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 Date reported : 9 November 2011

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 Date : 9 November 2011



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DRY DENSITY / WATER CONTENT RELATIONSHIP

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19 DECEMBER 2021

10 NOV 2011

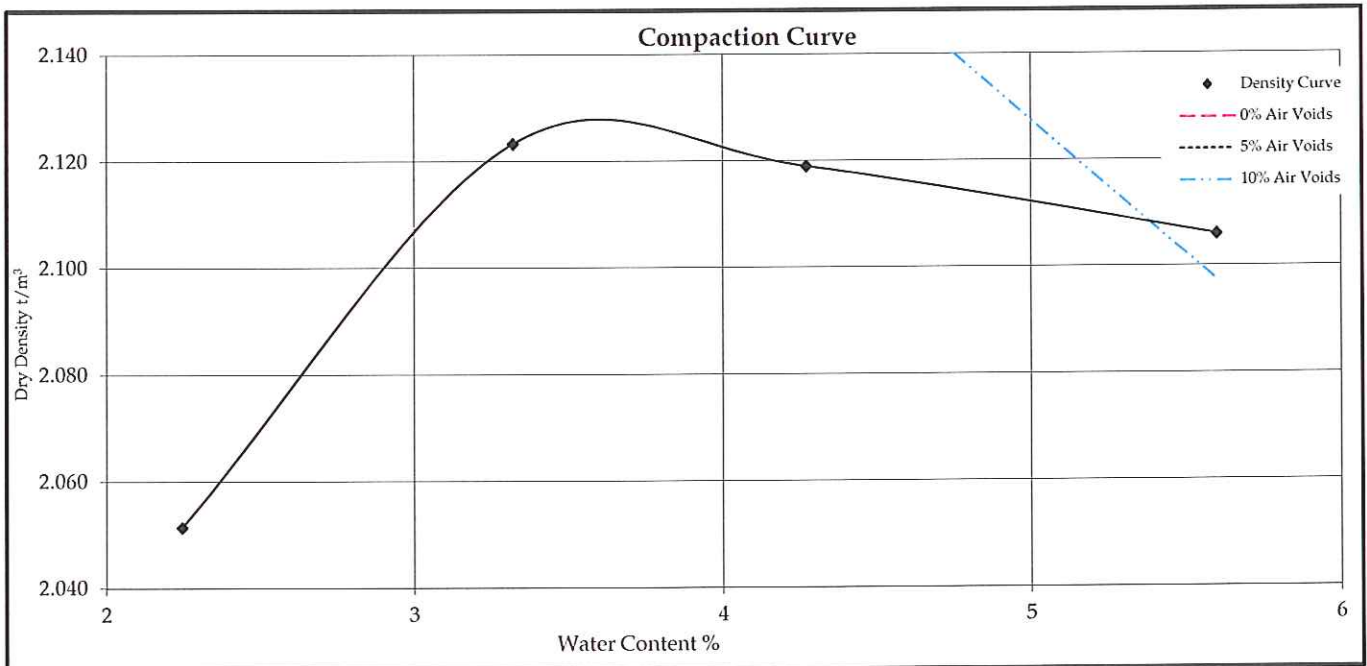


Project : Wil Storage Ponds
 Location : Waimakariri River, Eyrewell, North Canterbury
 Client : Rooney Earthmoving Limited
 Contractor : Rooney Earthmoving Limited
 Sampled by : Gerard Richardson
 Date sampled : 3 October 2011
 Sampling method : Not Advised
 Sample description : GRAVEL with some sand
 Sample condition : Damp as received
 Solid density : 2.68 t/m³ (Assumed)
 Source : Test Pit 10

Project No : 6-JROON.11/006LC
 Lab Ref No : 6389
 Client Ref No : 20851

Test Results

Maximum dry density	2.13	t/m ³	Natural water content	-	%
Optimum water content	3.6	%	Fraction tested	Passing 19mm Test Sieve	
Sample ID	+2%	+3%	+4%	+5%	
Bulk density t/m ³	2.098	2.194	2.209	2.224	
Water content %	2.2	3.3	4.3	5.6	
Dry density t/m ³	2.051	2.123	2.119	2.106	
Sample condition	Dry Loose	Moist Hard	Wet Firm	Saturated Fines Lost	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.1 (Standard)	Sampling is outside the laboratory's scope of accreditation

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DRY DENSITY / WATER CONTENT RELATIONSHIP

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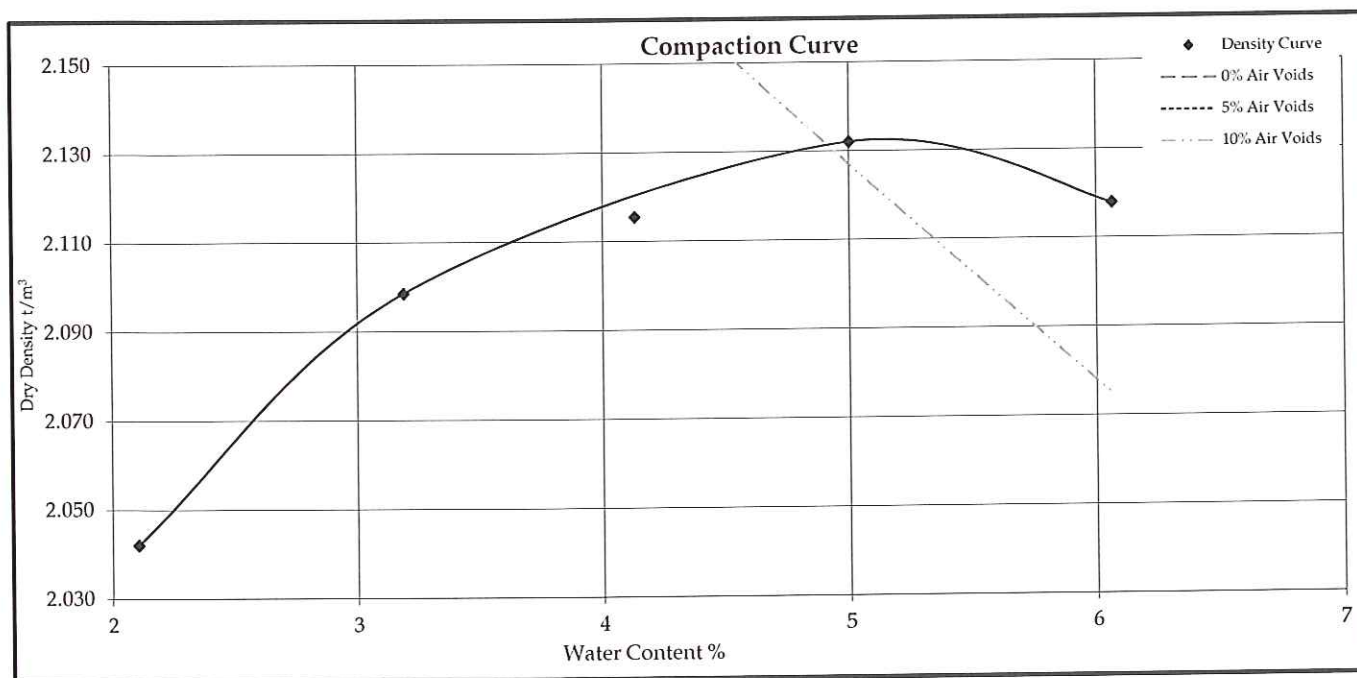
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10 NOV 2011



Project : Wil Storage Ponds
 Location : Waimakariri River, Eyrewell, North Canterbury
 Client : Rooney Earthmoving Limited
 Contractor : Rooney Earthmoving Limited
 Sampled by : Gerard Richardson
 Date sampled : 3 October 2011
 Sampling method : Not Advised
 Sample description : Sandy Gravel
 Sample condition : Damp as received
 Solid density : 2.68 t/m³ (Assumed)
 Source : Test Pit 12

Project No : 6-JROON.11/006LC
 Lab Ref No : 6390
 Client Ref No : 20851

Test Results							
Maximum dry density	2.13	t/m³	Natural water content		-	%	
Optimum water content	5	%	Fraction tested		Passing 19mm Test Sieve		
Sample ID	+2%	+3%	+4%	+5%	+6%		
Bulk density t/m³	2.085	2.165	2.203	2.239	2.246		
Water content %	2.1	3.2	4.1	5.0	6.1		
Dry density t/m³	2.042	2.099	2.115	2.132	2.118		
Sample condition	Dry Loose	Damp Firm	Moist Hard	Wet Firm	Saturated Fines Lost		



Test Methods	Notes
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 Date reported : 9 November 2011

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IANZ Approved Signatory

Designation : Senior Civil Engineering Technician
 Date : 9 November 2011



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DRY SIEVE ANALYSIS TEST REPORT

ENVIRONMENT CANTEBURY

APPROVED

SUBJECT TO CONDITIONS

10 DECEMBER 2021

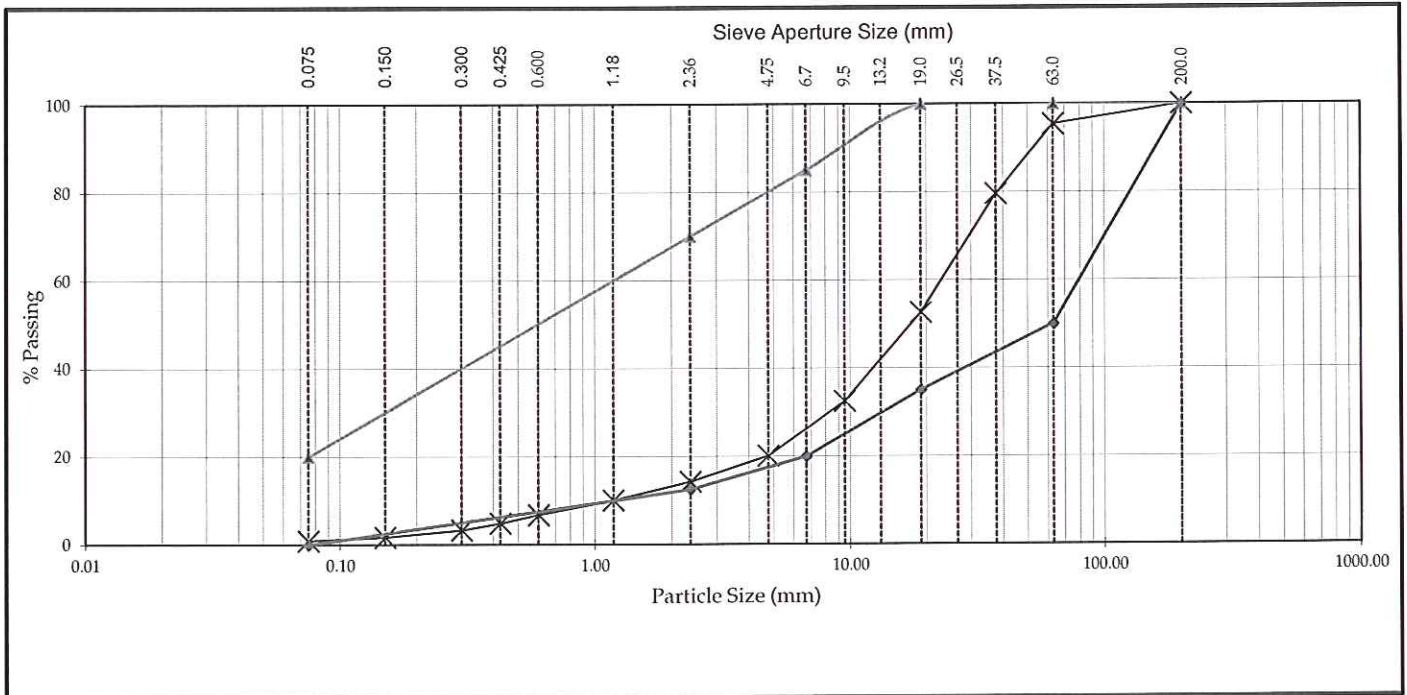
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10 NOV 2011



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no: 2
Depth : 1.6m-5.0m

Project No : 6-JROON.11/006LC
Lab Ref No : 6382
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	53	4.75	20	0.425	5
63.00	95	13.20	-	2.36	14	0.300	3
37.50	80	9.50	32	1.18	10	0.150	2
26.50	-	6.70	-	0.600	7	0.075	1



Test Method	Notes
NZS 4407 : 1991 Test 3.8.2	Sampling is outside the laboratory's scope of accreditation Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 7 November 2011
Date reported : 8 November 2011

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Designation : Senior Civil Engineering Technician
Date : 8 November 2011



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DRY SIEVE ANALYSIS TEST REPORT

ENVIRONMENT CANTEBURY

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SUBJECT TO CONDITIONS

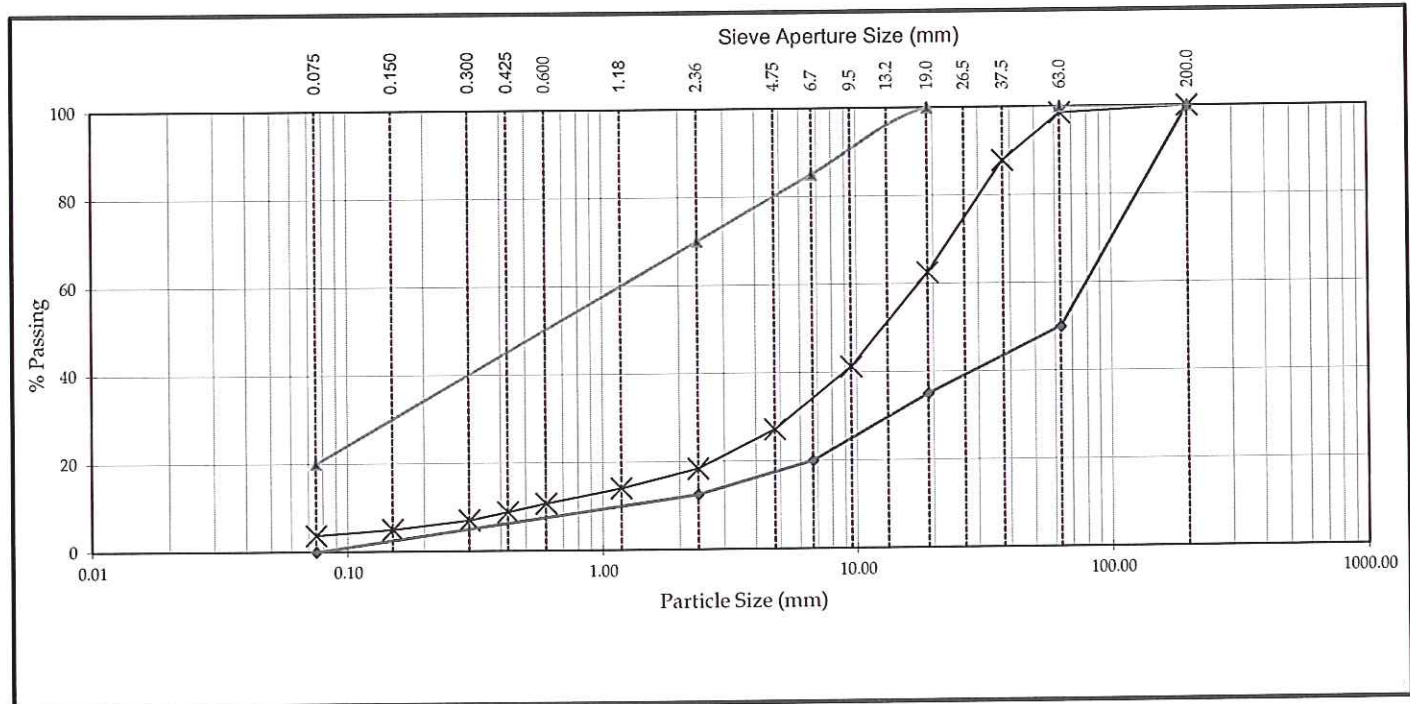
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10 NOV 2011



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no : 3
Depth : 0.25m-0.70m

Project No : 6-JROON.11/006LC
Lab Ref No : 6383
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	62	4.75	27	0.425	9
63.00	99	13.20	-	2.36	18	0.300	7
37.50	88	9.50	41	1.18	14	0.150	5
26.50	-	6.70	-	0.600	11	0.075	4



Test Method	Notes
NZS 4407 : 1991 Test 3.8.2	Sampling is outside the laboratory's scope of accreditation Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 3 November 2011
Date reported : 4 November 2011

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Designation : Senior Civil Engineering Technician
Date : 4 November 2011



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DRY SIEVE ANALYSIS TEST REPORT

ENVIRONMENT CANTEBURY

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10 DECEMBER 2021

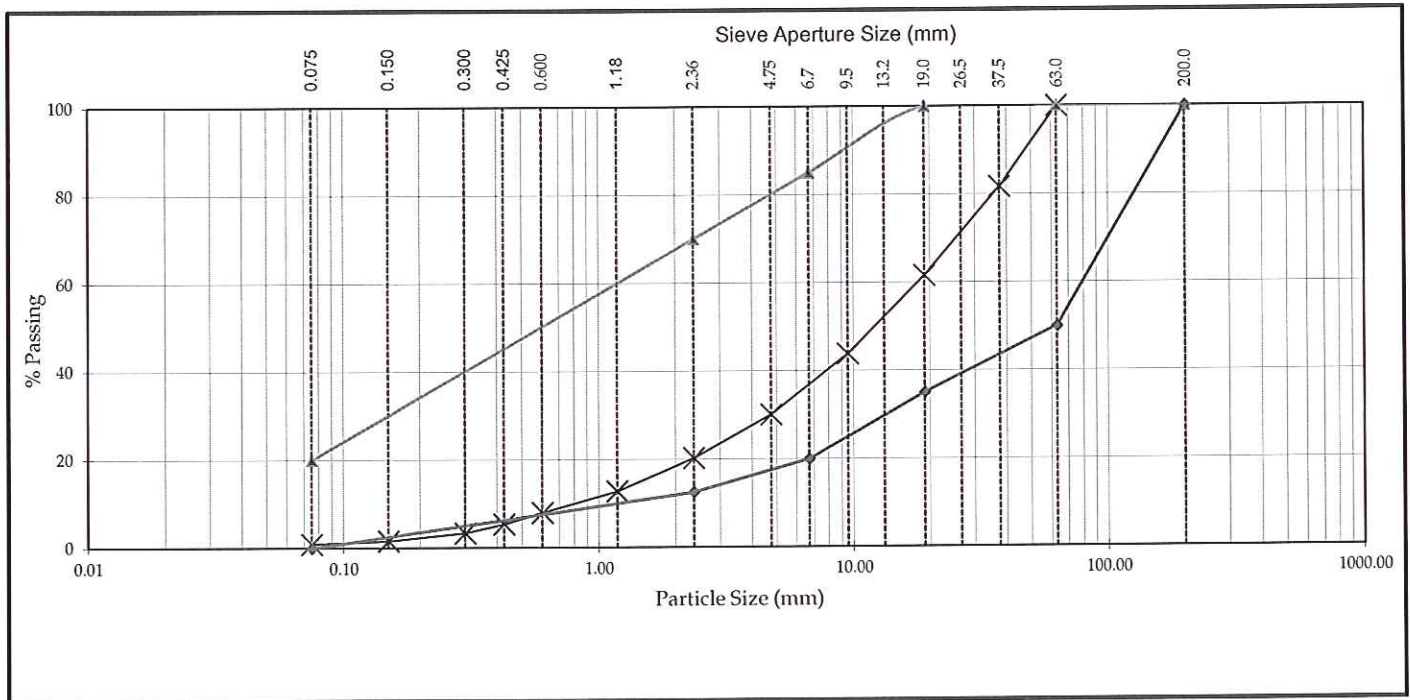
10 NOV 2011



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no: 5
Depth : 0.7m-2.0m

Project No : 6-JROON.11/006LC
Lab Ref No : 6385
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	-	19.00	62	4.75	30	0.425	5
63.00	100	13.20	-	2.36	20	0.300	3
37.50	82	9.50	44	1.18	13	0.150	2
26.50	-	6.70	-	0.600	8	0.075	1



Test Method	Notes
NZS 4407 : 1991 Test 3.8.2	Sampling is outside the laboratory's scope of accreditation Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 3 November 2011
Date reported : 4 November 2011

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Date : 4 November 2011



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DRY SIEVE ANALYSIS TEST REPORT

ENVIRONMENT CANTEBURY

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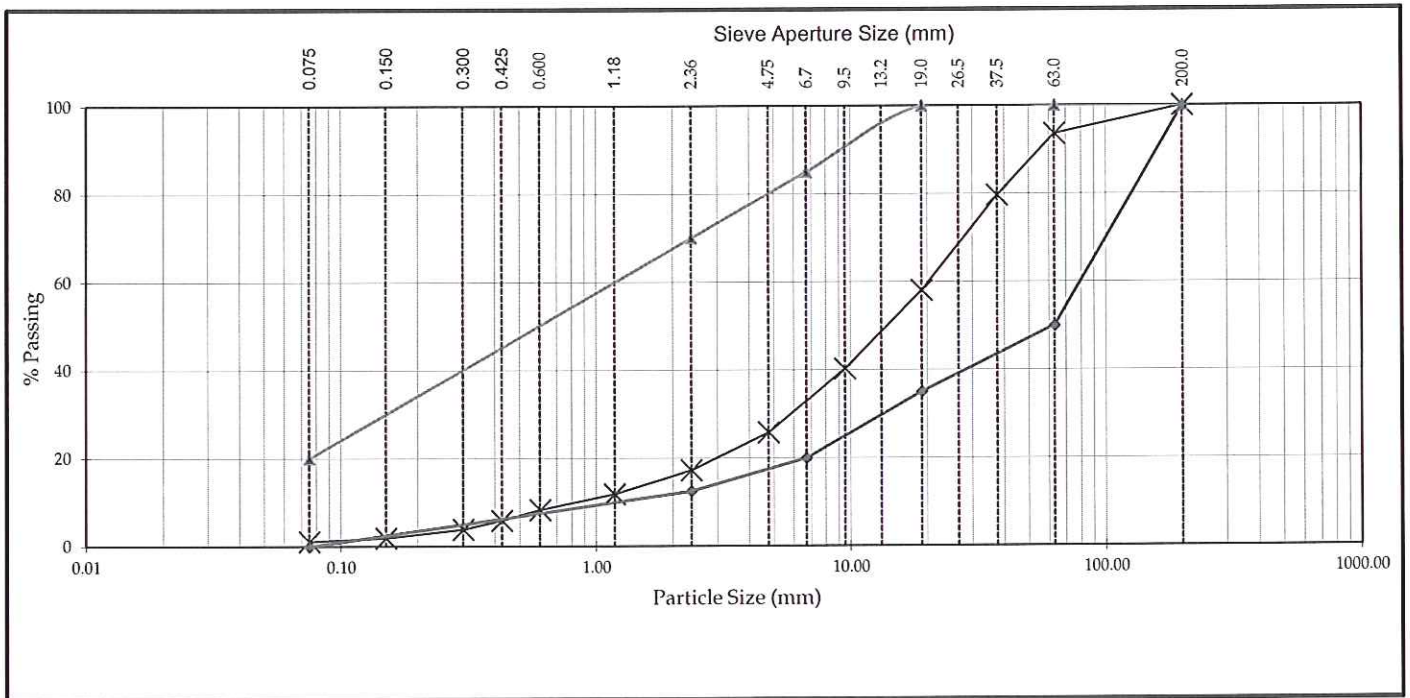
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10 NOV 2011



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 4 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no: 7
Depth : 0.3m-0.45m

Project No : 6-JROON.11/006LC
Lab Ref No : 6386
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	58	4.75	26	0.425	6
63.00	94	13.20	-	2.36	17	0.300	4
37.50	80	9.50	40	1.18	12	0.150	2
26.50	-	6.70	-	0.600	8	0.075	1



Test Method	Notes
NZS 4407 : 1991 Test 3.8.2	Sampling is outside the laboratory's scope of accreditation Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 7 November 2011
Date reported : 8 November 2011

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Date : 8 November 2011



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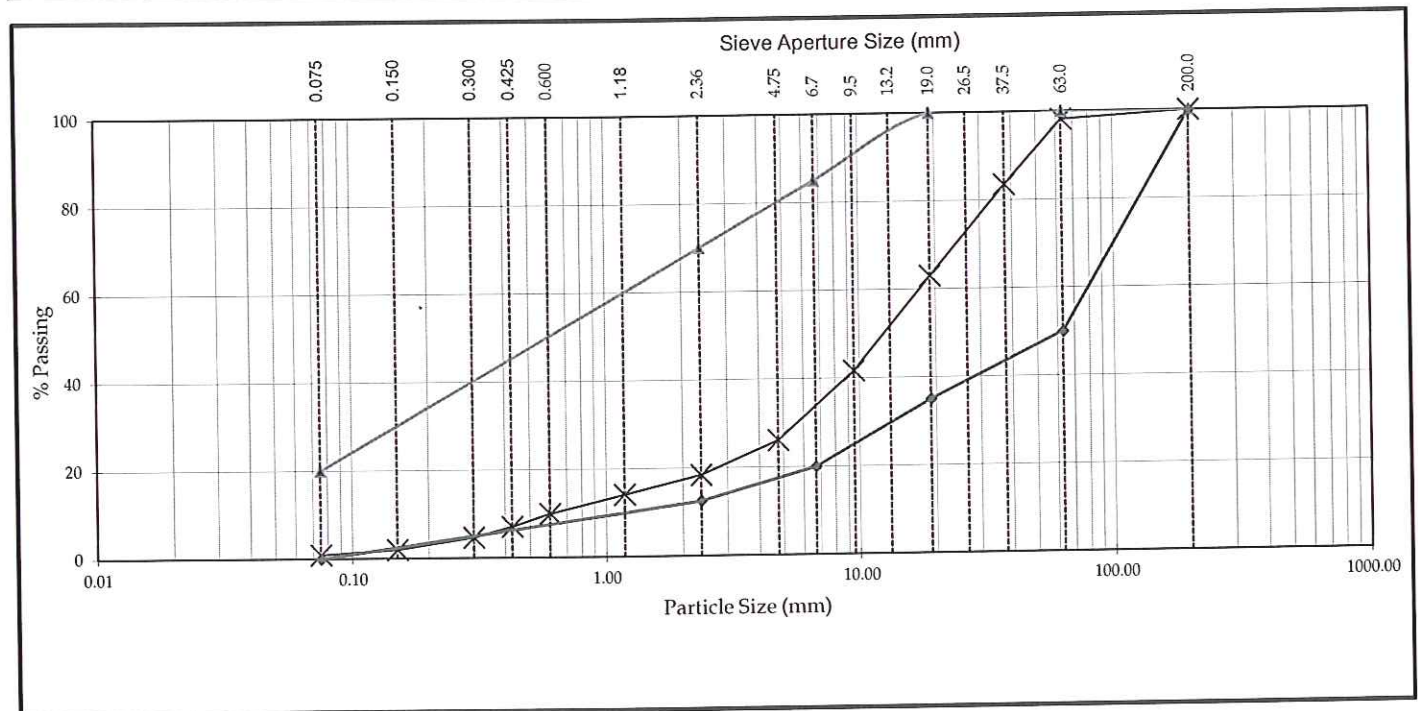
10 NOV 2011



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 3 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no : 9
Depth : 1.4m-3.0m

Project No : 6-JROON.11/006LC
Lab Ref No : 6387
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	63	4.75	26	0.425	7
63.00	98	13.20	-	2.36	18	0.300	5
37.50	84	9.50	42	1.18	14	0.150	2
26.50	-	6.70	-	0.600	10	0.075	1



Test Method

NZS 4407 : 1991 Test 3.8.2

Notes

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Date tested : 8 November 2011

Date reported : 9 November 2011

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Designation : Senior Civil Engineering Technician

Date : 9 November 2011



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PF-LAB-099 (18/12/2010)

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Christchurch Laboratory
Quality Management Systems Certified to ISO 9001

52C Hayton Road
Wigram, Christchurch 8042,
New Zealand

Telephone +64 3 343 0739
Facsimile +64 3 343 0737
Website www.opus.co.nz

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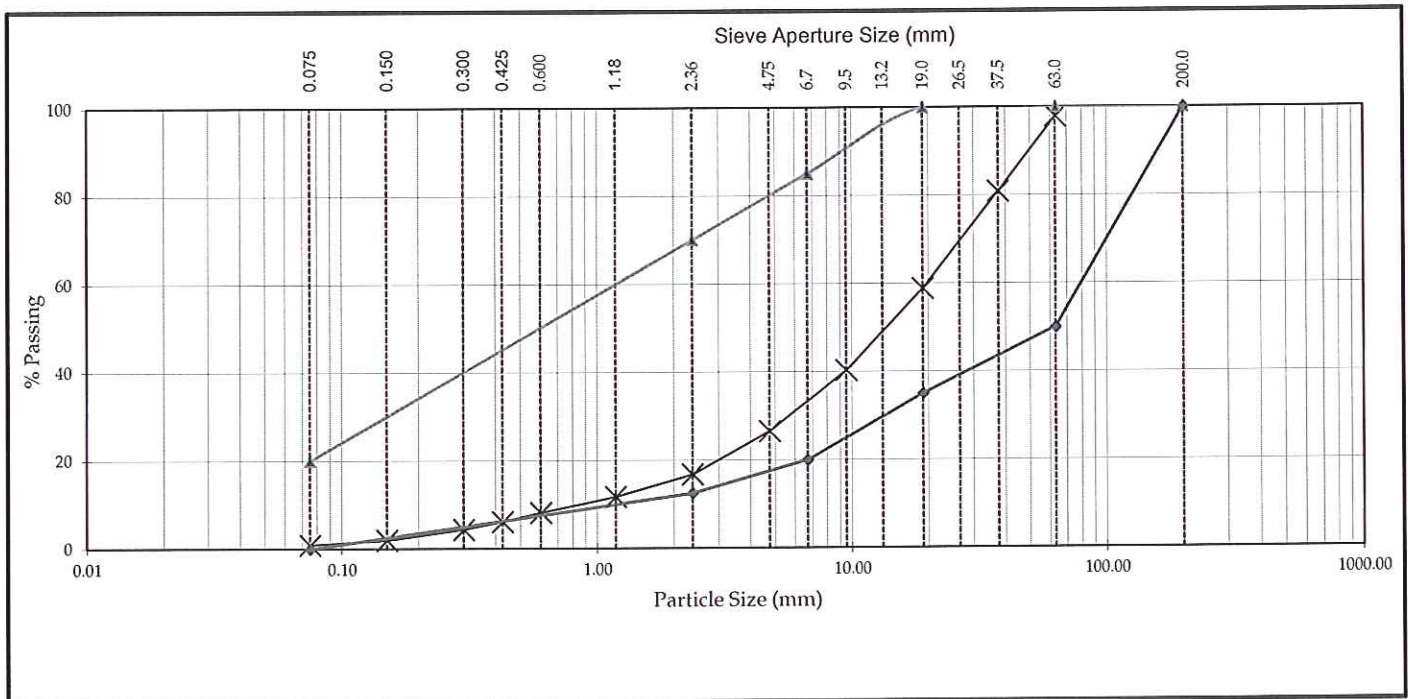
10 NOVEMBER 2011



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 3 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no: 10
Depth : 1.0m-2.05m

Project No : 6-JROON.11/006LC
Lab Ref No : 6389
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	-	19.00	59	4.75	26	0.425	6
63.00	98	13.20	-	2.36	17	0.300	4
37.50	81	9.50	40	1.18	12	0.150	2
26.50	-	6.70	-	0.600	8	0.075	1



Test Method	Notes
NZS 4407 : 1991 Test 3.8.2	Sampling is outside the laboratory's scope of accreditation Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 3 November 2011
Date reported : 4 November 2011

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Designation : Senior Civil Engineering Technician
Date : 4 November 2011



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DRY SIEVE ANALYSIS TEST REPORT

ENVIRONMENT CANTEBURY

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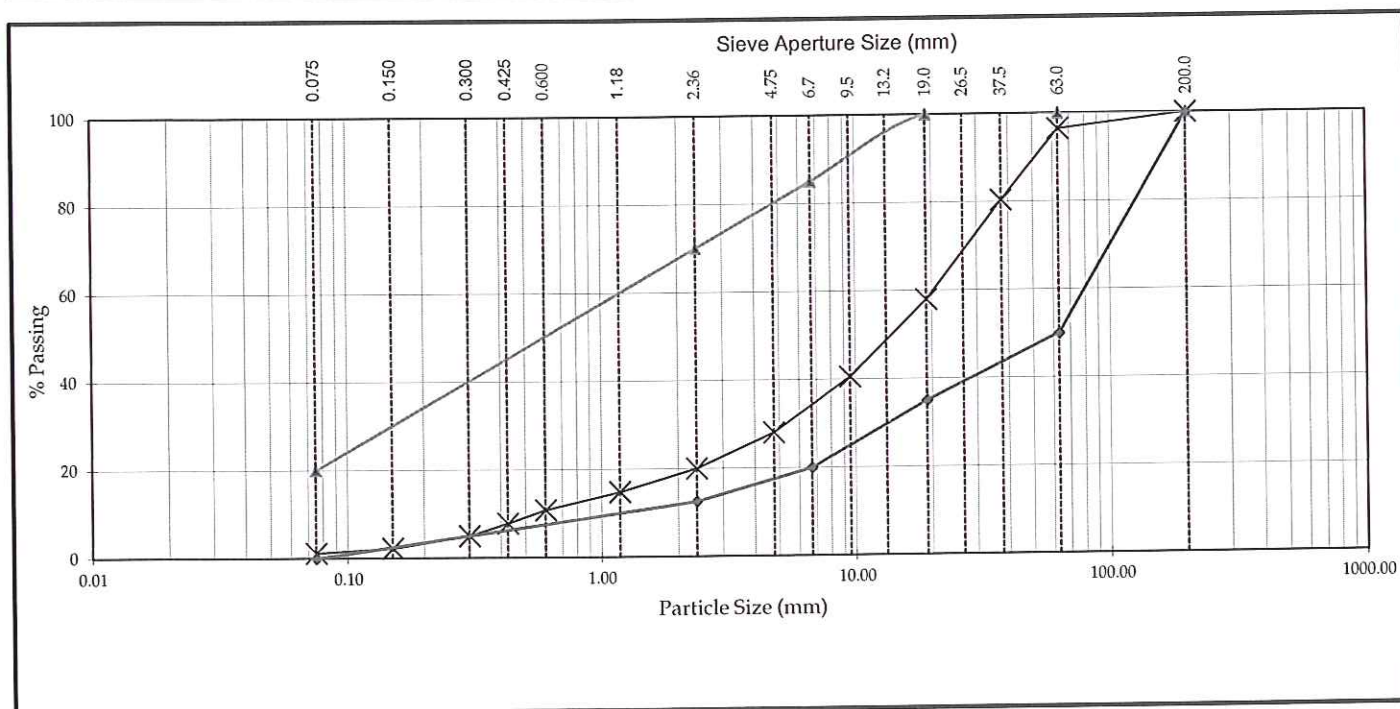
12 NOVEMBER 2021



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 3 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no : 12
Depth : 0.7m-2.2m

Project No : 6-JROON.11/006LC
Lab Ref No : 6390
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	58	4.75	28	0.425	8
63.00	96	13.20	-	2.36	20	0.300	5
37.50	80	9.50	41	1.18	15	0.150	2
26.50	-	6.70	-	0.600	11	0.075	1



Test Method

NZS 4407 : 1991 Test 3.8.2

Notes

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Date tested : 8 November 2011

Date reported : 9 November 2011

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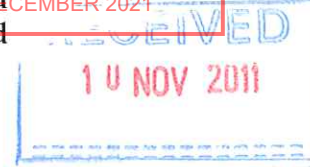
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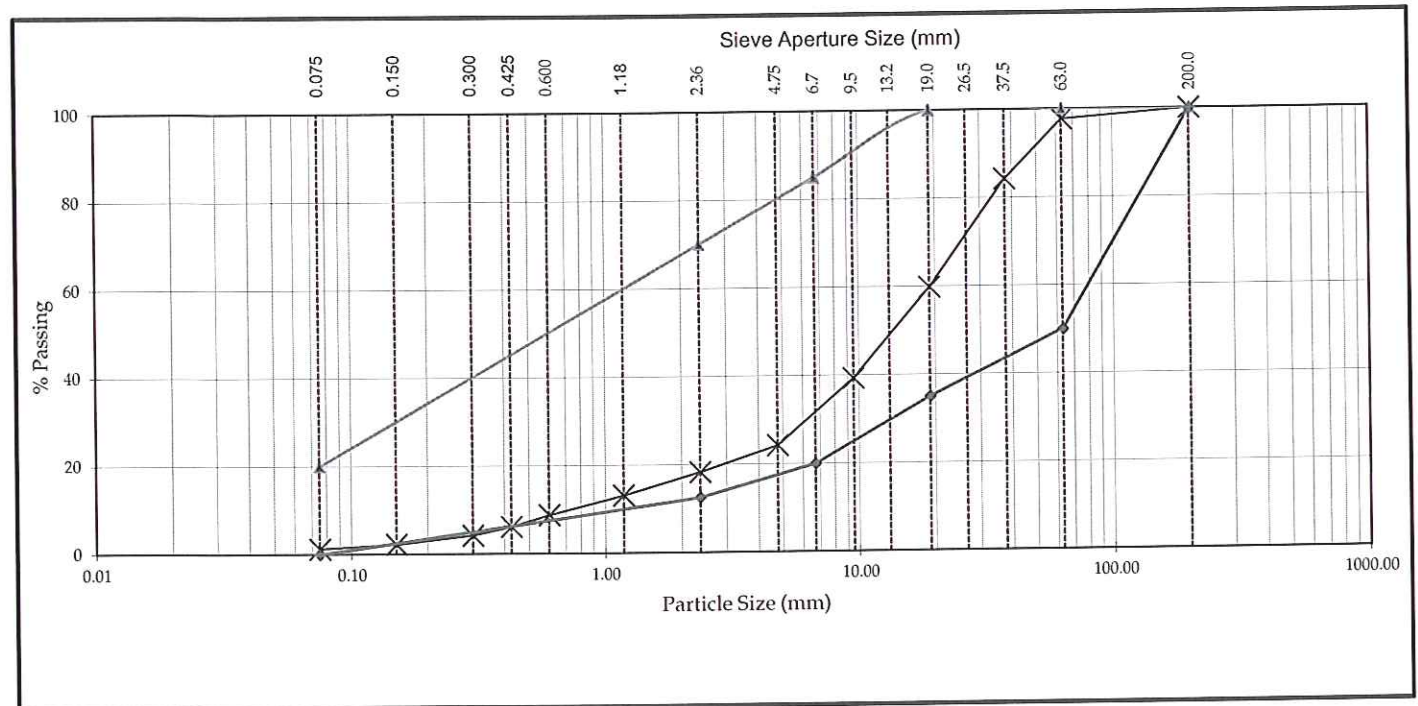
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Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 3 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no : 13
Depth : Not Advised

Project No : 6-JROON.11/006LC
Lab Ref No : 6391
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	60	4.75	24	0.425	6
63.00	98	13.20	-	2.36	18	0.300	4
37.50	84	9.50	39	1.18	13	0.150	2
26.50	-	6.70	-	0.600	9	0.075	1



Test Method

NZS 4407 : 1991 Test 3.8.2

Notes

Sampling is outside the laboratory's scope of accreditation
Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 7 November 2011

Date reported : 8 November 2011

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Date : 8 November 2011



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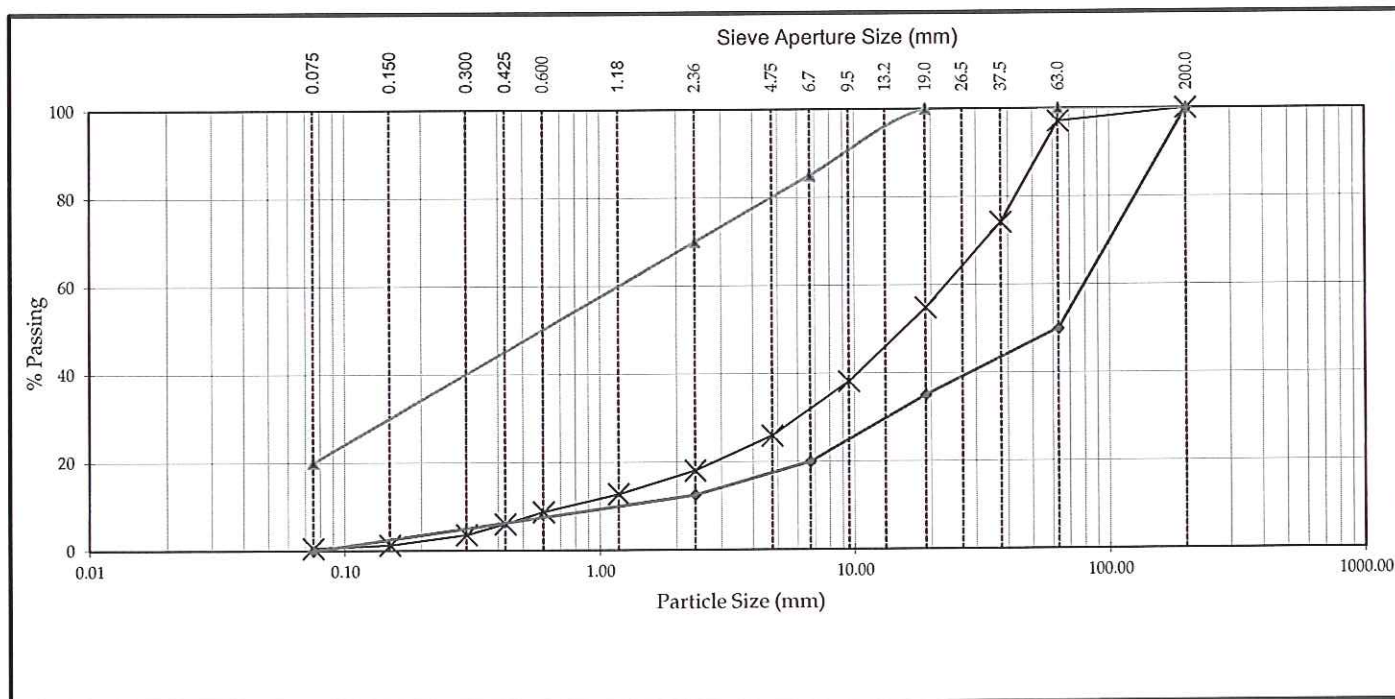
10 DECEMBER 2021



Project : Wil Storage Ponds
Project Location : Waimakariri River, Eyrewell, North Canterbury
Client : Rooney Earthmoving Limited
Contractor : Rooney Earthmoving Limited
Sampled by : Gerard Richardson
Date sampled : 3 October 2011
Sampling method : Not Advised
Sample description : Sandy GRAVEL
Sample condition : Damp as received
Test Pit no: 17
Depth : 1.0m-2.50m

Project No : 6-JROON.11/006LC
Lab Ref No : 6393
Client Ref No : 20851

Sieve Analysis							
Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing	Size (mm)	% Passing
200.00	100	19.00	55	4.75	26	0.425	6
63.00	97	13.20	-	2.36	18	0.300	4
37.50	74	9.50	38	1.18	13	0.150	1
26.50	-	6.70	-	0.600	9	0.075	1



Test Method	Notes
NZS 4407 : 1991 Test 3.8.2	Sampling is outside the laboratory's scope of accreditation Rangitata South Zone 4 Envelope (Supplied by Rooney)

Date tested : 3 November 2011
Date reported : 4 November 2011

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Designation : Senior Civil Engineering Technician
Date : 4 November 2011



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Waimakariri Storage Pond Site Investigation
Test Pit Samples

TP2, 1.6 - 5.0m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	93
100	82
63	74
38	62
19	41
10	25
5	16
2	11
1	8
1	5
0	4
0	2
0	2
0	1
<0.075	0

TP3, 0.25 - 0.70m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	81
150	75
100	72
63	70
38	62
19	44
10	29
5	19
2	13
1	10
1	8
0	6
0	5
0	4
0	3
<0.075	0

TP5, 0.7 - 2.0m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	92
100	88
63	80
38	66
19	50
10	35
5	24
2	16
1	10
1	6
0	4
0	2
0	2
0	1
<0.075	0

TP7, 1.6-5.2m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	82
150	76
100	68
63	61
38	52
19	38
10	26
5	17
2	11
1	8
1	5
0	4
0	3
0	1
0	1
<0.075	0

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 21 DECEMBER 2021

TP9, 1.4 - 3.0m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	93
100	85
63	77
37.5	66
19	49
9.5	33
4.75	20
2.36	14
1.18	11
0.60	8
0.425	5
0.30	4
0.150	2
0.075	1
<0.075	0

TP10, 1.0 - 2.05m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	93
100	85
63	77
37.5	63
19	46
9.5	31
4.75	20
2.36	13
1.18	9
0.60	6
0.425	5
0.30	3
0.150	2
0.075	1
<0.075	0

TP12, 0.7 -2.2m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	94
100	86
63	71
38	59
19	43
10	30
5	21
2	15
1	11
1	8
0	6
0	4
0	1
0	1
<0.075	0

TP13, 1.5 - 4.8m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	100
100	92
63	82
38	71
19	50
10	33
5	20
2	15
1	11
1	8
0	5
0	3
0	2
0	1
<0.075	0

TP17, 1.0 - 2.5m

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
350	100
300	100
200	100
150	94
100	82
63	74
38	56
19	42
10	29
5	20
2	14
1	10
1	7
0	5
0	3
0	1
0	1
<0.075	0

TP10, Gravelly Silt

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
19	100
13	78
10	69
5	66
2	64
1	63
1	63
0	63
0	63
0	62
0	61
0	56
0	54
0	50
0	47
0	43
0	37
0	34
0	30
0	27
0	22
0	18
0	16

TP4, Clayey Silty Sand

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
19	100
13	100
10	100
5	98
2	98
1	96
1	95
0	93
0	89
0	83
0	77
0	68
0	68
0	63
0	59
0	54
0	49
0	45
0	41
0	37
0	34
0	32
0	29

TP15, Clayey Silt

Revised Grading with Oversize added	
Particle Size (mm)	Revised % Passing
19	100
13	100
10	100
5	100
2	100
1	99
1	98
0	97
0	95
0	92
0	89
0	82
0	80
0	76
0	70
0	64
0	57
0	52
0	47
0	42
0	39
0	35
0	34

0	15
<0.0015	0

0	27
<0.0015	0

0	31
<0.0014	0

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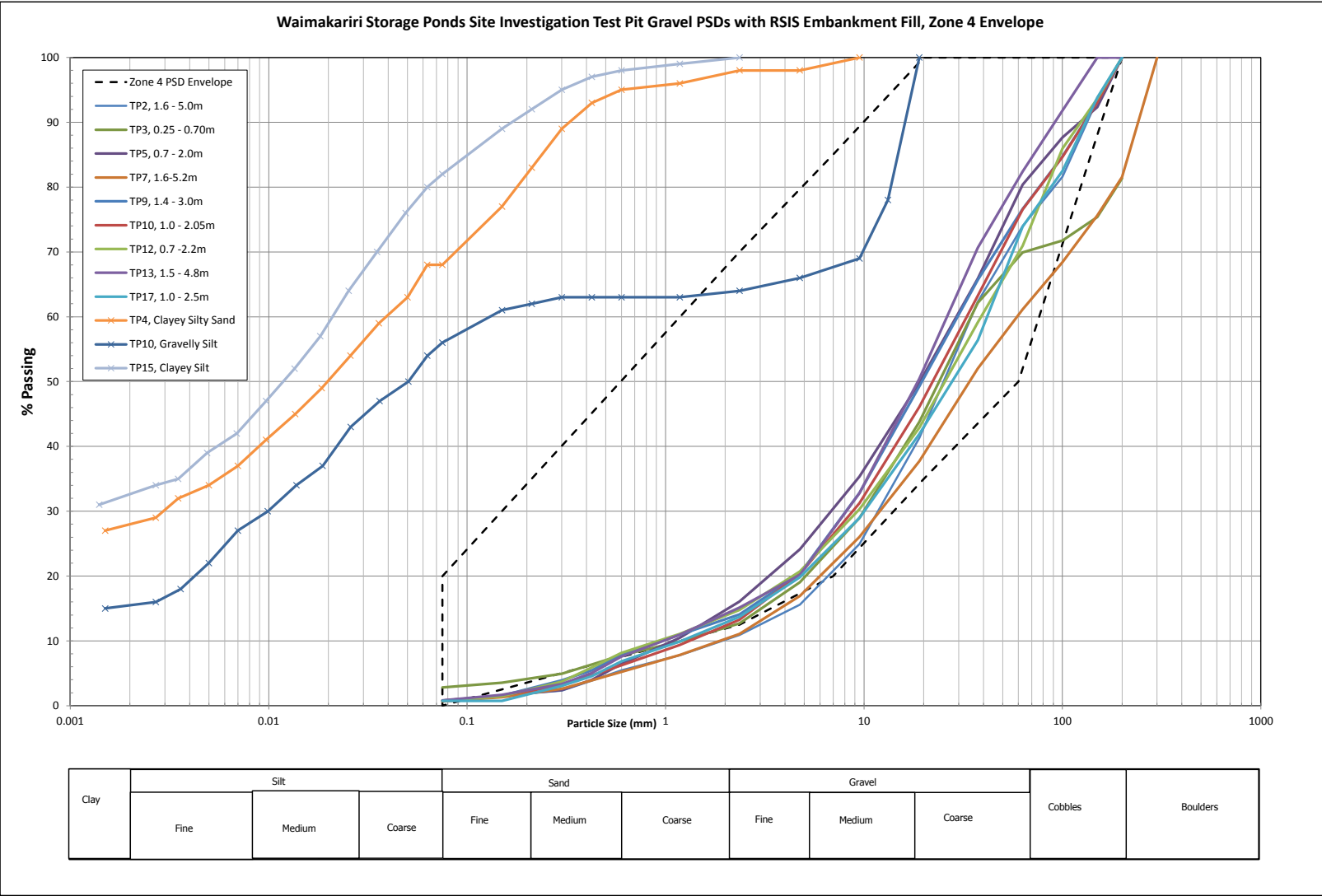
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21 DECEMBER 2021

Waimakariri Storage Pond Site Investigation
Test Pit Samples



Zone 4 PSD Envelope

Particle Size (mm)	Envelope %
200	100
60	50
20	35
7.0	20
2.36	12.5
0.075	0
0.075	20
2.36	70
7.0	85
20	100
200	100

Size (mm)	% Retained
>200	0
63-200	26
2.36-63	33
0.075-2.36	15
<0.075	1
Total:	74

Size (mm)	Average Particle Mass (kg)	18/05/2011
300	0	
200	20.600	
150	8.288	7.300
100	3.261	2.975
63	1.447	1.871

Particle size range	WIL	RSIS
	Particle mass	Particle mass
63mm	1.17	1.66
100mm	3.75	3.12
150mm	6.18	7.79
200mm	19.22	20.60