Appendix B
Compaction Curves

Canterbury Laboratory

24 Miners Road, Templeton, Christchurch
PO Box 16-064, Christchurch 8441
Telephone: +64 3 349 9142
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www.fultonhogan.com
0800 LABORATORY

Maximum Dry Density Report

Report No: MDD:CAN20S-17343
Issue No: 1

Client: Toni O'Regan
City Care Limited
PO Box 7669
Sydenham

Christchurch 8240
NZ

Project: QA Testing - City Care Ltd

ACCREDITED IANZ TESTING LABORATORY

The tests reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. Samples are tested as received, in natural condition, unless stated otherwise in the comments. This report may only be reproduced in full.

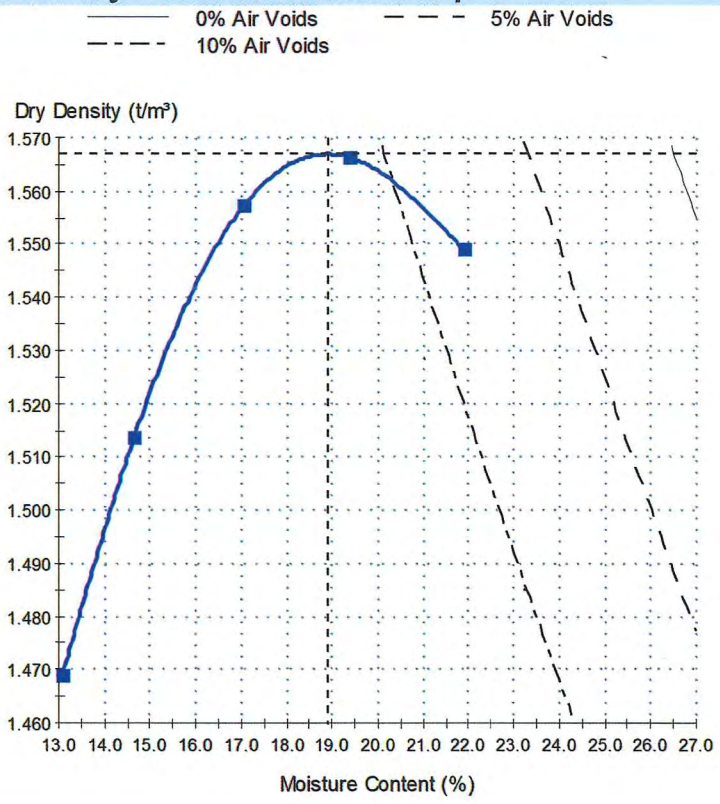
The results in this report relate only to the items / samples that were tested

Approved Signatory: Rebecca Royfee (Laboratory Technician)
IANZ Accreditation No:200
Date of Issue: 23/10/2020

Sample Details

Sample ID:	CAN20S-17343	**Client Sample ID:**	1691/20
Material:	Sand	**Sample Source:**	Miscellaneous Material Source
Site/Sampled From:	CD2 Prestons - Stage 5 East side of S/P	**Date Sampled:**	20/10/2020
Specification:	Vibrating Hammer Compaction Test	**Sampled By:**	Advised - See Comments
Sampling Method:	Stated to be NZS 4407:2015 2.4.6.5	**Date Tested:**	22/10/2020
Technician:	Laura Cranston	**Sampling Endorsed?:**	No

Dry Density - Moisture Relationship



Test Results

NZS 4402:1986 Test 4.1.3 - 1986

Maximum Dry Density (t/m³):	**1.56**
Optimum Moisture (%):	**19**
Solid Density (t/m³):	2.68 assumed
Fraction Tested Passes (mm):	37.5
Material Removed (%):	0
Sample History:	Natural
Tested By:	Laura Cranston
Date Tested:	22/10/2020

Comments

Sampled by A Hadlee

Canterbury Laboratory

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Report No: MDD:CAN20S-01176
Issue No: 1

Maximum Dry Density Report

Client: Toni O'Regan
City Care Limited
PO Box 7669
Sydenham

Christchurch 8240
NZ

Project: QA Testing - City Care Ltd

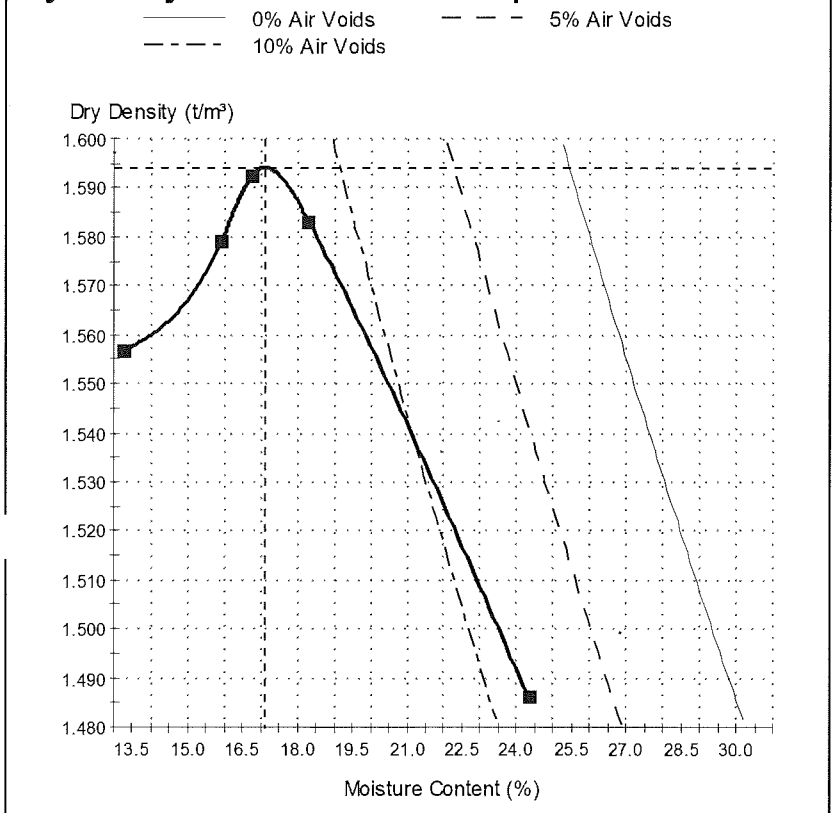
IANZ ACCREDITED LABORATORY

Approved Signatory: Max Burford (Supervisor)
IANZ Accreditation No:200
Date of Issue: 22/01/2020

Sample Details

Sample ID:	CAN20S-01176	**Client Sample ID:**	0055/20 Sample 3
Material:	Sand	**Sample Source:**	Miscellaneous Material Source
Site/Sampled From:	CDL Prestons Road	**Date Sampled:**	20/01/2020
Specification:	Vibrating Hammer Compaction Test	**Sampled By:**	Advised - See Comments
Sampling Method:	Not Advised	**Date Tested:**	21/01/2020
Technician:	Atu Rova	**Sampling Endorsed?:**	No

Dry Density - Moisture Relationship



Test Results

NZS 4402:1986 Test 4.1.3

Maximum Dry Density (t/m³):	**1.60**
Optimum Moisture (%):	**17**
Solid Density (t/m³):	2.68 assumed
Fraction Tested Passes (mm):	37.5
Material Removed (%):	0
Sample History:	Natural
Tested By:	Atu Rova
Date Tested:	21/01/2020

Comments

* Sample 3
* Material sampled by Clive Gould.

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Maximum Dry Density Report

Report No: MDD:CAN20S-01175
Issue No: 1

Client: Toni O'Regan
City Care Limited
PO Box 7669
Sydenham

Christchurch 8240
NZ

Project: QA Testing - City Care Ltd

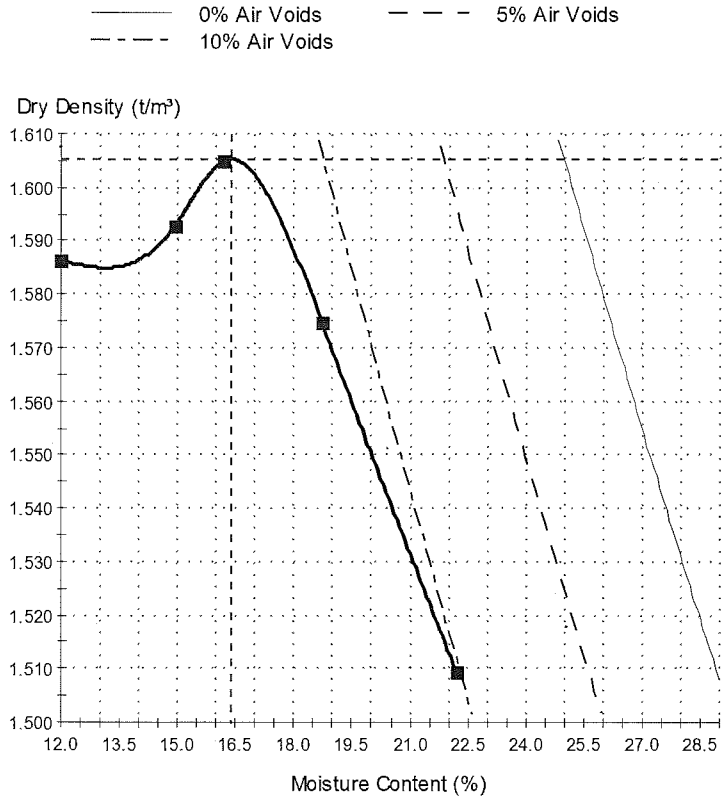
IANZ ACCREDITED LABORATORY

Approved Signatory: Max Burford
(Supervisor)
IANZ Accreditation No:200
Date of Issue: 22/01/2020

Sample Details

Sample ID:	CAN20S-01175	**Client Sample ID:**	0054/20 Sample 2
Material:	Sand	**Sample Source:**	Miscellaneous Material Source
Site/Sampled From:	CDL Prestons Road	**Date Sampled:**	20/01/2020
Specification:	Vibrating Hammer Compaction Test	**Sampled By:**	Advised - See Comments
Sampling Method:	Not Advised	**Date Tested:**	21/01/2020
Technician:	Atu Rova	**Sampling Endorsed?:**	No

Dry Density - Moisture Relationship



Test Results

NZS 4402:1986 Test 4.1.3

Maximum Dry Density (t/m³):	**1.60**
Optimum Moisture (%):	**16**
Solid Density (t/m³):	2.68 assumed
Fraction Tested Passes (mm):	37.5
Material Removed (%):	0
Sample History:	Natural
Tested By:	Atu Rova
Date Tested:	21/01/2020

Comments

* Sample 2
* Material sampled by Clive Gould.

Canterbury Laboratory

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Report No: MDD:CAN21S-00814
Issue No: 1

Maximum Dry Density Report

Client:
City Care Limited
PO Box 7669
Sydenham

Christchurch 8240
NZ

Project: City Care

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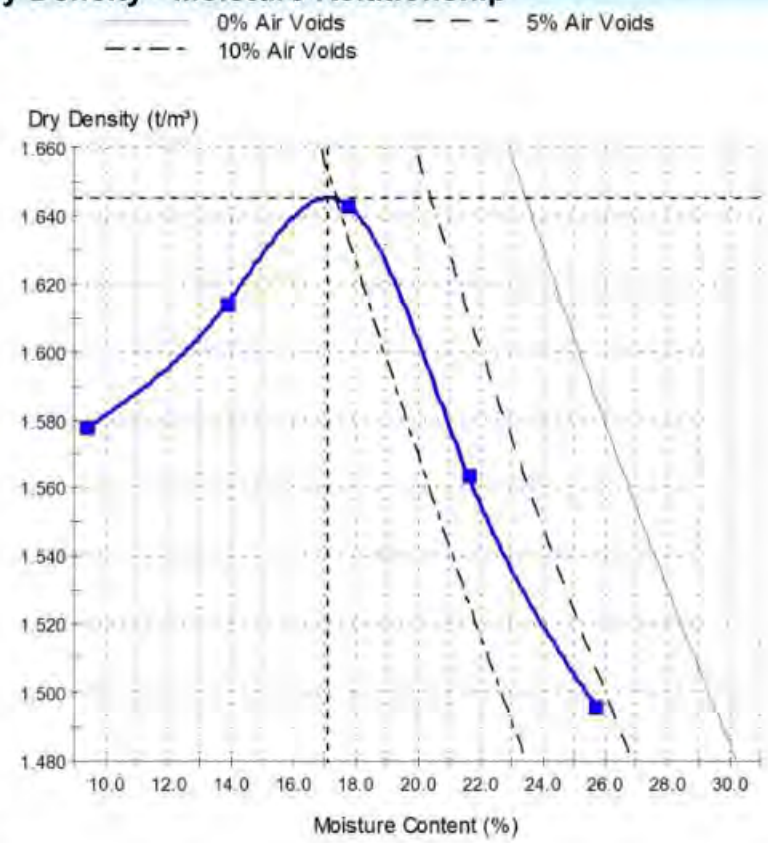
The results in this report relate only to the items / samples that were tested

Approved Signatory: Liam Brennan
(Laboratory Technician)
IANZ Accreditation No:200
Date of Issue: 29/01/2021

Sample Details

Sample ID:	CAN21S-00814	**Client Sample ID:**	Lab Ref: 0095/21
Material:	Silty Sand	**Sample Source:**	Miscellaneous Material Source
Site/Sampled From:	Ex Oakbridge, Eastern BDY Reserve	**Date Sampled:**	27/01/2021
Specification:	Vibrating Hammer Compaction Test	**Sampled By:**	Advised - See Comments
Sampling Method:	As Received - Not Accredited	**Date Tested:**	28/01/2021
Technician:	Maciej Gaworecki	**Sampling Endorsed?:**	No

Dry Density - Moisture Relationship



Test Results

NZS 4402:1986 Test 4.1.3 - 1986

Maximum Dry Density (t/m³):	**1.64**
Optimum Moisture (%):	**17**
Solid Density (t/m³):	2.68 assumed
Fraction Tested Passes (mm):	37.5
Material Removed (%):	0
Sample History:	Natural
Tested By:	Maciej Gaworecki
Date Tested:	28/01/2021

Comments

Compaction for test points @ 21.6% & 25.7% ceased prior to 3 minutes due to oversaturation causing ejection of fines from sample.
Material sampled by Clive Gould

Road Science
Leading Transport Technology

CHRISTCHURCH LABORATORY

397 Mcleans Island Road, Harewood
P O Box 11-326, Sockburn, Christchurch 8443
Phone: (03) 359-0757

Test Report

Client:	K.B. Contracting & Quarries Limited	**Sample Date:**	08/12/2017	08:00
Address:	PO Box 19746, Woolston, Christchurch 8241	**Sampled By:**	Pete Haward	
Client Ref:	Not advised	**Laboratory No:**	C17/3810	
Job Location:	McLeans Island	**Report No:**	257833	**Final**
Material:	Pit Run	**Report Date:**	15/12/2017	Page 1 of 2
Material Source:	McLeans Island			

Test Methods:

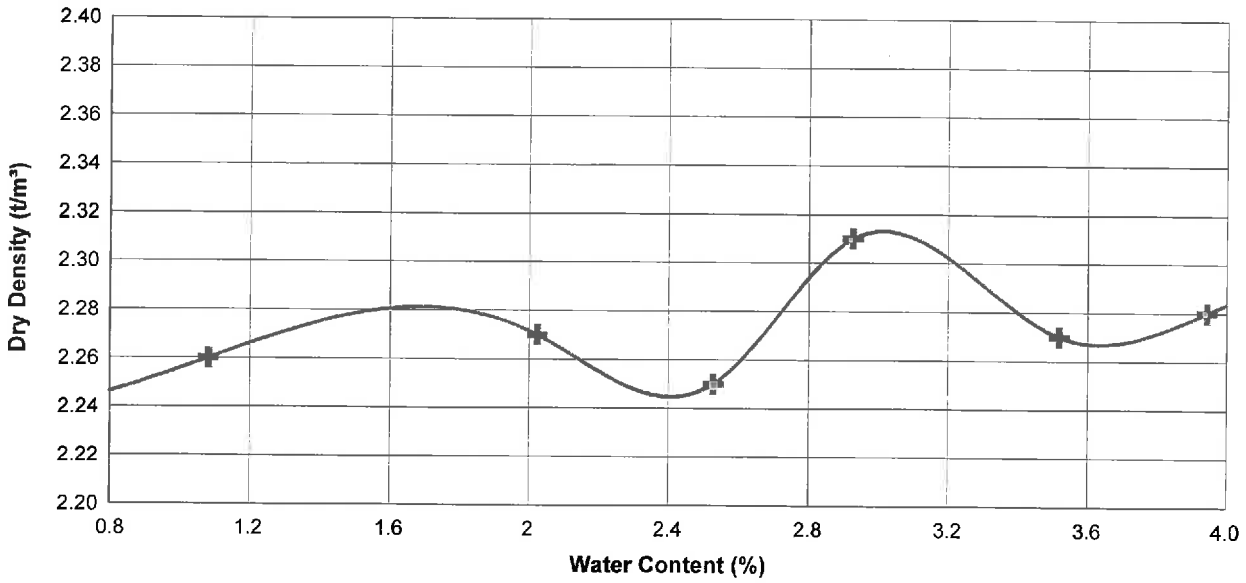
1#	Sampling from stockpiles of well graded aggregate - machine method	NZS4407:2015 2.4.6.3.2
2	Determination of the Dry Density/Water Content Relationship - New Zealand Vibrating Hammer Compaction Test	NZS4402:1986 Test 4.1.3

Test methods marked with a hash are not accredited.

Results

Water Content (%)	1.08	2.02	2.53	2.93	3.52	3.94
Dry Density (t/m³)	2.26	2.27	2.25	2.31	2.27	2.28

Dry Density/Water Content Relationship



Maximum Dry Density (t/m³)	2.32
Optimum Water Content (%)	3.0
History of Sample	Result obtained from oven-dried sample.
Test Fraction	Passing 37.5mm sieve
Test Date:	13/12/2017

Notes

Date of sample receipt: 08/12/2017

Vicky Henderson
Approved Signatory
Laboratory Manager
IANZ Accreditation No: 439
Date of Issue: 10/04/92

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Road Science
Leading Transport Technology

CHRISTCHURCH LABORATORY
PO Box 11326, Sockburn, Christchurch, 8443
Phone: 03 359 0757

Test Report

Client:	K.B. Contracting & Quarries Limited	**Sample Date:**	14/10/2021	10:00
Address:	PO Box 19746, Woolston, Christchurch 8241	**Sampled By:**	Pete Haward	
Job Location:	Mcleans Island	**Laboratory No:**	C21/1895	
Material:	Pitrun	**Client Ref:**	Not Advised	
Material Source:	Mcleans Island	**Report No:**	52897	**Final**
		Report Date:	20/10/2021	

Test Methods

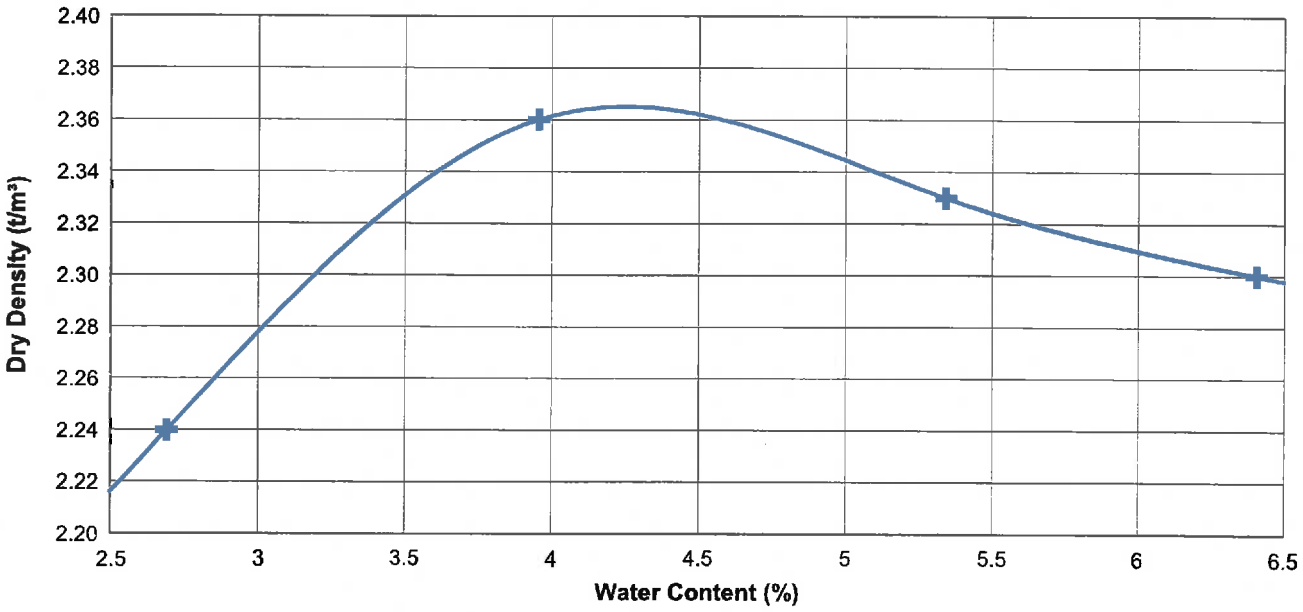
1	Determination of the dry density/water content relationship - New Zealand vibrating hammer compaction test	NZS4402:1986 Test 4.1.3
2	Sampling from stockpiles of well graded aggregate - machine method	NZS4407:2015 Test 2.4.6.3.2

Determination of the Dry Density/Water Content Relationship - New Zealand Vibrating Hammer Compaction Test

Results

Dry Density (t/m³)	2.24	2.36	2.33	2.30
Water Content (%)	2.7	4.0	5.3	6.4

Dry Density/Water Content Relationship



	Results
Natural moisture content (%)	3.5
Maximum Dry Density (t/m³)	2.36
Optimum Water Content (%)	4.2
Test Fraction	Passing 37.5mm sieve
Test Date:	19-10-2021

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PO Box 11326, Sockburn, Christchurch, 8443
Phone: 03 359 0757

Laboratory No: C21/1895
Report No: 52897 **Final**
Report Date: 20/10/2021

Sample Notes

Sample received in a damp condition.

Test results apply to sample as received.

Date of sample receipt: 14/10/2021

Vicky Henderson
Laboratory Manager

Road Science
Leading Transport Technology

CHRISTCHURCH LABORATORY
PO Box 11326, Sockburn, Christchurch, 8443
Phone: 03 359 0757

Test Report

Client:	K.B. Contracting & Quarries Limited	**Sample Date:**	19/04/2021	13:00
Address:	PO Box 19746, Woolston, Christchurch 8241	**Sampled By:**	Pete Haward	
Client Ref:	Not Advised	**Laboratory No:**	C21/0839	
Job Location:	Mcleans Island	**Report No:**	45807	**Final**
Material:	Pitrun	**Report Date:**	27/04/2021	
Material Source:	Mcleans Island			

Test Methods

1	The clay index	NZS 4407:2015 Test 3.5
2	Particle size distribution - Subsidiary method by dry sieving	NZS 4407:2015 Test 3.8.2
3	Determination of the dry density/water content relationship - New Zealand vibrating hammer compaction test	NZS4402:1986 Test 4.1.3
4	* Sampling from stockpiles of well graded aggregate - machine method	NZS4407:2015 Test 2.4.6.3.2

** Test methods marked with an asterisk are not accredited.*

The Clay Index

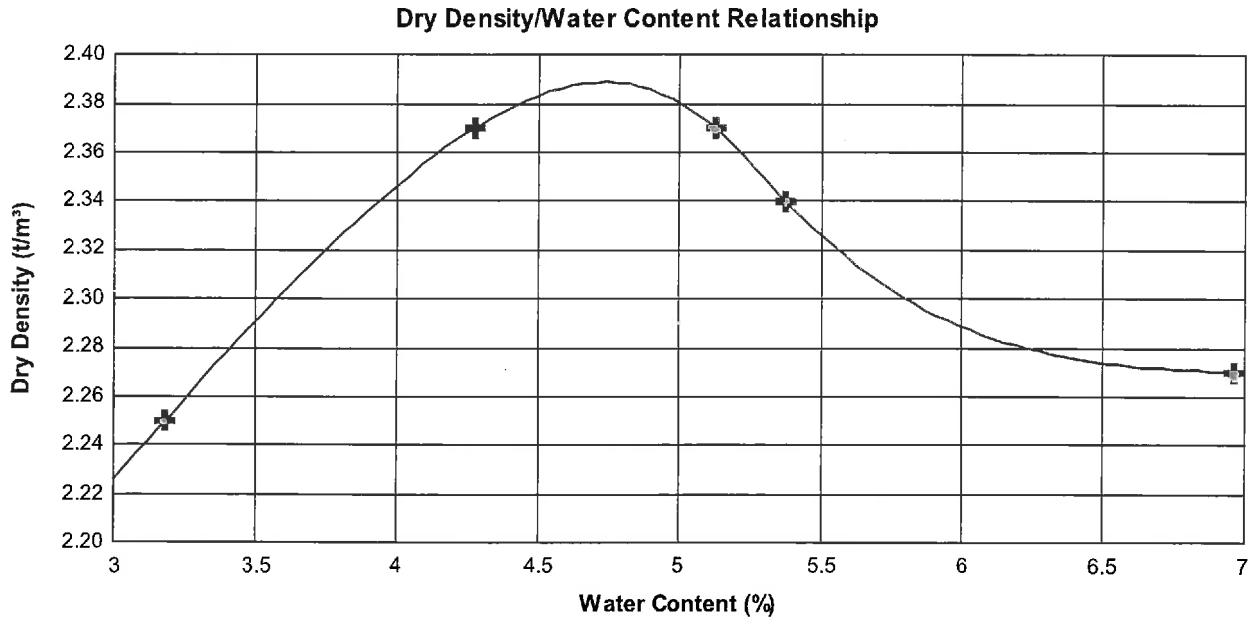
	Results
Clay Index:	1.9
Test Date:	23-04-2021

Note: The field sample was sourced from natural fines

Determination of the Dry Density/Water Content Relationship - New Zealand Vibrating Hammer Compaction Test

Results

Dry Density (t/m³)	2.25	2.37	2.37	2.34	2.27
Water Content (%)	3.2	4.3	5.1	5.4	7.0



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CHRISTCHURCH LABORATORY
PO Box 11326, Sockburn, Christchurch, 8443
Phone: 03 359 0757

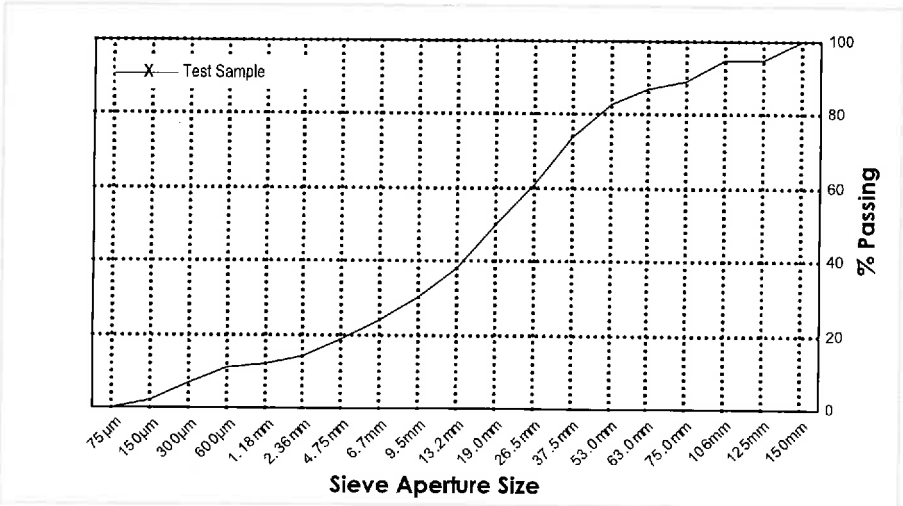
Laboratory No: C21/0839
Report No: 45807 **Final**
Report Date: 27/04/2021

	Results
Maximum Dry Density (t/m³)	2.38
Optimum Water Content (%)	4.8
Test Fraction	Passing 37.5mm sieve
Test Date:	20-04-2021

The Particle-Size Distribution - Subsidiary Method by Dry Sieving

Results

Sieve Size (BSS)	Percent passing	Specification
150mm	100	
125mm	95	
106mm	95	
75.0mm	89	
63.0mm	87	
53.0mm	83	
37.5mm	74	
26.5mm	61	
19.0mm	50	
13.2mm	38	
9.5mm	30	
6.7mm	24	
4.75mm	19	
2.36mm	14	
1.18mm	12	
600µm	11	
300µm	7	
150µm	2	
75µm	0	



Note: PSD results obtained from an oven dry test sample.

Test Date: 27-04-2021

Sample Notes

Sample received in a damp condition.

Test results apply to sample as received.

Date of sample receipt: 20/04/2021

Vicky Henderson
Approved Signatory
Laboratory Manager
IANZ Accreditation No: 439

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Tests indicated as not accredited are outside the scope of the laboratory's accreditation.
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Appendix C
NDM Earthfill Testing Results

Project Prestons South Subdivision
Project No. 235361

Title Summary of Compaction

Test Date	Test ID#	Test #	Unique ID	mE	mN	Stage	MDD	Type	Lift #	Lot ID	Compaction (%)
19/09/2019	2334/19	5	11	395799.532	812147.449	Stage 5	2320	Pitrun	Lift 1	Lot 1040	100
19/09/2019	2334/19	6	12	395810.316	812129.671	Stage 5	2320	Pitrun	Lift 1	Lot 1040	100
19/09/2019	2334/19	7	13	395818.33	812130.108	Stage 5	2320	Pitrun	Lift 1	Lot 1039	101
19/09/2019	2334/19	8	14	395826.782	812149.489	Stage 5	2320	Pitrun	Lift 1	Lot 1039	101
19/09/2019	2334/19	9	15	395833.923	812149.926	Stage 5	2320	Pitrun	Lift 1	Lot 1038	99
19/09/2019	2334/19	10	16	395845.531	812132.07	Stage 5	2320	Pitrun	Lift 1	Lot 1038	99
19/09/2019	2334/19	11	17	395852.143	812132.841	Stage 5	2320	Pitrun	Lift 1	Lot 1037	99
19/09/2019	2334/19	12	18	395859.194	812151.463	Stage 5	2320	Pitrun	Lift 1	Lot 1037	99
19/09/2019	2334/19	13	19	395868.107	812152.173	Stage 5	2320	Pitrun	Lift 1	Lot 1036	100
19/09/2019	2334/19	14	20	395878.016	812135.998	Stage 5	2320	Pitrun	Lift 1	Lot 1036	97
19/09/2019	2334/19	15	21	395886.759	812136.435	Stage 5	2320	Pitrun	Lift 1	Lot 1035	98
19/09/2019	2334/19	16	22	395894.191	812153.921	Stage 5	2320	Pitrun	Lift 1	Lot 1035	98
25/09/2019	2391/19	1	47	395842.903	812150.659	Stage 5	2320	Pitrun	Lift 2	Lot 1038	98
25/09/2019	2391/19	2	48	395834.969	812131.486	Stage 5	2320	Pitrun	Lift 2	Lot 1038	97
25/09/2019	2391/19	3	49	395827.587	812131.045	Stage 5	2320	Pitrun	Lift 2	Lot 1039	99
25/09/2019	2391/19	4	50	395817.34	812148.675	Stage 5	2320	Pitrun	Lift 2	Lot 1039	99
25/09/2019	2391/19	5	51	395809.296	812148.234	Stage 5	2320	Pitrun	Lift 2	Lot 1040	100
25/09/2019	2391/19	6	52	395800.04	812128.842	Stage 5	2320	Pitrun	Lift 2	Lot 1040	98
24/09/2019	2358/19	1	69	395990.515	812141.585	Stage 5	2320	Pitrun	Lift 1	Lot 1030	100
24/09/2019	2358/19	2	70	395989.204	812157.615	Stage 5	2320	Pitrun	Lift 1	Lot 1030	99
24/09/2019	2358/19	3	71	395967.929	812158.78	Stage 5	2320	Pitrun	Lift 1	Lot 1031	96
24/09/2019	2358/19	4	72	395969.386	812143.043	Stage 5	2320	Pitrun	Lift 1	Lot 1031	101
24/09/2019	2358/19	5	73	395952.191	812141.148	Stage 5	2320	Pitrun	Lift 1	Lot 1032	99
24/09/2019	2358/19	6	74	395950.588	812157.177	Stage 5	2320	Pitrun	Lift 1	Lot 1032	103
24/09/2019	2358/19	7	75	395933.247	812156.303	Stage 5	2320	Pitrun	Lift 1	Lot 1033	97
24/09/2019	2358/19	8	76	395935.287	812140.274	Stage 5	2320	Pitrun	Lift 1	Lot 1033	99
24/09/2019	2358/19	9	77	395907.746	812139.254	Stage 5	2320	Pitrun	Lift 1	Lot 1034	100
24/09/2019	2358/19	10	78	395905.56	812153.972	Stage 5	2320	Pitrun	Lift 1	Lot 1034	101
24/09/2019	2358/19	11	79	395889.239	812153.243	Stage 5	2320	Pitrun	Lift 1	Lot 1035	102
24/09/2019	2358/19	12	80	395890.842	812137.068	Stage 5	2320	Pitrun	Lift 1	Lot 1035	98
24/09/2019	2358/19	13	81	395873.793	812135.757	Stage 5	2320	Pitrun	Lift 1	Lot 1036	98
24/09/2019	2358/19	14	82	395872.627	812151.64	Stage 5	2320	Pitrun	Lift 1	Lot 1036	100
27/09/2019	2382/19	1	83	395990.515	812141.585	Stage 5	2320	Pitrun	Lift 2	Lot 1030	99
27/09/2019	2382/19	2	84	395989.204	812157.615	Stage 5	2320	Pitrun	Lift 2	Lot 1030	97
27/09/2019	2382/19	3	85	395967.929	812158.78	Stage 5	2320	Pitrun	Lift 2	Lot 1031	97
27/09/2019	2382/19	4	86	395969.386	812143.043	Stage 5	2320	Pitrun	Lift 2	Lot 1031	97
27/09/2019	2382/19	5	87	395952.191	812141.148	Stage 5	2320	Pitrun	Lift 2	Lot 1032	99
27/09/2019	2382/19	6	88	395950.588	812157.177	Stage 5	2320	Pitrun	Lift 2	Lot 1032	100
27/09/2019	2382/19	7	89	395933.247	812156.303	Stage 5	2320	Pitrun	Lift 2	Lot 1033	100
27/09/2019	2382/19	8	90	395935.287	812140.274	Stage 5	2320	Pitrun	Lift 2	Lot 1033	97
27/09/2019	2382/19	9	91	395907.746	812139.254	Stage 5	2320	Pitrun	Lift 2	Lot 1034	98
27/09/2019	2382/19	10	92	395905.56	812153.972	Stage 5	2320	Pitrun	Lift 2	Lot 1034	95
27/09/2019	2382/19	11	93	395889.239	812153.243	Stage 5	2320	Pitrun	Lift 2	Lot 1035	96
27/09/2019	2382/19	12	94	395890.842	812137.068	Stage 5	2320	Pitrun	Lift 2	Lot 1035	99

Project Prestons South Subdivision
Project No. 235361

Title Summary of Compaction

Test Date	Test ID#	Test #	Unique ID	mE	mN	Stage	MDD	Type	Lift #	Lot ID	Compaction (%)
27/09/2019	2382/19	13	95	395873.793	812135.757	Stage 5	2320	Pitrun	Lift 2	Lot 1036	96
27/09/2019	2382/19	14	96	395872.627	812151.64	Stage 5	2320	Pitrun	Lift 2	Lot 1036	100
27/09/2019	2382/19	15	97	395855.455	812150.734	Stage 5	2320	Pitrun	Lift 2	Lot 1037	96
27/09/2019	2382/19	16	98	395856.628	812133.306	Stage 5	2320	Pitrun	Lift 2	Lot 1037	98
2/10/2019	2425/19	1	99	395928.637	812155.737	Stage 5	2320	Pitrun	Lift 3	Lot 1033	99
2/10/2019	2425/19	2	100	395940.206	812140.862	Stage 5	2320	Pitrun	Lift 3	Lot 1033	98
2/10/2019	2425/19	3	101	395946.046	812141.082	Stage 5	2320	Pitrun	Lift 3	Lot 1032	99
2/10/2019	2425/19	4	102	395955.412	812157.61	Stage 5	2320	Pitrun	Lift 3	Lot 1032	99
2/10/2019	2425/19	5	103	395962.244	812158.271	Stage 5	2320	Pitrun	Lift 3	Lot 1031	96
2/10/2019	2425/19	6	104	395973.703	812143.837	Stage 5	2320	Pitrun	Lift 3	Lot 1031	98
2/10/2019	2425/19	7	105	395983.069	812139.319	Stage 5	2320	Pitrun	Lift 3	Lot 1030	99
2/10/2019	2425/19	8	106	395994.969	812158.712	Stage 5	2320	Pitrun	Lift 3	Lot 1030	100
3/10/2019	2454/19	3	109	395800.04	812128.842	Stage 5	2320	Pitrun	Final Lift	Lot 1040	95
3/10/2019	2454/19	4	110	395809.296	812148.234	Stage 5	2320	Pitrun	Final Lift	Lot 1040	96
3/10/2019	2454/19	5	111	395817.34	812148.675	Stage 5	2320	Pitrun	Final Lift	Lot 1039	100
3/10/2019	2454/19	6	112	395827.587	812131.045	Stage 5	2320	Pitrun	Final Lift	Lot 1039	99
3/10/2019	2454/19	7	113	395834.969	812131.486	Stage 5	2320	Pitrun	Final Lift	Lot 1038	99
3/10/2019	2454/19	8	114	395842.903	812150.659	Stage 5	2320	Pitrun	Final Lift	Lot 1038	98
3/10/2019	2454/19	9	115	395850.739	812150.694	Stage 5	2320	Pitrun	Final Lift	Lot 1037	96
3/10/2019	2454/19	10	116	395862.259	812133.451	Stage 5	2320	Pitrun	Final Lift	Lot 1037	100
3/10/2019	2454/19	11	117	395867.982	812134.9	Stage 5	2320	Pitrun	Final Lift	Lot 1036	97
3/10/2019	2454/19	12	118	395876.966	812152.36	Stage 5	2320	Pitrun	Final Lift	Lot 1036	97
3/10/2019	2454/19	13	119	395885.152	812152.795	Stage 5	2320	Pitrun	Final Lift	Lot 1035	98
3/10/2019	2454/19	14	120	395896.527	812137.218	Stage 5	2320	Pitrun	Final Lift	Lot 1035	103
3/10/2019	2454/19	15	121	395903.468	812137.635	Stage 5	2320	Pitrun	Final Lift	Lot 1034	102
3/10/2019	2454/19	16	122	395911.324	812154.69	Stage 5	2320	Pitrun	Final Lift	Lot 1034	99
3/10/2019	2454/19	17	123	395928.637	812155.737	Stage 5	2320	Pitrun	Final Lift	Lot 1033	99
3/10/2019	2454/19	18	124	395940.206	812140.862	Stage 5	2320	Pitrun	Final Lift	Lot 1033	100
3/10/2019	2454/19	19	125	395946.046	812141.082	Stage 5	2320	Pitrun	Final Lift	Lot 1032	100
3/10/2019	2454/19	20	126	395955.412	812157.61	Stage 5	2320	Pitrun	Final Lift	Lot 1032	96
3/10/2019	2454/19	21	127	395962.244	812158.271	Stage 5	2320	Pitrun	Final Lift	Lot 1031	97
3/10/2019	2454/19	22	128	395973.703	812143.837	Stage 5	2320	Pitrun	Final Lift	Lot 1031	98
3/10/2019	2454/19	23	129	395983.069	812139.319	Stage 5	2320	Pitrun	Final Lift	Lot 1030	102
3/10/2019	2454/19	24	130	395994.969	812158.712	Stage 5	2320	Pitrun	Final Lift	Lot 1030	99
12/05/2020	KB20/0149	1	131	395984.608	812125.176	Stage 5	2320	Pitrun	Lift 1	Lot 1029	99
12/05/2020	KB20/0149	2	132	395999.928	812127.83	Stage 5	2320	Pitrun	Lift 1	Lot 1029	98
12/05/2020	KB20/0149	3	133	396001.897	812110.027	Stage 5	2320	Pitrun	Lift 1	Lot 1028	99
12/05/2020	KB20/0149	4	134	395987.261	812108.829	Stage 5	2320	Pitrun	Lift 1	Lot 1028	100
13/05/2020	KB20/0158	1	139	395999.928	812127.83	Stage 5	2320	Pitrun	Lift 2	Lot 1029	100
13/05/2020	KB20/0158	2	140	396001.897	812110.027	Stage 5	2320	Pitrun	Lift 2	Lot 1028	101
13/05/2020	KB20/0158	7	145	395987.261	812108.829	Stage 5	2320	Pitrun	Lift 2	Lot 1028	99
13/05/2020	KB20/0158	8	146	395984.608	812125.176	Stage 5	2320	Pitrun	Lift 2	Lot 1029	98
19/11/2020	1949-20	1	167	395935.703	812110.221	Stage 5	1600	Sand	Lift 3	Lot 1004	103
19/11/2020	1949-20	2	168	395927.704	812094.098	Stage 5	1600	Sand	Lift 3	Lot 1004	100

Project Prestons South Subdivision
Project No. 235361

Title Summary of Compaction

Test Date	Test ID#	Test #	Unique ID	mE	mN	Stage	MDD	Type	Lift #		Lot ID	Compaction (%)
16/11/2020	1922-20	1	171	395925.713	812109.725	Stage 5	1600	Sand	Lift 2		Lot 1004	98
16/11/2020	1922-20	2	172	395938.786	812094.369	Stage 5	1600	Sand	Lift 2		Lot 1004	100
16/11/2020	1922-20	7	177	395927.052	812094.013	Stage 5	1600	Sand	Lift 2		Lot 1004	101
16/11/2020	1922-20	8	178	395936.267	812110.445	Stage 5	1600	Sand	Lift 2		Lot 1004	99
11/11/2020	1912-20	1	179	395936.34	812109.99	Stage 5	1640	Sand	Lift 1		Lot 1004	98
11/11/2020	1912-20	2	180	395927.633	812093.531	Stage 5	1640	Sand	Lift 1		Lot 1004	100
11/11/2020	1912-20	7	185	395927.422	812093.655	Stage 5	1640	Sand	Lift 1		Lot 1004	99
11/11/2020	1912-20	8	186	395936.047	812109.827	Stage 5	1640	Sand	Lift 1		Lot 1004	102
16/11/2020	KB20/0425	1	247	395945.129	812112.472	Stage 5	2320	Pitrun	Lift 1		Lot 1005	98
16/11/2020	KB20/0425	2	248	395946.465	812095.777	Stage 5	2320	Pitrun	Lift 1		Lot 1005	97
17/11/2020	KB20/0426	1	251	395945.267	812111.807	Stage 5	2320	Pitrun	Lift 2		Lot 1005	98
17/11/2020	KB20/0426	2	252	395947.143	812096.107	Stage 5	2320	Pitrun	Lift 2		Lot 1005	99
20/11/2020	KB20/0432	1	255	395951.296	812112.53	Stage 5	2320	Pitrun	Final Lift		Lot 1005	98
20/11/2020	KB20/0432	2	256	395961.24	812099.101	Stage 5	2320	Pitrun	Final Lift		Lot 1005	99
20/01/2022	3071_001 (0051/2	1	328	396010.149	812109.322	Stage 5	2360	Pitrun	Lift 11	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		95
20/01/2022	3071_001 (0051/2	2	329	396007.881	812126.187	Stage 5	2360	Pitrun	Lift 11	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		96
20/01/2022	3071_001 (0051/2	3	330	396005.093	812147.666	Stage 5	2360	Pitrun	Lift 11	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		95
20/01/2022	3071_001 (0051/2	4	331	396002.866	812161.695	Stage 5	2360	Pitrun	Lift 11	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		95
23/02/2022	KB22/0071	1	400	395811.448	812104.845	Stage 5	2360	Pitrun	Lift 2		Lot 982	96
23/02/2022	KB22/0071	2	401	395824.697	812105.513	Stage 5	2360	Pitrun	Lift 2		Lot 982	99
23/02/2022	KB22/0071	3	402	395854.09	812107.851	Stage 5	2360	Pitrun	Lift 2		Lot 992	95
23/02/2022	KB22/0071	4	403	395868.786	812108.853	Stage 5	2360	Pitrun	Lift 2		Lot 992	100
23/02/2022	KB22/0071	5	404	395880.477	812109.632	Stage 5	2360	Pitrun	Lift 2		Lot 993	99
23/02/2022	KB22/0071	6	405	395894.06	812109.966	Stage 5	2360	Pitrun	Lift 2		Lot 993	101
23/02/2022	KB22/0073	1	406	395811.448	812104.845	Stage 5	2360	Pitrun	Lift 3		Lot 982	101
23/02/2022	KB22/0073	2	407	395824.697	812105.513	Stage 5	2360	Pitrun	Lift 3		Lot 982	100
22/02/2022	KB22/0065	1	408	395811.448	812104.845	Stage 5	2360	Pitrun	Lift 1		Lot 982	98
22/02/2022	KB22/0065	2	409	395824.697	812105.513	Stage 5	2360	Pitrun	Lift 1		Lot 982	104
22/02/2022	KB22/0065	3	410	395854.09	812107.851	Stage 5	2360	Pitrun	Lift 1		Lot 992	97
22/02/2022	KB22/0065	4	411	395868.786	812108.853	Stage 5	2360	Pitrun	Lift 1		Lot 992	99
22/02/2022	KB22/0065	5	412	395880.477	812109.632	Stage 5	2360	Pitrun	Lift 1		Lot 993	102
22/02/2022	KB22/0065	6	413	395894.06	812109.966	Stage 5	2360	Pitrun	Lift 1		Lot 993	103
24/02/2022	KB22/0080	1	430	395824.697	812105.513	Stage 5	2360	Pitrun	Lift 4		Lot 982	97
24/02/2022	KB22/0080	2	431	395811.448	812104.845	Stage 5	2360	Pitrun	Lift 4		Lot 982	100
7/03/2022	KB22/0096	1	444	395868.786	812108.853	Stage 5	2360	Pitrun	Lift 3		Lot 992	98
7/03/2022	KB22/0096	2	445	395854.09	812107.851	Stage 5	2360	Pitrun	Lift 3		Lot 992	98
30/05/2022	0907_001 (0909/2	7	563	395811.448	812104.845	Stage 5	1560	Sand	Lift 1		Lot 982	102
30/05/2022	0907_001 (0909/2	8	564	395826.876	812088.246	Stage 5	1560	Sand	Lift 1		Lot 982	102
2/06/2022	1022_001 (0939/2	7	571	395811.448	812104.845	Stage 5	1640	Sand	Lift 2		Lot 982	100
2/06/2022	1022_001 (0939/2	8	572	395826.876	812088.246	Stage 5	1640	Sand	Lift 2		Lot 982	104
14/06/2022	1204_001 (1001/2	7	624	395811.448	812104.845	Stage 5	1640	Sand	Lift 3		Lot 982	98
14/06/2022	1204_001 (1001/2	8	625	395826.876	812088.246	Stage 5	1640	Sand	Lift 3		Lot 982	98
17/02/2022	1541_001 (1033/2	7	632	395811.448	812104.845	Stage 5	1640	Sand	Lift 4 (Final)		Lot 982	99
17/02/2022	1541_001 (1033/2	8	633	395826.876	812088.246	Stage 5	1640	Sand	Lift 4 (Final)		Lot 982	99

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Title Summary of Compaction

Test Date	Test ID#	Test #	Unique ID	mE	mN	Stage	MDD	Type	Lift #		Lot ID	Compaction (%)
1/10/2019	2421_19 (2454/19	5	666	395799.238	812144.694	Stage 5	2320	Pitrun	lift 3		Lot 1040	98
1/10/2019	2421_19 (2454/19	6	667	395810.003	812133.174	Stage 5	2320	Pitrun	lift 3		Lot 1040	99
1/10/2019	2421_19 (2454/19	7	668	395818.314	812134.352	Stage 5	2320	Pitrun	lift 3		Lot 1039	98
1/10/2019	2421_19 (2454/19	8	669	395826.407	812145.582	Stage 5	2320	Pitrun	lift 3		Lot 1039	101
1/10/2019	2421_19 (2454/19	9	670	395833.464	812146.491	Stage 5	2320	Pitrun	lift 3		Lot 1038	99
1/10/2019	2421_19 (2454/19	10	671	395844.631	812136.063	Stage 5	2320	Pitrun	lift 3		Lot 1038	99
1/10/2019	2421_19 (2454/19	11	672	395850.872	812136.802	Stage 5	2320	Pitrun	lift 3		Lot 1037	101
1/10/2019	2421_19 (2454/19	12	673	395860.56	812148.955	Stage 5	2320	Pitrun	lift 3		Lot 1037	100
1/10/2019	2421_19 (2454/19	13	674	395867.293	812149.283	Stage 5	2320	Pitrun	lift 3		Lot 1036	99
1/10/2019	2421_19 (2454/19	14	675	395879.362	812139.38	Stage 5	2320	Pitrun	lift 3		Lot 1036	99
1/10/2019	2421_19 (2454/19	15	676	395886.255	812139.38	Stage 5	2320	Pitrun	lift 3		Lot 1035	100
1/10/2019	2421_19 (2454/19	16	677	395894.564	812151.277	Stage 5	2320	Pitrun	lift 3		Lot 1035	101
1/10/2019	2421_19 (2454/19	17	678	395900.88	812152.609	Stage 5	2320	Pitrun	lift 3		Lot 1034	97
1/10/2019	2421_19 (2454/19	18	679	395912.117	812140.523	Stage 5	2320	Pitrun	lift 3		Lot 1034	97
27/07/2002	KB22/0286	1	823	396005.503	812142.316	Stage 5	2320	Pit Run	Lift 13		Lot 1030	98
27/07/2002	KB22/0286	2	824	396002.866	812161.695	Stage 5	2320	Pit Run	Lift 13		Lot 1030	98
20/01/2022	KB22/0012	1	875	396010.149	812109.322	Stage 5	2360	Pit Run	Lift 11 - Final	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		95
20/01/2022	KB22/0012	2	876	396007.881	812126.187	Stage 5	2360	Pit Run	Lift 11 - Final	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		98
20/01/2022	KB22/0012	3	877	396005.503	812142.316	Stage 5	2360	Pit Run	Lift 11 - Final	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		95
20/01/2022	KB22/0012	4	878	396002.866	812161.695	Stage 5	2360	Pit Run	Lift 11 - Final	Gravel embankment - From Lot 1028 to Lot 1030 in 15 m intervals		96
13/01/2022	KB22/0002	1	879	396002.866	812161.695	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		97
13/01/2022	KB22/0002	2	880	396003.439	812154.498	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		96
13/01/2022	KB22/0002	3	881	396005.503	812142.316	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	4	882	396007.881	812126.187	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	5	883	396010.149	812109.322	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		96
13/01/2022	KB22/0002	6	884	396014.613	812086.757	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	7	885	396016.628	812071.497	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	8	886	396018.075	812056.244	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	9	887	396020.367	812039.746	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	10	888	396022.528	812022.843	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		98
13/01/2022	KB22/0002	11	889	396026.729	812013.6	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		96
13/01/2022	KB22/0002	12	890	396029.526	811998.14	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0002	13	891	396026.287	811983.121	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		96
13/01/2022	KB22/0002	14	892	396018.63	811970.311	Stage 5	2380	Pit Run	Lift 10	Gravel embankment - From Lot 1030 to Lot 1020 in 15 m intervals		95
13/01/2022	KB22/0001	1	893	396002.735	812163.606	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	2	894	396003.439	812154.498	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	3	895	396005.856	812139.916	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	4	896	396007.881	812126.187	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		97
13/01/2022	KB22/0001	5	897	396010.149	812109.322	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	6	898	396014.613	812086.757	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	7	899	396016.628	812071.497	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	8	900	396018.075	812056.244	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	9	901	396020.367	812039.746	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		95
13/01/2022	KB22/0001	10	902	396022.528	812022.843	Stage 5	2380	Pit Run	Lift 9	Gravel embankment - From Lot 1030 to Lot 1023		98

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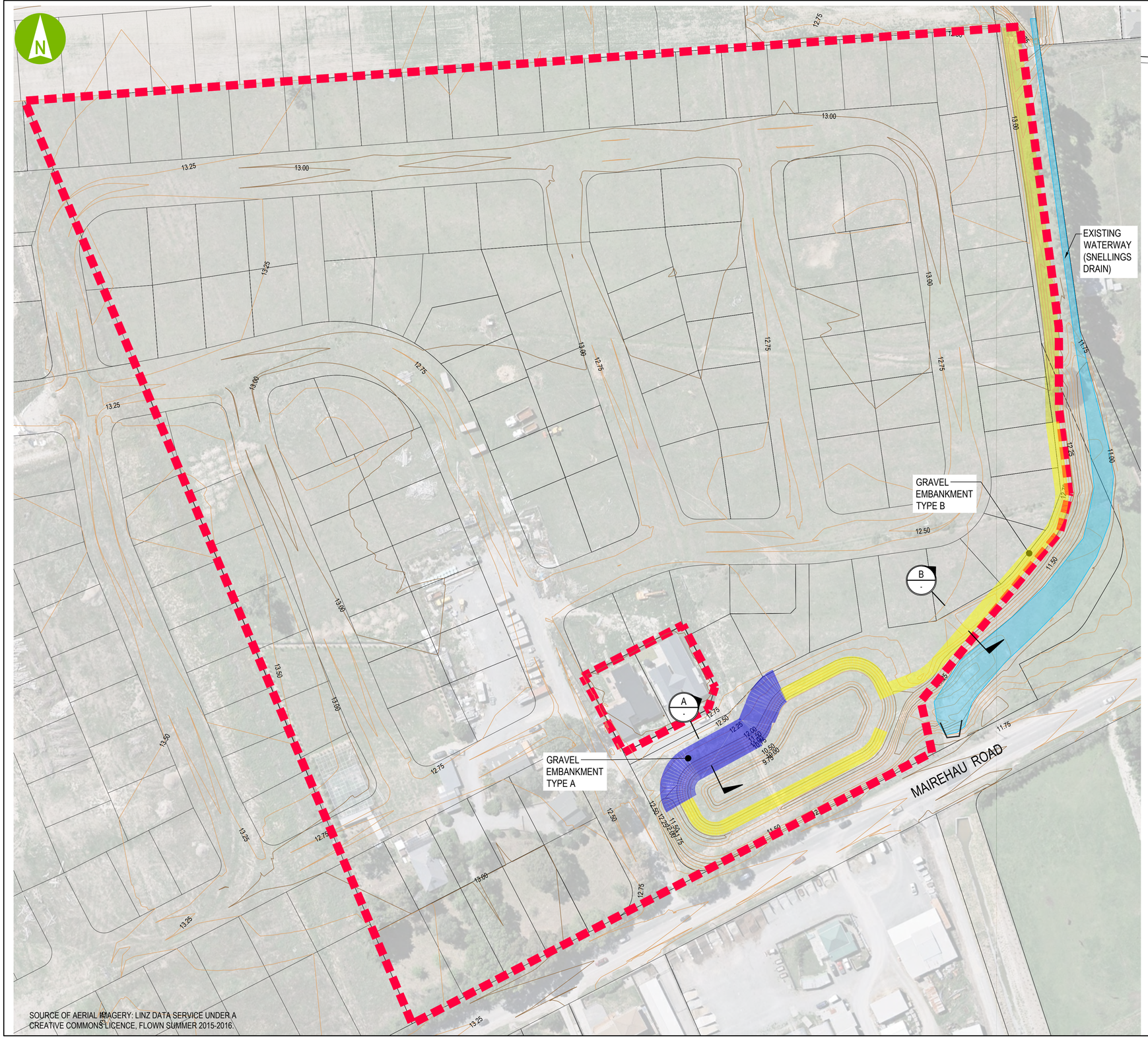
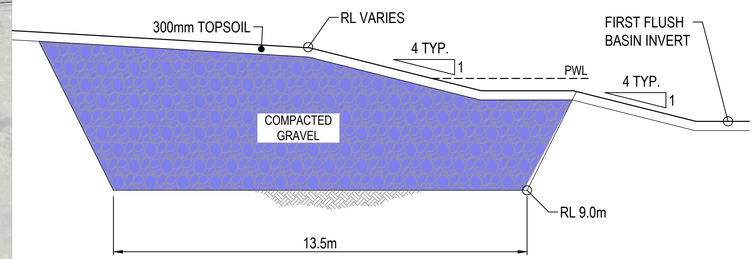
Title Summary of Compaction

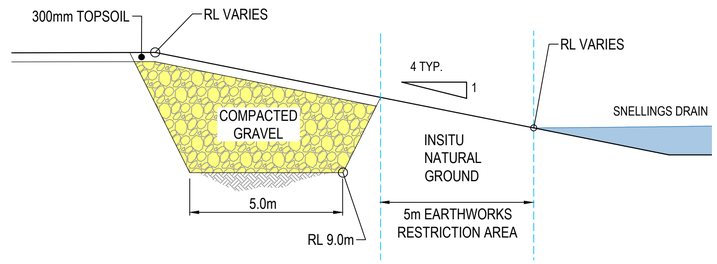
Test Date	Test ID#	Test #	Unique ID	mE	mN	Stage	MDD	Type	Lift #	Lot ID	Compaction (%)
6/09/2022	1480/22	5	907	395938.786	812094.369		1640	Sand	Lift 4	Lot 1004	99
6/09/2022	1480/22	6	908	395925.713	812109.725		1640	Sand	Lift 4	Lot 1004	96
8/09/2022	KB2/0366	1	909	395895.983	812097.66		2320	Pit Run	Lift 1	Lot 993	100
8/09/2022	KB2/0366	2	910	395882.001	812096.553		2320	Pit Run	Lift 1	Lot 993	102
8/09/2022	KB2/0366	3	911	395869.729	812095.245		2320	Pit Run	Lift 1	Lot 992	101
8/09/2022	KB2/0366	4	912	395855.143	812094.038		2320	Pit Run	Lift 1	Lot 992	99
9/09/2022	KB2/0369	1	913	395895.983	812097.66		2320	Pit Run	Lift 2	Lot 993	96
9/09/2022	KB2/0369	2	914	395882.001	812096.553		2320	Pit Run	Lift 2	Lot 993	98
9/09/2022	KB2/0369	3	915	395869.729	812095.245		2320	Pit Run	Lift 2	Lot 992	97
9/09/2022	KB2/0369	4	916	395855.143	812094.038		2320	Pit Run	Lift 2	Lot 992	97
6/09/2022	1480 (1480/22)	5	937	395927.704	812094.098		1640	Sand	Final Lift	Lot 1004	99
6/09/2022	1480 (1480/22)	6	938	395936.267	812110.445		1640	Sand	Final Lift	Lot 1004	96
13/09/2022	KB22/0375	1	939	395855.143	812094.038		2320	Pit Run	Lift 3	Lot 992	98
13/09/2022	KB22/0375	2	940	395869.729	812095.245		2320	Pit Run	Lift 3	Lot 992	97
13/09/2022	KB22/0375	3	941	395882.001	812096.553		2320	Pit Run	Lift 3	Lot 993	97
13/09/2022	KB22/0375	4	942	395895.983	812097.66		2320	Pit Run	Lift 3	Lot 993	97
13/09/2022	1515 (1515/22)	1	943	395854.09	812107.851		2320	Pit Run	Final Lift	Lot 992	98
13/09/2022	1515 (1515/22)	2	944	395869.729	812095.245		2320	Pit Run	Final Lift	Lot 992	96
13/09/2022	1515 (1515/22)	3	945	395882.001	812096.553		2320	Pit Run	Final Lift	Lot 993	96
13/09/2022	1515 (1515/22)	4	946	395894.06	812109.966		2320	Pit Run	Final Lift	Lot 993	96

Appendix D
Gravel Embankment Design and As-Builts





SECTION A : EMBANKMENT TYPE A
1:100



SECTION B : EMBANKMENT TYPE B
1:100

NOTES

1. NO EARTHWORKS OR WORKS ASSOCIATED WITH EARTHWORKS ARE TO BE UNDERTAKEN IN CCC LAND OR WITHIN 5m OF SNELLINGS DRAIN.
2. COMPACTED EMBANKMENT GRAVEL TO BE CCC APPROVED AP65 OR PIT RUN. COMPACTION TO BE COMPLETED TO 98% OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH NZS4402 TEST 4.1.3.
3. CUT SUBGRADE TO BE INSPECTED BY SUITABLY QUALIFIED GEOTECHNICAL ENGINEER.
4. ALL EXCAVATIONS TO BE CARRIED OUT IN ACCORDANCE WITH WORKSAFE AND CCC SAFE TRENCHING GUIDELINES.
5. INTERNAL BOUNDARIES ARE INDICATIVE ONLY AND ARE SUBJECT TO CHANGE. BOUNDARIES TO BE CONFIRMED AT TIME OF SUBDIVISION CONSENT.
6. FINAL TOPOGRAPHY OF THE DRAIN AND BASIN VARIES SIGNIFICANTLY ACROSS THE SITE. REFER TO CIVIL DESIGN MODEL FOR FINAL EARTHWORKS FINISHED LEVELS. THIS DRAWING IS TO BE USED FOR DIMENSIONS OF GRAVEL EMBANKMENT ONLY.

1 0 2 4m
SCALE 1:100

7.5 0 15 30m
SCALE 1:750

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CLIENT
CDL LAND NEW ZEALAND LIMITED

REV	DATE	REVISION DETAILS	APPROVED
1	06/09/19	ISSUE FOR CONSTRUCTION	K ASHBY
0	27/08/19	ISSUE FOR CONSTRUCTION	K ASHBY

DRAWN	DESIGNED
J W-K	K FOOTE

CHECKED: R DAVIES
APPROVED: *K ASHBY* DATE 27/08/19
K ASHBY

PROJECT: PRESTONS PARK
TITLE: STAGE 5 EARTHWORKS GRAVEL EMBANKMENT DETAILS

CONSTRUCTION
PROJECT No.: 235361
SCALE: 1:750
SIZE: A1
DRAWING No.: PS-S5-EW-05
REV: 1

10 0 20 40m
SCALE 1:1000

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CLIENT
CDL LAND
NEW ZEALAND LIMITED

REV	DATE	REVISION DETAILS	APPROVED
A	20/10/22	AS BUILT ISSUE	

DRAWN	DESIGNED
A. COLUMBUS	M. CROWE

CHECKED

APPROVED
DATE

PROJECT
PRESTONS PARK

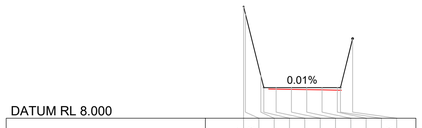
TITLE
STAGE 5
GRAVEL EMBANKMENT
AS BUILT PLAN

AS BUILT

PROJECT No.
235361

SCALE	SIZE
1:1000(m)	A1

DRAWING No.	REV
LD-PS-S5-EW-12	A



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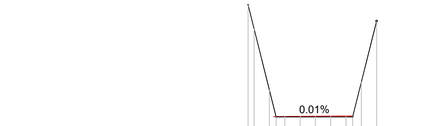
DESIGN	11.644	11.400	9.400	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600						
GRAVEL EMBANKMENT SUBGRADE					8.951	8.944	8.936	8.928	8.918	8.916										
OFFSET	-7.122	-7.000	-6.000	-5.800	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000									

CHAINAGE 60

DATUM RL 8.000																				
DESIGN											11.648	11.400	9.400	9.000	9.000	9.000	9.000	9.000	9.000	10.600
GRAVEL EMBANKMENT SUBGRADE									8.993	8.991	8.988	8.986	8.983	8.982	8.981					
OFFSET	-7.124	-7.000	-6.000	-5.800	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000									

CHAINAGE 140



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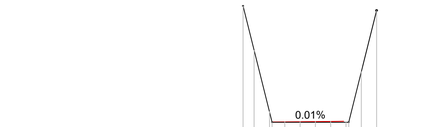
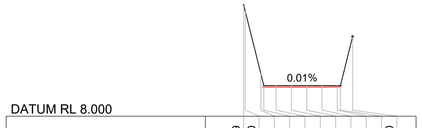
DESIGN	12.658	11.871	9.871	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.129	12.129					
GRAVEL EMBANKMENT SUBGRADE				9.012	9.014	9.017	9.020	9.024	9.027											
OFFSET	-8.393	-8.000	-7.000	-6.565	-6.000	-5.000	-4.000	-3.000	-2.000	-1.565	-1.000	0.000								

CHAINAGE 220



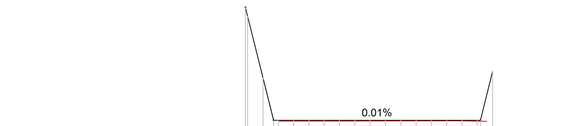
DATUM RL 8.000																				
DESIGN	12.799	11.348	9.348	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.652	12.652							
GRAVEL EMBANKMENT SUBGRADE					9.014	9.020	9.025	9.031												
OFFSET	-8.725	-8.000	-7.000	-6.826	-6.000	-5.000	-4.000	-3.000	-2.000	-1.826	-1.000	0.000								

CHAINAGE 300



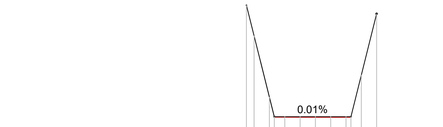
DATUM RL 8.000																				
DESIGN	11.629	11.400	9.400	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600								
GRAVEL EMBANKMENT SUBGRADE				8.954	8.953	8.953	8.952	8.951	8.957	8.959										
OFFSET	-7.114	-7.000	-6.000	-5.800	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000									

CHAINAGE 40



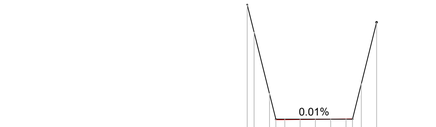
DATUM RL 8.000																				
DESIGN	12.688	12.401	10.401	9.001	9.001	9.001	9.001	9.001	9.001	9.001	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600
GRAVEL EMBANKMENT SUBGRADE						8.975	8.976	8.976	8.976	8.977	8.978	8.979	8.979	8.980	8.981	8.982	8.979	8.970	8.969	
OFFSET	-16.143	-16.000	-15.000	-14.300	-14.000	-13.000	-12.000	-11.000	-10.000	-9.000	-8.000	-7.000	-6.000	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000

CHAINAGE 120



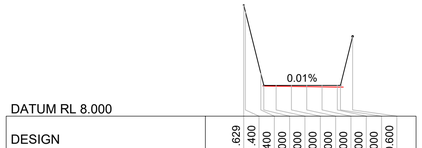
DATUM RL 8.000																				
DESIGN	12.641	11.638	9.638	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.362	12.362							
GRAVEL EMBANKMENT SUBGRADE					8.996	8.988	8.986	8.985	8.985											
OFFSET	-8.501	-8.000	-7.000	-6.681	-6.000	-5.000	-4.000	-3.000	-2.000	-1.681	-1.000	0.000								

CHAINAGE 200



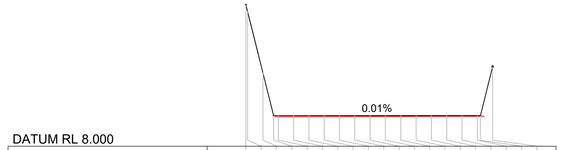
DATUM RL 8.000																				
DESIGN	12.737	11.840	9.840	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.160	12.160							
GRAVEL EMBANKMENT SUBGRADE				8.982	8.984	8.990	8.996	9.001	9.007	9.009										
OFFSET	-8.448	-8.000	-7.000	-6.580	-6.000	-5.000	-4.000	-3.000	-2.000	-1.580	-1.000	0.000								

CHAINAGE 280



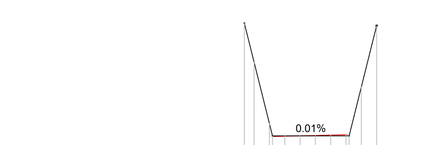
DATUM RL 8.000																				
DESIGN	11.629	11.400	9.400	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600								
GRAVEL EMBANKMENT SUBGRADE				8.981	8.976	8.969	8.962	8.955	8.948	8.946										
OFFSET	-7.114	-7.000	-6.000	-5.800	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000									

CHAINAGE 20



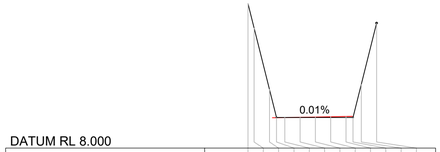
DATUM RL 8.000																				
DESIGN	12.621	12.401	10.401	9.001	9.001	9.001	9.001	9.001	9.001	9.001	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600
GRAVEL EMBANKMENT SUBGRADE						8.963	8.964	8.966	8.967	8.969	8.971	8.972	8.974	8.975	8.977	8.978	8.980	8.981	8.981	
OFFSET	-16.110	-16.000	-15.000	-14.300	-14.000	-13.000	-12.000	-11.000	-10.000	-9.000	-8.000	-7.000	-6.000	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000

CHAINAGE 100



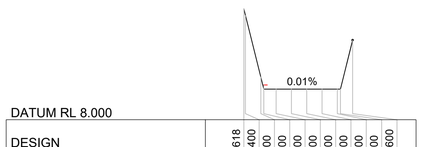
DATUM RL 8.000																				
DESIGN	12.678	11.405	9.405	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.595	12.595							
GRAVEL EMBANKMENT SUBGRADE					8.989	9.001	9.013	9.024	9.036											
OFFSET	-8.637	-8.000	-7.000	-6.798	-6.000	-5.000	-4.000	-3.000	-2.000	-1.798	-1.000	0.000								

CHAINAGE 180



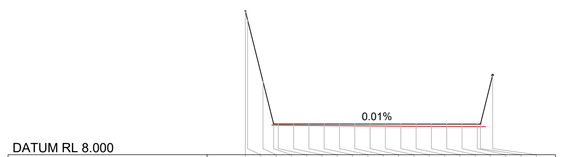
DATUM RL 8.000																				
DESIGN	12.719	11.919	9.919	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.082	12.082							
GRAVEL EMBANKMENT SUBGRADE				8.993	8.998	9.007	9.015	9.025	9.035											
OFFSET	-8.400	-8.000	-7.000	-6.541	-6.000	-5.000	-4.000	-3.000	-2.000	-1.541	-1.000	0.000								

CHAINAGE 260



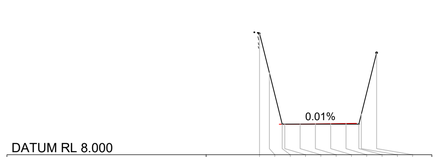
DATUM RL 8.000																				
DESIGN	11.618	11.400	9.400	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600								
GRAVEL EMBANKMENT SUBGRADE				9.134																
OFFSET	-7.109	-7.000	-6.000	-5.800	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000									

CHAINAGE 0



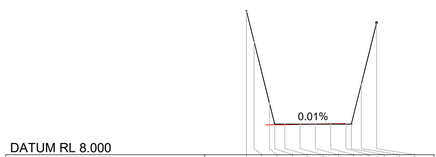
DATUM RL 8.000																				
DESIGN	12.690	12.401	10.401	9.001	9.001	9.001	9.001	9.001	9.001	9.001	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.600
GRAVEL EMBANKMENT SUBGRADE					8.963	8.962	8.958	8.954	8.951	8.947	8.943	8.940	8.936	8.932	8.929	8.927	8.925	8.922	8.920	
OFFSET	-16.145	-16.000	-15.000	-14.300	-14.000	-13.000	-12.000	-11.000	-10.000	-9.000	-8.000	-7.000	-6.000	-5.000	-4.000	-3.000	-2.000	-1.000	-0.800	0.000

CHAINAGE 80



DATUM RL 8.000																				
DESIGN	11.961	10.671	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.329	11.329								
GRAVEL EMBANKMENT SUBGRADE				8.995	8.995	8.999	9.005	9.013	9.020											
OFFSET	-7.645	-7.000	-6.164	-6.000	-5.000	-4.000	-3.000	-2.000	-1.164	-1.000	0.000									

CHAINAGE 160



DATUM RL 8.000																				
DESIGN	12.695	11.692	9.692	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.309	12.309								
GRAVEL EMBANKMENT SUBGRADE			8.976	8.977	8.980	8.989	8.999	9.008												
OFFSET	-8.502	-8.000	-7.000	-6.654	-6.000	-5.000	-4.000	-3.000	-2.000	-1.654	-1.000	0.000								

CHAINAGE 240

2 0 4 8m

SCALE 1:200

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CLIENT

CDL LAND
NEW ZEALAND LIMITED

REV	DATE	REVISION DETAILS	APPROVED
A	20/10/22	AS BUILT ISSUE	

DRAWN	DESIGNED
A. COLUMBUS	M. CROWE

CHECKED

APPROVED

DATE

PROJECT

PRESTONS PARK

TITLE

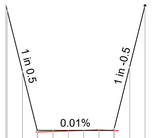
STAGE 5 GRAVEL EMBANKMENT
AS BUILT CROSS SECTION
SHEET 1 OF 2

AS BUILT

PROJECT No.
235361

SCALE	SIZE
1:200(m)	A1

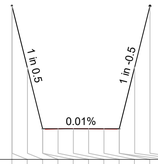
DRAWING No.	REV
LD-PS-S5-EW-13	A



DATUM RL 8.000

DESIGN	13.088	12.931	10.931	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.069	11.069	13.069	
GRAVEL EMBANKMENT SUBGRADE				8.945	8.946	8.963	8.981	8.998	9.012	8.995	8.995				
OFFSET	-9.079	-9.000	-8.000	-7.035	-7.000	-6.000	-5.000	-4.000	-3.000	-2.035	-2.000	-1.000	0.000		

CHAINAGE 380



DATUM RL 8.000

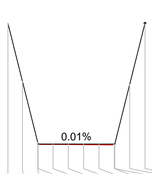
DESIGN	13.015	12.992	10.992	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.008	11.008	13.008		
GRAVEL EMBANKMENT SUBGRADE					8.997	9.000	8.997	8.993							
OFFSET	-9.012	-9.000	-8.000	-7.004	-7.000	-6.000	-5.000	-4.000	-3.000	-2.004	-2.000	-1.000	0.000		

CHAINAGE 360

DATUM RL 8.000

DESIGN	13.242	12.750	10.750	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.251	11.251	13.251		
GRAVEL EMBANKMENT SUBGRADE															
OFFSET	-9.246	-9.000	-8.000	-7.125	-7.000	-6.000	-5.000	-4.000	-3.000	-2.125	-2.000	-1.000	0.000		

CHAINAGE 439.739



DATUM RL 8.000

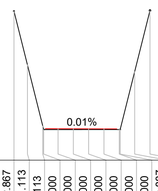
DESIGN	12.942	11.053	9.053	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.948	12.948		
GRAVEL EMBANKMENT SUBGRADE					8.987	8.985	8.981	8.977							
OFFSET	-8.945	-8.000	-7.000	-6.974	-6.000	-5.000	-4.000	-3.000	-2.000	-1.974	-1.000	0.000			

CHAINAGE 340

DATUM RL 8.000

DESIGN	13.191	12.810	10.810	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.191	11.191	13.191	
GRAVEL EMBANKMENT SUBGRADE				8.995	8.996	9.001	9.006	9.011	9.016						
OFFSET	-9.191	-9.000	-8.000	-7.095	-7.000	-6.000	-5.000	-4.000	-3.000	-2.095	-2.000	-1.000	0.000		

CHAINAGE 420



DATUM RL 8.000

DESIGN	12.867	11.113	9.113	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	10.887	12.887		
GRAVEL EMBANKMENT SUBGRADE					9.027	9.025	9.024	9.022							
OFFSET	-8.877	-8.000	-7.000	-6.943	-6.000	-5.000	-4.000	-3.000	-2.000	-1.943	-1.000	0.000			

CHAINAGE 320

DATUM RL 8.000

DESIGN	13.139	12.870	10.870	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.000	9.130	11.130	13.130	
GRAVEL EMBANKMENT SUBGRADE				8.981	8.982	8.992	9.002	9.008	9.012	9.016	9.017				
OFFSET	-9.134	-9.000	-8.000	-7.065	-7.000	-6.000	-5.000	-4.000	-3.000	-2.065	-2.000	-1.000	0.000		

CHAINAGE 400

2 0 4 8m

SCALE 1:200

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CLIENT

CDL LAND
NEW ZEALAND LIMITED

REV	DATE	REVISION DETAILS	APPROVED
A	20/10/22	AS BUILT ISSUE	

DRAWN	DESIGNED
A. COLUMBUS	M. CROWE

CHECKED

APPROVED

DATE

PROJECT

PRESTONS PARK

TITLE

STAGE 5 GRAVEL EMBANKMENT
AS BUILT CROSS SECTION
SHEET 2 OF 2

TENDER

PROJECT No.
235361

SCALE	SIZE
1:200(m)	A1

DRAWING No.	REV
LD-PS-S5-EW-14	A

Appendix E
Post Earthworks CPT Testing

CONE PENETRATION TEST (CPT) REPORT

Client: Aurecon NZ Ltd

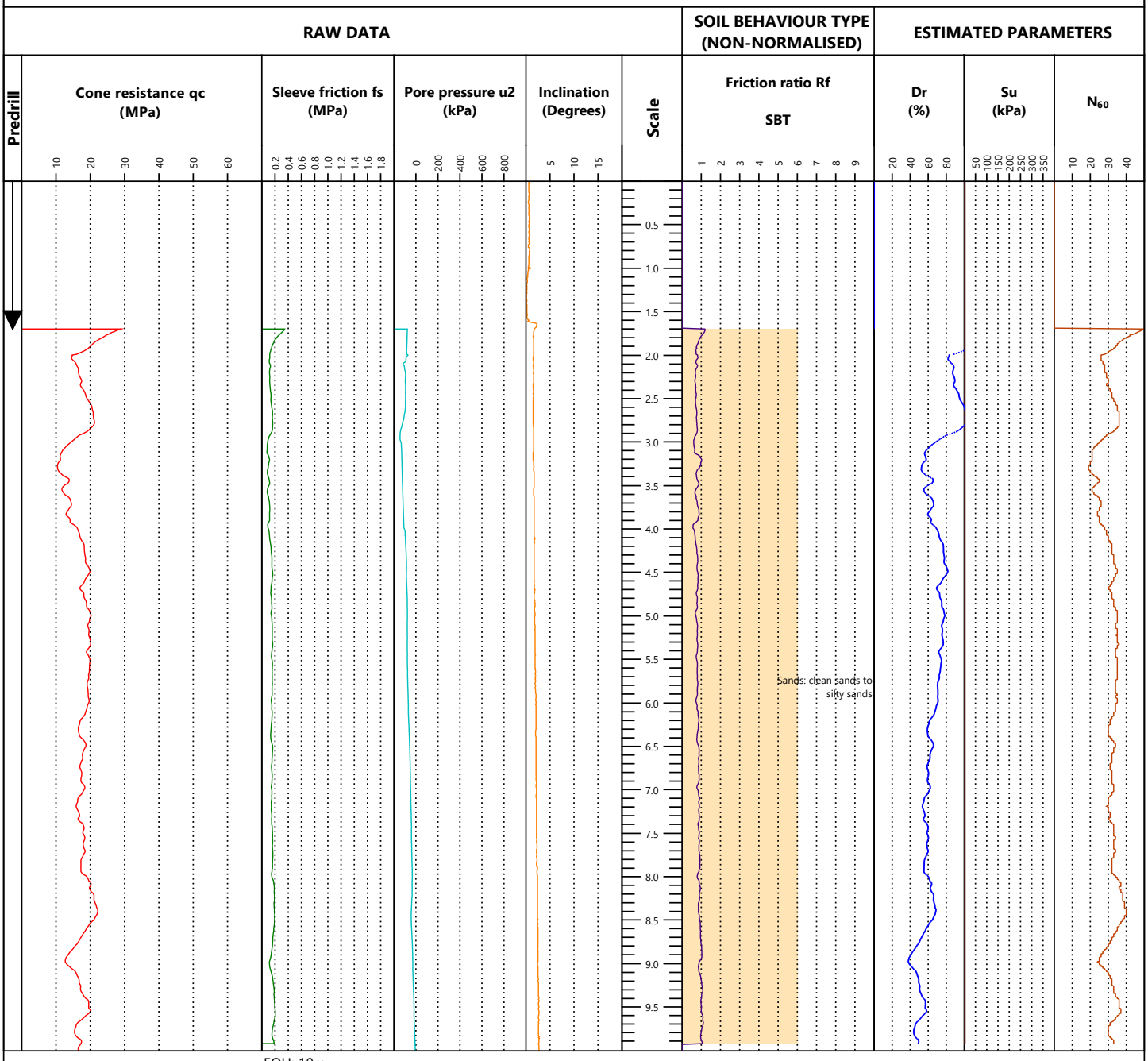
Location: Prestons Park, Christchurch

Printed: 09/05/2022

McMILLAN Drilling

Client: Aurecon NZ Ltd	**Bore No.:** CPTu301
Project: Prestons Park, Christchurch	**Job No.:** 20882

Site Location: Prestons Park, Christchurch
Date: 6/5/2022
Grid Reference: 1573724.73m E, 5185683.38m N (NZTM) - Map or aerial photograph
Rig Operator: B. Wilson
Elevation: 0.00m
Datum: Ground
Equipment: Geomil Panther 100



Cone Type: I-CFXYP20-10 - Compression
Cone Reference: 100992
Cone Area Ratio: 0.75
Standards: ISO 22476-1:2012

Predrill: 1.70m
Water Level: -
Collapse: 2.2m

Termination
Target Depth ✓
Effective Refusal
Tip
Gauge
Inclinometer
Other

Zero load outputs (MPa)	Before test	After test
Tip Resistance	0.9252	0.8986
Local Friction	0.0266	0.0265
Pore Pressure	0.0146	0.0130

Soil Behaviour Type (SBT) - Robertson et al. 1986

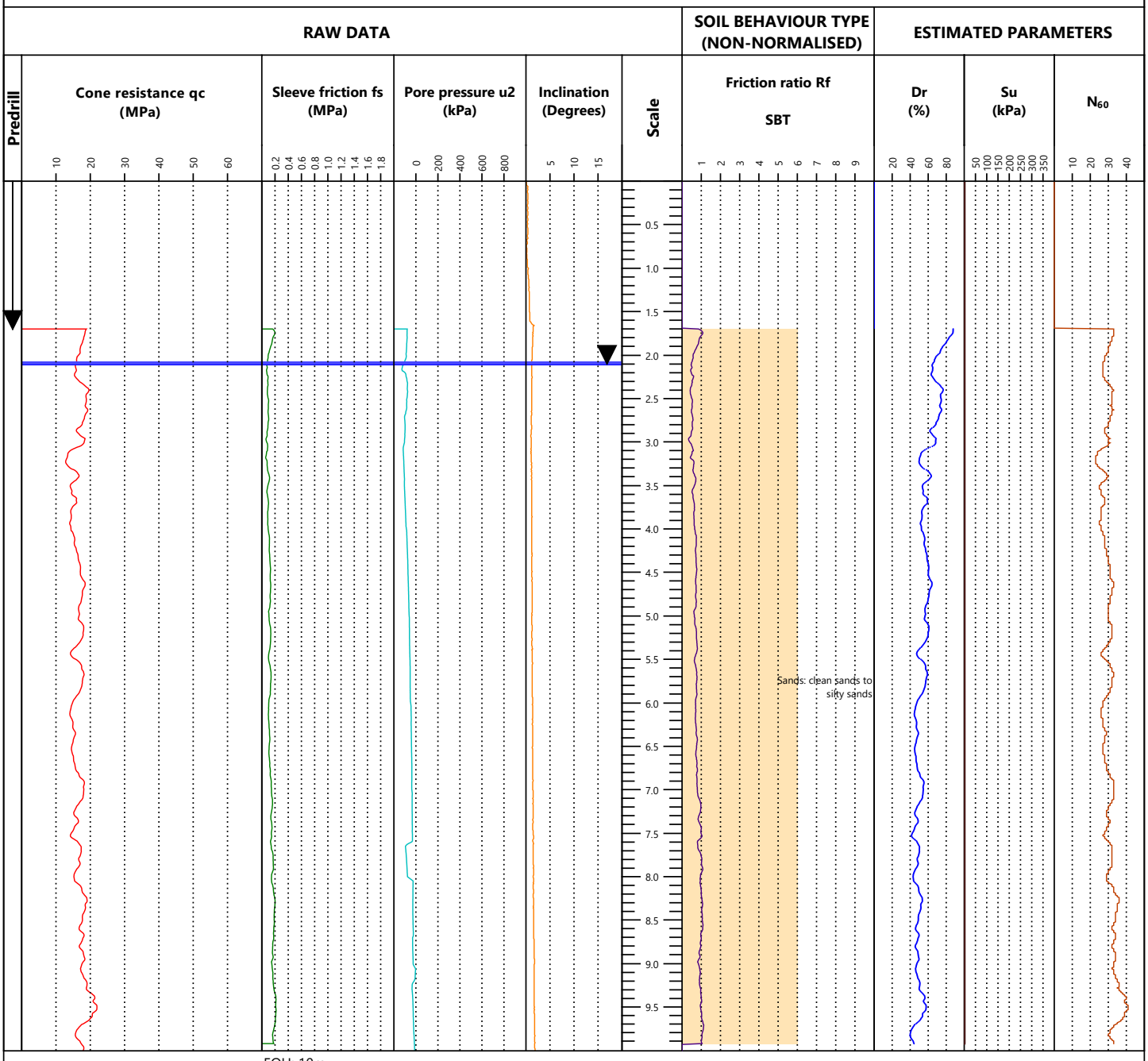
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Notes & Limitations
Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P. K. Robertson and K.L. Cabal, Guide to Cone Penetration Testing for Geotechnical Engineering. The interpretations are presented only as a guide for geotechnical use, and should be carefully reviewed by the user. No warranty is provided as to the correctness or the applicability of any of the geotechnical soil and design parameters shown and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Remarks

McMILLAN Drilling	Client: Aurecon NZ Ltd	Bore No.: CPTu302
	Project: Prestons Park, Christchurch	Job No.: 20882

Site Location: Prestons Park, Christchurch
Date: 6/5/2022
Grid Reference: 1573767m E, 5185686.4m N (NZTM) - Map or aerial photograph
Rig Operator: B. Wilson
Elevation: 0.00m
Datum: Ground
Equipment: Geomil Panther 100



Cone Type: I-CFXYP20-10 - Compression
Cone Reference: 100992
Cone Area Ratio: 0.75
Standards: ISO 22476-1:2012

Predrill: 1.70m
Water Level: 2.10m
Collapse: 2.2m

Zero load outputs (MPa)	Before test	After test
Tip Resistance	0.9258	0.9206
Local Friction	0.0286	0.0272
Pore Pressure	0.0180	0.0157

Termination

Target Depth ✓

Effective Refusal

Tip
Gauge
Inclinometer
Other

Soil Behaviour Type (SBT) - Robertson et al. 1986

0 Undefined
1 Sensitive fine-grained
2 Clay - organic soil
3 Clays: clay to silty clay
4 Silt mixtures: clayey silt & silty clay
5 Sand mixtures: silty sand to sandy silt
6 Sands: clean sands to silty sands
7 Dense sand to gravelly sand
8 Stiff sand to clayey sand
9 Stiff fine-grained

Notes & Limitations

Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P. K. Robertson and K.L. Cabal, Guide to Cone Penetration Testing for Geotechnical Engineering. The interpretations are presented only as a guide for geotechnical use, and should be carefully reviewed by the user. No warranty is provided as to the correctness or the applicability of any of the geotechnical soil and design parameters shown and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

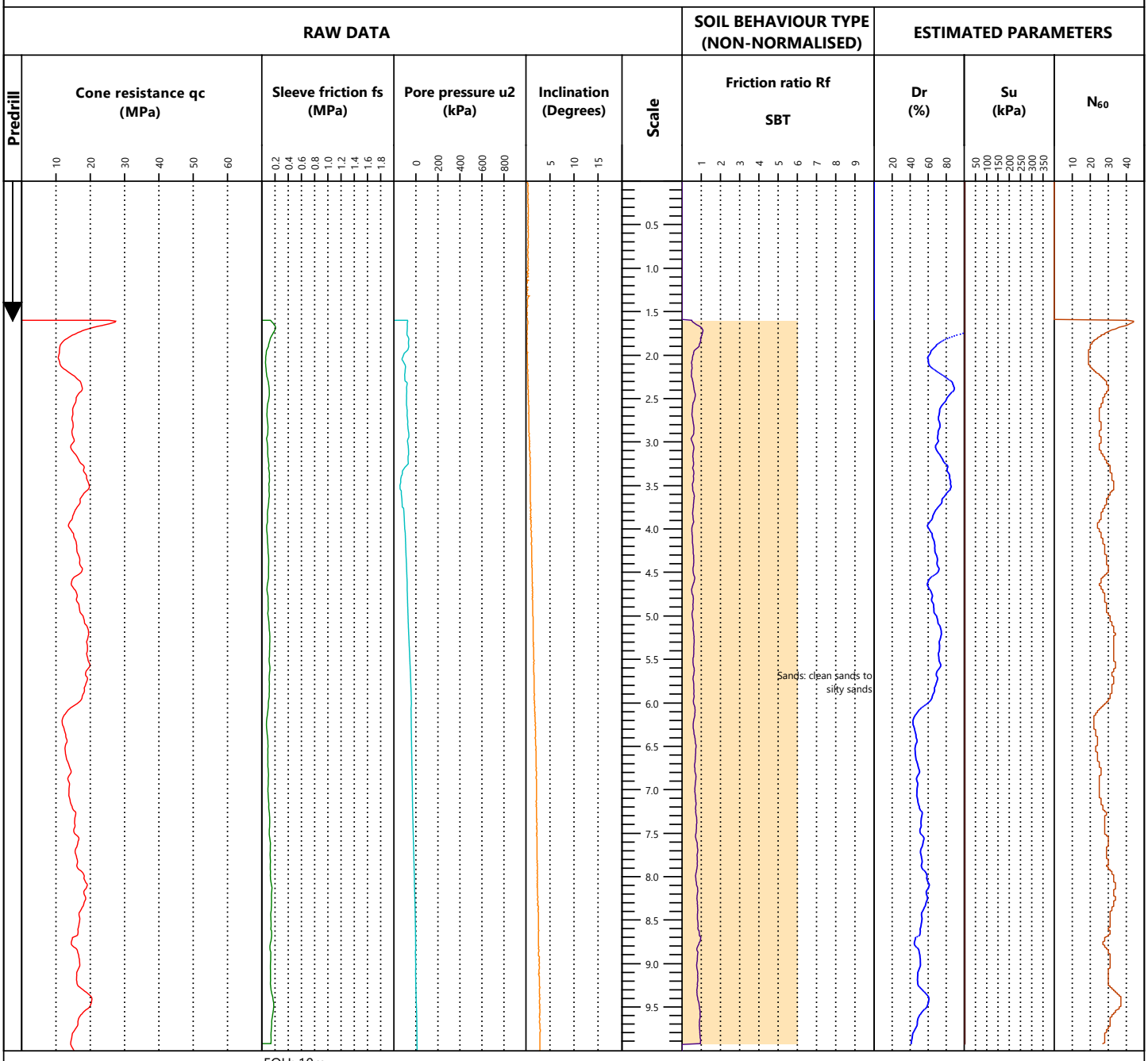
Remarks

McMILLAN Drilling	Client: Aurecon NZ Ltd	Bore No.: CPTu303
	Project: Prestons Park, Christchurch	Job No.: 20882

Site Location: Prestons Park, Christchurch **Date:** 6/5/2022

Grid Reference: 1573806.15m E, 5185696.46m N (NZTM) - Map or aerial photograph **Rig Operator:** B. Wilson

Elevation: 0.00m **Datum:** Ground **Equipment:** Geomil Panther 100



Cone Type: I-CFXYP20-10 - Compression
Cone Reference: 111007
Cone Area Ratio: 0.75
Standards: ISO 22476-1:2012

Predrill: 1.60m
Water Level: -
Collapse: 2.05m

Termination

Target Depth ☑

Effective Refusal

Tip ☐
Gauge ☐
Inclinometer ☐
Other ☐

Zero load outputs (MPa)	Before test	After test
Tip Resistance	0.1578	0.1308
Local Friction	0.0047	0.0049
Pore Pressure	-0.0074	-0.0116

Soil Behaviour Type (SBT) - Robertson et al. 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Notes & Limitations

Data shown on this report has been assessed to provide a basic interpretation in terms of Soil Behaviour Type (SBT) and various geotechnical soil and design parameters using methods published in P. K. Robertson and K.L. Cabal, Guide to Cone Penetration Testing for Geotechnical Engineering. The interpretations are presented only as a guide for geotechnical use, and should be carefully reviewed by the user. No warranty is provided as to the correctness or the applicability of any of the geotechnical soil and design parameters shown and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used to derive data shown in this report.

Remarks

TEST DETAIL

PointID: CPTu301
Sounding: 1

Operator: B. Wilson
Cone Type: I-CFXYP20-10 - Compression
Cone Reference: 100992
Cone Area Ratio: 0.75

Date: 6/5/2022
Predrill: 1.70m
Water Level: -
Collapse: 2.2m

Termination

Target Depth ☑

Effective Refusal

Tip ☐
Gauge ☐
Inclinometer ☐
Other ☐

Zero load outputs (MPa)	Before test	After test
Tip Resistance	0.9252	0.8986
Local Friction	0.0266	0.0265
Pore Pressure	0.0146	0.0130

PointID: CPTu302
Sounding: 2

Operator: B. Wilson
Cone Type: I-CFXYP20-10 - Compression
Cone Reference: 100992
Cone Area Ratio: 0.75

Date: 6/5/2022
Predrill: 1.70m
Water Level: 2.10m
Collapse: 2.2m

Termination

Target Depth ☑

Effective Refusal

Tip ☐
Gauge ☐
Inclinometer ☐
Other ☐

Zero load outputs (MPa)	Before test	After test
Tip Resistance	0.9258	0.9206
Local Friction	0.0286	0.0272
Pore Pressure	0.0180	0.0157

PointID: CPTu303
Sounding: 3

Operator: B. Wilson
Cone Type: I-CFXYP20-10 - Compression
Cone Reference: 111007
Cone Area Ratio: 0.75

Date: 6/5/2022
Predrill: 1.60m
Water Level: -
Collapse: 2.05m

Termination

Target Depth ☑

Effective Refusal

Tip ☐
Gauge ☐
Inclinometer ☐
Other ☐

Zero load outputs (MPa)	Before test	After test
Tip Resistance	0.1578	0.1308
Local Friction	0.0047	0.0049
Pore Pressure	-0.0074	-0.0116

CPT CALIBRATION AND TECHNICAL NOTES

These notes describe the technical specifications and associated calibration references pertaining to the following cone types:

- I-CFXY-10 measuring cone resistance, sleeve friction and inclination (standard cone, 10cm²);
- I-CFXY-15 measuring cone resistance, sleeve friction and inclination (standard cone, 15cm²);
- I-CFXYP20-10 measuring cone resistance, sleeve friction, inclination and pore pressure (piezocone, 10cm²);
- I-CFXYP100-10 measuring cone resistance, sleeve friction, inclination and high range pore pressure (piezocone, 10cm²);
- I-C2xFXYP100-10 measuring cone resistance, high range sleeve friction, inclination and high range pore pressure (piezocone, 10cm²);
- I-C5F0p15XYP20-10 measuring sensitive cone resistance, sleeve friction, inclination and pore pressure (piezocone, 10cm²).
- I-CFXYP20-15 measuring cone resistance, sleeve friction, inclination and pore pressure (piezocone, 15cm²);

Dimensions

Dimensional specifications for all cone types are detailed below. All tolerances are routinely checked prior to testing and measurements taken are electronically recorded. All records are kept on file and available on request.

A.P. van den Berg Machinefabriek

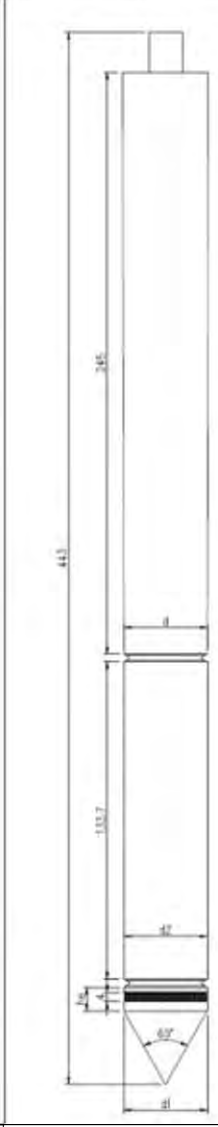
tel.: +31 (0)513-631355
info@apvandenberg.com

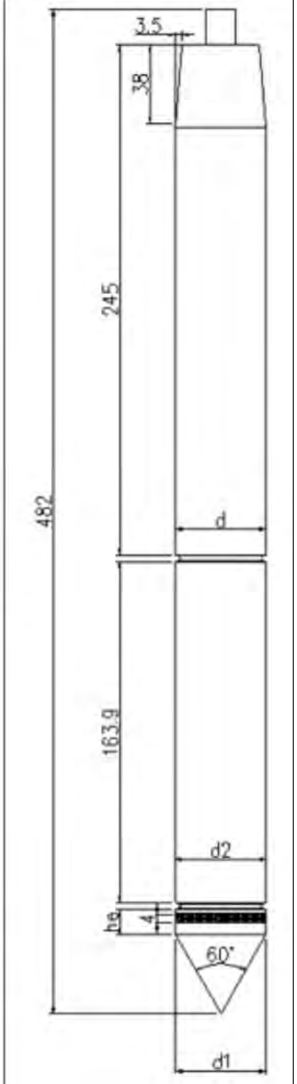
DEVIATION of Straightness + MINIMUM Dimensions tip, friction jacket, cone adapter

Standards:

EN ISO 22476-1
APB-standard

Type of cone:	Icone 10 cm²	Icone 15 cm²
ALLOWABLE SIZE VARIATION		
Diameter of tip:	35,3 ≤ d1 ≤ 36,0	43,2 ≤ d_1 ≤ 44,1
Diameter of centering ring CFP	35,3 ≤ d1 ≤ 36,0	43,2 ≤ d_1 ≤ 44,1
Diameter of friction jacket:	$d_1 \le d_2 < d_1 + 0{,}35$	$d_1 \le d_2 < d_1 + 0{,}43$
Height dimension of tip edge:	$7 \le h_e \le 10$	$9 \le h_e \le 12$
PRODUCTION DIMENSIONS		
Tip:	$d_1 = 35{,}7\ ^{+0,2}_{0}$	$d_1 = 43{,}8\ ^{+0,2}_{0}$
Jacket (C-cone):	$d_2 = 35{,}7\ ^{+0,2}_{0}$	$d_2 = 43{,}7\ ^{+0,2}_{0}$
Friction jacket (CF-cone):	$d_2 = 35{,}9\ ^{+0,1}_{0}$	$d_2 = 44{,}0\ ^{+0,1}_{0}$
Tip for used cone:	$d_1 = 35{,}5\ ^{+0,1}_{0}$	$d_1 = 43{,}5\ ^{+0,1}_{0}$
MINIMUM DIMENSIONS		
Minimum diameter jacket (C-cone):	d_2 = 35,2 (APB standard)	d_2 = 43,0 (APB standard)
Minimum diameter friction jacket (CF-cone):	d_2 = 35,3	d_2 = 43,2
Use "used cone"-tip when friction jacket diameter:	$d_2 \le 35{,}65$	$d_2 \le 43{,}7$
Minimum diameter of cone adaptor:	d = 35,3	d = 43,8
Maximum deviation of straightness:	1 mm on a length of 1000 mm (max. oscillation 1,0 mm.)	1 mm on a length of 1000 mm (max. oscillation: 2.0 mm)

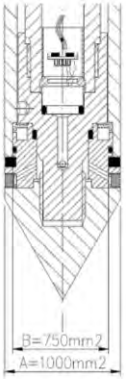




Tip and Local Friction sensor displacement

The different distances of the sensors are compensated depending on the cone types:

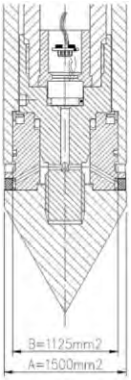
- 10cm² cones: 80mm
- 15cm² cones: 100mm



Cone area ratio

α = B / A = 0.75

β = 1 - B / A = 0.25



McMILLAN Drilling

CPT CALIBRATION AND TECHNICAL NOTES

Calibration

Each cone has a unique identification number that is electronically recorded and reported for each CPT test. The identification number enables the operator to compare 'zero-load offsets' to manufacturer calibrated zero-load offsets.

The recommended maximum zero-load offset for each sensor is determined as ± 5% of the nominal measuring range.

In addition to maximum zero-load offsets, the difference in zero load offset before and after the test is limited as ± 2% of the maximum measuring range. See table below:

	Tip (MPa)		Friction (MPa)			Pore Pressure (MPa)	
Maximum Measuring Range:	150	15 *	1.50	0.3 *	3 **	3	15 ***
Nominal Measuring Range:	75	7.5 *	1.00	0.15 *	1 **	2	10 ***
Max. 'zero-load offset':	7.5	0.75 *	0.10	0.015 *	0.1 **	0.2	1 ***
Max 'before and after test':	3	0.3 *	0.03	0.006 *	0.06 **	0.06	0.3 ***

***** I-C5F0p15XYP20-10 ("sensitive")
** I-C2xFXYP100-10 (high range friction and pore water pressure sensors)
******* I-CFXYP100-10 (high range pore water pressure sensor)

Note: The zero offsets are electronically recorded and reported for each test in the same units as that of each sensor.

Calibration Certificate

CALIBRATION RvA K 176

a.p. van den berg

1.1 General

Probe number:	100992
Probe type:	I-CFXYP20-10
Description:	Tip 75 MPa Sleeve 1.00 MPa Inclinometer 20° Pore 2MPa
Part number:	0100277B
Certificate number:	100992-2
Manufacturer:	A.P. van den Berg, Heerenveen (NL)
Calibration lab.:	A.P. van den Berg Ingenieursburo, IJzerweg 4, 8445 PK, Heerenveen (NL) RvA accredited laboratory according to ISO/IEC 17025:2017
Location of calibration:	Heerenveen (NL)
Client:	McMillan Drilling Ltd 120 High Street SOUTHBRIDGE, CANTERBURY New Zealand

1.2 Calibration equipment

Reference measuring equipment:

DAQ MX238B 0177FD	March 2021 (HBM: 92591)
DAQ MX440B 0182F3	March 2021 (HBM: 92778)
Loadcell 100kN H54435	August 2020 (HBM: 86959 2020-07)
Loadcell 20kN D16200	July 2020 (HBM: 86871 2020-07)
Sensor 20 Bar 240310140	Sept 2020 (ZMK: 02-1194 2020-09)
ACS-080-SC00-HE2-PM 12/17 2321909	April 2021 (Trescal: 2103-24007)
Temperature logger: 620-2326 SN:170800101	March 2021 (AVANTOR 219001540)

1.3 Laboratory conditions:

Ambient temperature: 23.8 ± 2 °C

1.4 Measurement uncertainty

The expanded combined uncertainty (k=2) of the sensor at laboratory conditions was analysed according to ISO/IEC Guide 98-3:2008 and is based on the standard uncertainty of the measurement multiplied by a coverage factor k, such that the coverage probability corresponds to approximately 95%. The results of the measurement uncertainty analysis of the different parameters are as listed below:

Cone resistance	5,6 + 0,165%	(kPa)
Sleeve friction	0,17 + 0,105%	(kPa)
Pore Pressure 2 MPa sensor	4,16 + 0,037%	(kPa)
Inclination	0,42	(degrees)

1.5 Standard and method of calibration

EN ISO 22476-1 2012 Class 2

1.6 Results

The probe complies with the requirements of the above-mentioned standard and indicated calibration class. The calibrated sensors compiy if the measured deviations over the nominal measuring range are within the accuracy limits of the standard (decision rule). The deviations and standard limits are shown in graphs in the Calibration Report.

Calibrated by:	D.Bisschops
Calibration Date:	23 November 2021
Signature:	
QA Manager:	N.R.E. de Jong
Date:	23 November 2021
Signature:	
Expiration date according to EN ISO 22476-1:	24 May 2022

1.7 Remarks

The calibration results only relate to the probe identified in this certificate. This new calibration certificate replaces all previously issued certificates for this probe. The calibration certificate documents the traceability to national and international standards, which realize the units of measurement according to the International System of Units (SI). This calibration certificate may not be reproduced other than in full and except with permission of the issuing laboratory. Calibration certificates without signature are not valid.

McMILLAN Drilling

Calibration Certificate

CALIBRATION RvA K 176

a.p. van den berg

1.1 General

Probe number:	111007
Probe type:	I-CFXYP20-10
Description:	Tip 75 MPa Sleeve 1.00 MPa Inclinometer 20° Pore 2MPa
Part number:	0100277B
Certificate number:	111007-5
Manufacturer:	A.P. van den Berg, Heerenveen (NL)
Calibration lab.:	A.P. van den Berg Ingenieursburo, IJzerweg 4, 8445 PK, Heerenveen (NL) RvA accredited laboratory according to ISO/IEC 17025:2017
Location of calibration:	Heerenveen (NL)
Client:	McMillan Drilling Ltd 120 High Street SOUTHBRIDGE, CANTERBURY New Zealand

1.2 Calibration equipment

Reference measuring equipment:

DAQ MX238B 00E80F	Aug 2021 (HBM: 96998 2021-08)
DAQ MX440B 00FCAB	Aug 2021 (HBM: 97005 2021-08)
Loadcell 100kN 201330120	August 2021 (HBM: 96532 2021-08)
Loadcell 20kN 210230193	Aug 2021 (HBM: 96418 2021-08)
Sensor 20 Bar 240310135	Sept 2020 (ZKM: 02-1193 2020-09)
ACS-080-SC00-HP2-PM 02/18 2610439	April 2021 (Trescal: 2103-24005)
Temperature logger: 620-2326 SN: 170800285	June 2021 (AVANTOR: 219003177)

1.3 Laboratory conditions:

Ambient temperature: 22.5 ± 2 °C

1.4 Measurement uncertainty

The expanded combined uncertainty (k=2) of the sensor at laboratory conditions was analysed according to ISO/IEC Guide 98-3:2008 and is based on the standard uncertainty of the measurement multiplied by a coverage factor k, such that the coverage probability corresponds to approximately 95%. The results of the measurement uncertainty analysis of the different parameters are as listed below:

Cone resistance	5,6 + 0,165%	(kPa)
Sleeve friction	0,17 + 0,105%	(kPa)
Pore Pressure 2 MPa sensor	4,16 + 0,037%	(kPa)
Inclination	0,42	(degrees)

1.5 Standard and method of calibration

EN ISO 22476-1 2012 Class 2

1.6 Results

The probe complies with the requirements of the above-mentioned standard and indicated calibration class. The calibrated sensors comply if the measured deviations over the nominal measuring range are within the accuracy limits of the standard (decision rule). The deviations and standard limits are shown in graphs in the Calibration Report.

Calibrated by:	D. Bisschops
Calibration Date:	22 February 2022
Signature:	
QA Manager:	N.R.E. de Jong
Date:	22 February 2022
Signature:	
Expiration date according to EN ISO 22476-1:	23 August 2022

1.7 Remarks

The calibration results only relate to the probe identified in this certificate. This new calibration certificate replaces all previously issued certificates for this probe. The calibration certificate documents the traceability to national and international standards, which realize the units of measurement according to the International System of Units (SI). This calibration certificate may not be reproduced other than in full and except with permission of the issuing laboratory. Calibration certificates without signature are not valid.

McMILLAN Drilling

Document prepared by

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aurecon

Bringing ideas to life

Aurecon offices are located in:
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