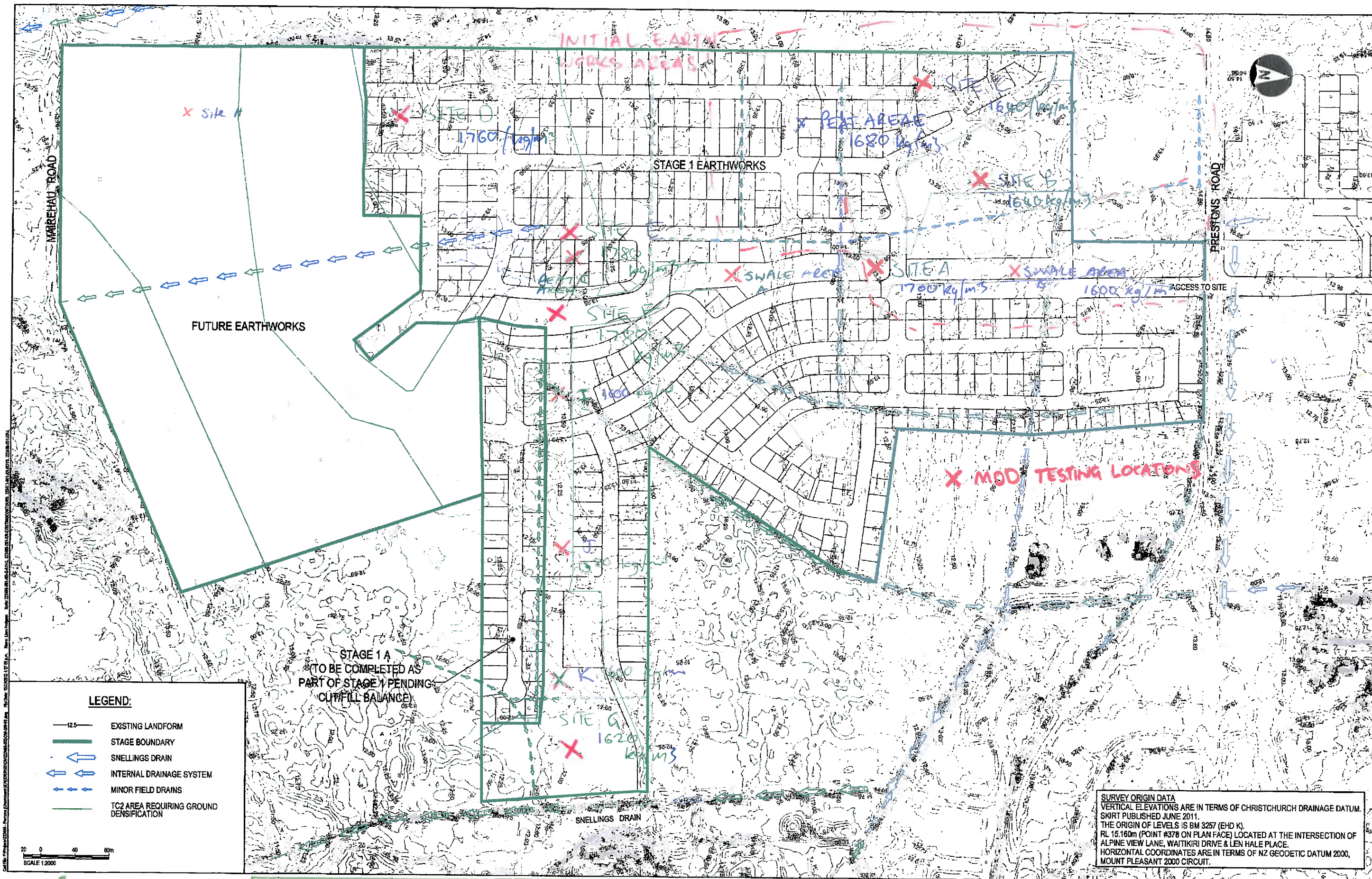




# Appendix G

## Compaction Curves

Master copy



**aurecon**  
www.aurecongroup.com



1 09/10/19 FOR CONSTRUCTION

KASHBY

APPROVED	DATE
L'SULLIVAN	09/10/19
CHECKED	
W NEL	
APPROVED	
KASHBY	
KASHBY	

PRESTONS SOUTH  
EARTHWORKS STAGE 1  
EXISTING LANDFORM

CONSTRUCTION	PROJECT No	235361
	SCALE	1:2000 @ A1
	DRAWING No	LD-PS-S1-EW-01
	REV	1



### Test Report

**Client:** K.B. Contracting & Quarries Limited  
**Address:** PO Box 19746, Woolston, Christchurch 8241  
**Client Ref:** Not Advised  
**Job Location:** New Quarry  
**Material:** Pit run  
**Material Source:** KB's Quarries McLeans Island

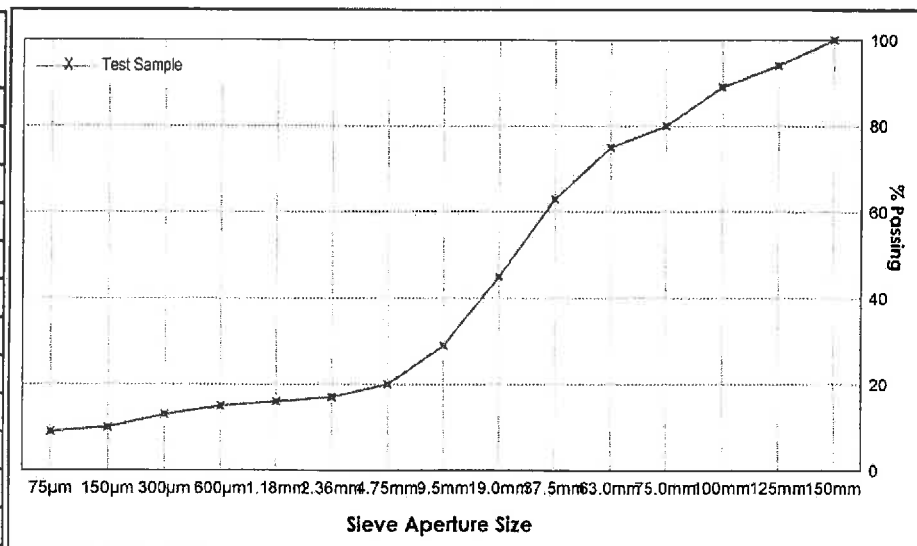
**Sample Date:** 11-Oct-2013 11:00  
**Sampled By:** Declan McGowan  
**Laboratory No:** C13/2221  
**Report No:** 158619  
**Report Date:** 18-Oct-2013  
**Replacement**  
Page 1 of 1

This report supersedes and replaces Report No: 158610

**Test Methods:** 1 The Particle-Size Distribution - Preferred Method by Wet Sieving

NZS 4407:1991 Test 3.8.1

Sieve Size (BSS)	Percent passing	Specification
125mm	94	
100mm	89	
75.0mm	80	
63.0mm	75	
37.5mm	63	
19.0mm	45	
9.5mm	29	
4.75mm	20	
2.36mm	17	
1.18mm	16	
600µm	15	
300µm	13	
150µm	10	
75µm	9	



Test Date:

14/10/2013

#### Notes

Test results apply to sample as received.  
Percent passing finest sieve obtained by difference.  
Sample received in a damp condition.  
Date of sample receipt: 11-Oct-13

Craig Kelly  
Approved Signatory  
Laboratory Technician  
IANZ Accreditation No: 439  
Date of Issue: 10/04/92

*C. Kelly*

**IANZ**  
ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.

**Report No: MDD:CAN14S-12828**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



*Max Burford*

Approved Signatory: Max Burford  
(Supervisor)

IANZ Accreditation No:200

Date of Issue: 25/06/14

### Sample Details

**Sample ID:** CAN14S-12828

**Material:** Pit Run

**Site/Sampled From:** KB's McLeans Island Quarry

**Specification:** No Specification (Coarse)

**Sampling Method:** Stated to be NZS 4407:1991 2.4.6.2.1

**Technician:** Greg Orr

**Client Sample ID:** Lab Ref 1381/14

**Sample Source:** Field Sample [Taken From Site]

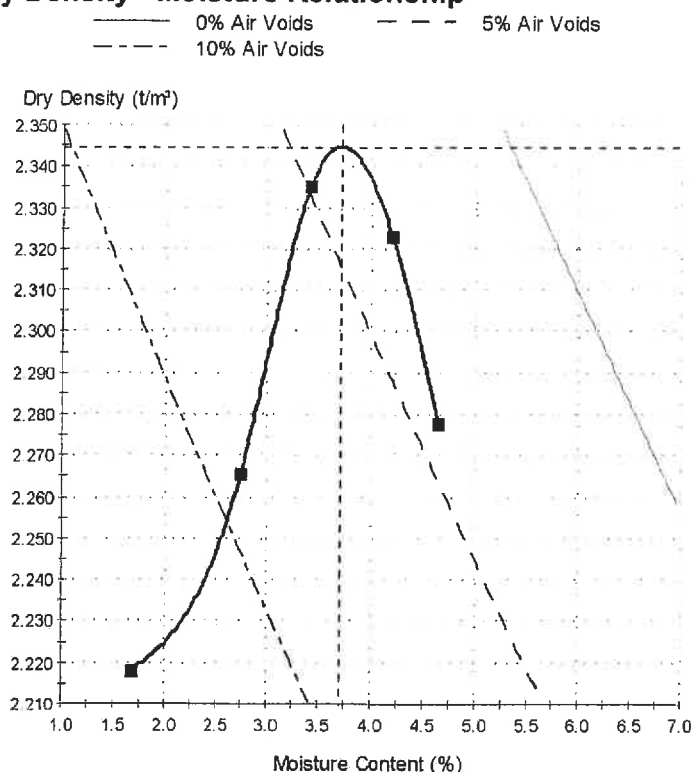
**Date Sampled:** 20/06/2014

**Sampled By:** Advised - See Comments

**Date Tested:** 25/06/2014

**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

\_\_\_\_ NZS 4402:1986 Test 4.1.3 - 1986 \_\_\_\_

**Maximum Dry Density (t/m³):** 2.34

**Optimum Moisture Content (%):** 3.8

**Solid Density (t/m³):** 2.68 assumed

**Fraction Tested Passes (mm):** 37.5

**Material Removed (%):** 12

**Sample History:** Natural

### Comments

Sampled by C Gould

### Test Report

**Client:** K.B. Contracting & Quarries Limited  
**Address:** PO Box 19746, Woolston, Christchurch 8241  
**Client Ref:** Not Advised  
**Job Location:** New Quarry  
**Material:** Pit run  
**Material Source:** KB's Quarries McLeans Island

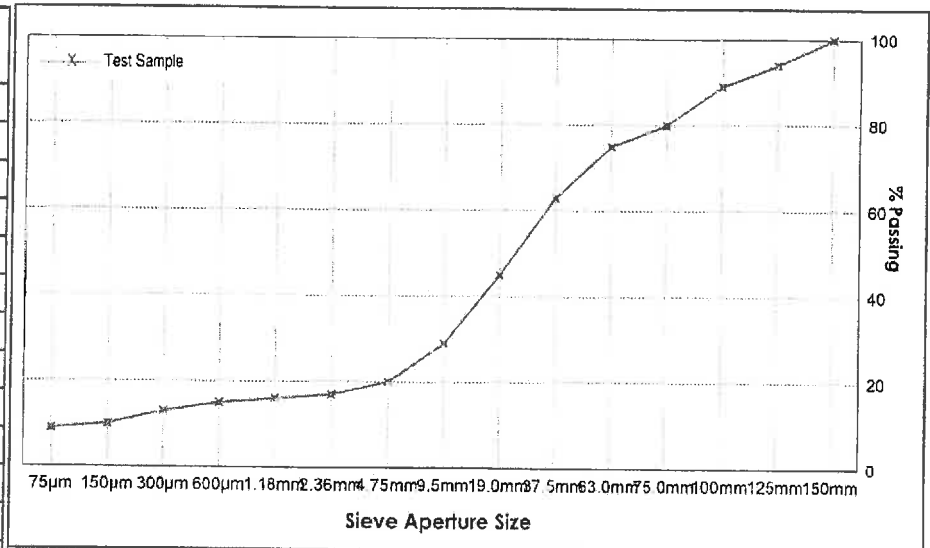
**Sample Date:** 11-Oct-2013 11:00  
**Sampled By:** Declan McGowan  
**Laboratory No:** C13/2221  
**Report No:** 158619  
**Report Date:** 18-Oct-2013  
**Replacement**  
Page 1 of 1

This report supersedes and replaces Report No: 158610

**Test Methods:** 1 The Particle-Size Distribution - Preferred Method by Wet Sieving

NZS 4407:1991 Test 3.8.1

Sieve Size (BSS)	Percent passing	Specification
125mm	94	
100mm	89	
75.0mm	80	
63.0mm	75	
37.5mm	63	
19.0mm	45	
9.5mm	29	
4.75mm	20	
2.36mm	17	
1.18mm	16	
600µm	15	
300µm	13	
150µm	10	
75µm	9	



Test Date:

14/10/2013

#### Notes

Test results apply to sample as received.  
Percent passing finest sieve obtained by difference.  
Sample received in a damp condition.  
Date of sample receipt: 11-Oct-13

Craig Kelly  
Approved Signatory  
Laboratory Technician  
IANZ Accreditation No: 439  
Date of Issue: 10/04/92

*C. Kelly*

**IANZ**  
ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.

**Report No: MDD:CAN14S-12828**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test(s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



*Max Burford*  
**Approved Signatory: Max Burford**  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 25/06/14

### Sample Details

**Sample ID:** CAN14S-12828

**Material:** Pit Run

**Site/Sampled From:** KB's McLeans Island Quarry

**Specification:** No Specification (Coarse)

**Sampling Method:** Stated to be NZS 4407:1991 2.4.6.2.1

**Technician:** Greg Orr

**Client Sample ID:** Lab Ref 1381/14

**Sample Source:** Field Sample [Taken From Site]

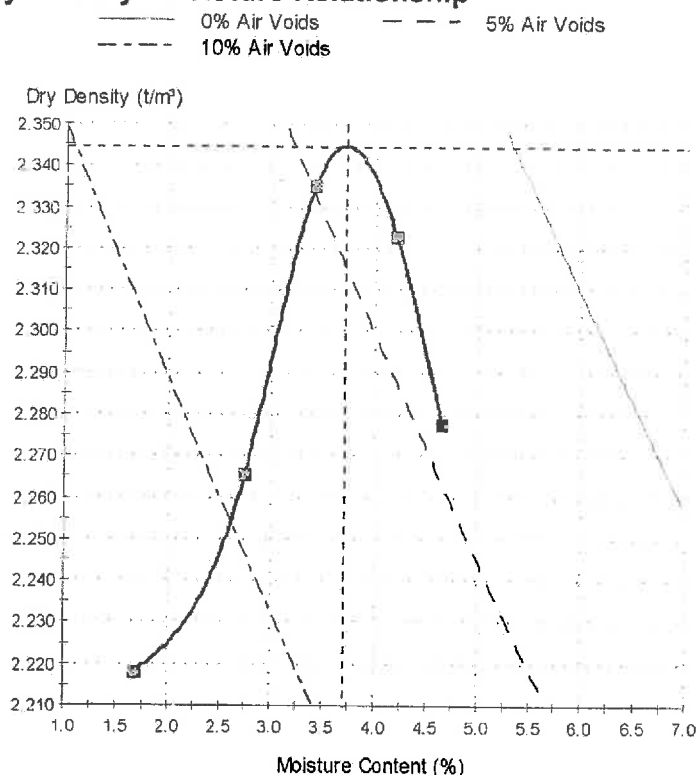
**Date Sampled:** 20/06/2014

**Sampled By:** Advised - See Comments

**Date Tested:** 25/06/2014

**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986

**Maximum Dry Density (t/m³):** 2.34

**Optimum Moisture Content (%):** 3.8

**Solid Density (t/m³):** 2.68 assumed

**Fraction Tested Passes (mm):** 37.5

**Material Removed (%):** 12

**Sample History:** Natural

### Comments

Sampled by C Gould

**Report No: MDD:CAN14S-11472**
**Issue No: 1**

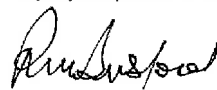
## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 03/06/14

### Sample Details

**Sample ID:** CAN14S-11472

**Material:** Pit Run

**Site/Sampled From:** KB Quarry Scalped over 53mm

**Specification:** No Specification

**Sampling Method:** Stated to be NZS 4407:1991 2.4.6.2.2

**Technician:** Greg Orr

**Client Sample ID:** 953081

**Sample Source:** Miscellaneous Material Source

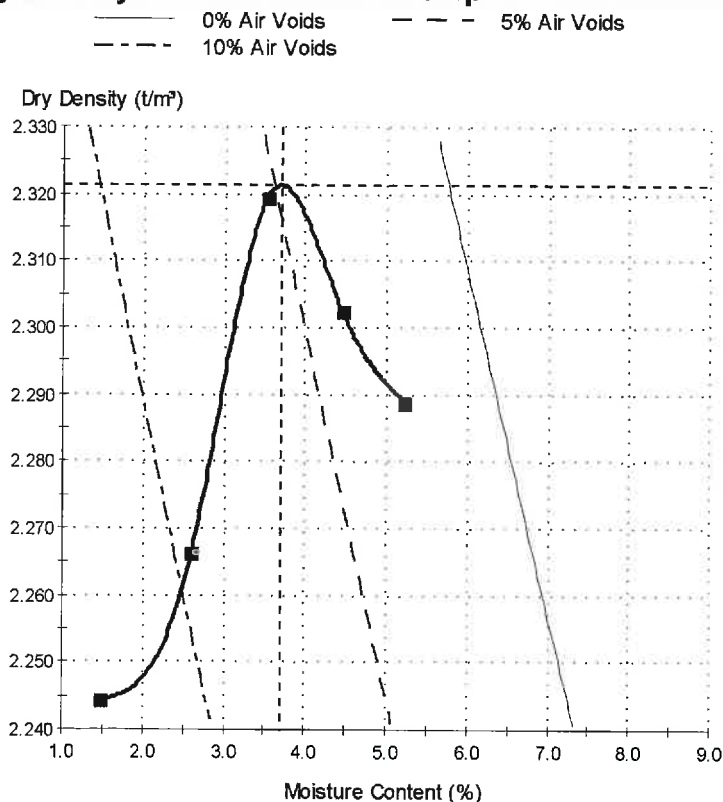
**Date Sampled:** 29/05/2014

**Sampled By:** Advised - See Comments

**Date Tested:** 03/06/2014

**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

\_\_\_\_NZS 4402:1986 Test 4.1.3 - 1986\_\_\_\_

**Maximum Dry Density (t/m³):** 2.32  
**Optimum Moisture Content (%):** 3.6  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 14  
**Sample History:** Natural

### Comments

Sampled by Toni O'Regan

# PIT RUN - MCLEANS ISLAND



Canterbury Laboratory

325 Pound Rd, Yaldhurst, Christchurch

PO Box 16-064, Christchurch 8441

Telephone: +64 3 349 9142

Facsimile: +64 3 349 9143

www.fultonhogan.com

0800 LABORATORY

Report No: MDD:CAN14S-12828

Issue No: 1

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



*Max Burford*

Approved Signatory: Max Burford  
(Supervisor)

IANZ Accreditation No:200

Date of Issue: 25/06/14

### Sample Details

**Sample ID:** CAN14S-12828

**Material:** Pit Run

**Site/Sampled From:** KB's McLeans Island Quarry

**Specification:** No Specification (Coarse)

**Sampling Method:** Stated to be NZS 4407:1991 2.4.6.2.1

**Technician:** Greg Orr

**Client Sample ID:** Lab Ref 1381/14

**Sample Source:** Field Sample [Taken From Site]

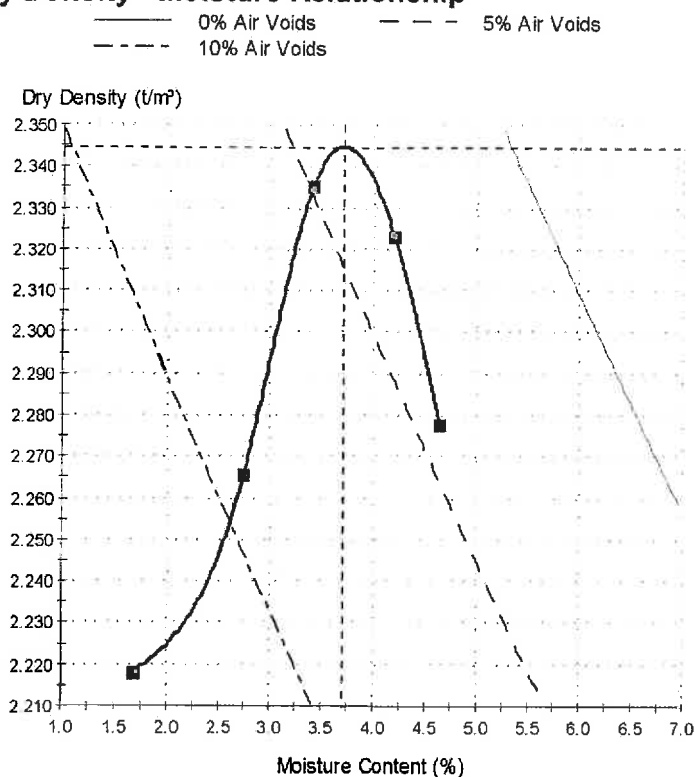
**Date Sampled:** 20/06/2014

**Sampled By:** Advised - See Comments

**Date Tested:** 25/06/2014

**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

————— NZS 4402:1986 Test 4.1.3 - 1986 —————

**Maximum Dry Density ( $t/m^3$ ):** 2.34

**Optimum Moisture Content (%):** 3.8

**Solid Density ( $t/m^3$ ):** 2.68 assumed

**Fraction Tested Passes (mm):** 37.5

**Material Removed (%):** 12

**Sample History:** Natural

### Comments

Sampled by C Gould



## Test Report

**Client:** K.B. Contracting & Quarries Limited  
**Address:** PO Box 19746, Woolston, Christchurch 8241  
**Client Ref:** Not Advised  
**Job Location:** New Quarry  
**Material:** Pit run  
**Material Source:** KB's Quarries McLeans Island

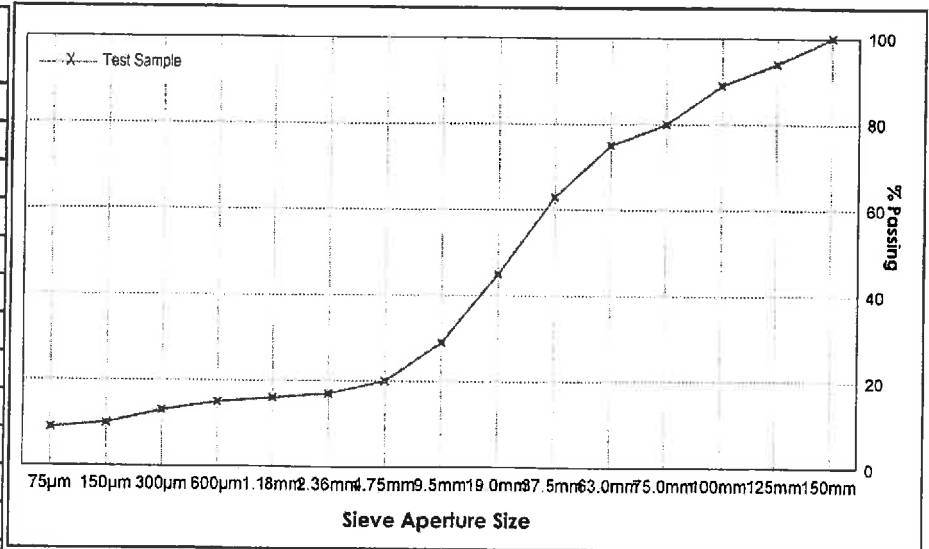
**Sample Date:** 11-Oct-2013 11:00  
**Sampled By:** Declan McGowan  
**Laboratory No:** C13/2221  
**Report No:** 158619  
**Report Date:** 18-Oct-2013  
**Replacement**  
Page 1 of 1

This report supersedes and replaces Report No: 158610

**Test Methods:** 1 The Particle-Size Distribution - Preferred Method by Wet Sieving

NZS 4407:1991 Test 3.8.1

Sieve Size (BSS)	Percent passing	Specification
125mm	94	
100mm	89	
75.0mm	80	
63.0mm	75	
37.5mm	63	
19.0mm	45	
9.5mm	29	
4.75mm	20	
2.36mm	17	
1.18mm	16	
600µm	15	
300µm	13	
150µm	10	
75µm	9	



Test Date:

14/10/2013

### Notes

Test results apply to sample as received.  
Percent passing finest sieve obtained by difference.  
Sample received in a damp condition.  
Date of sample receipt: 11-Oct-13

Craig Kelly  
Approved Signatory  
Laboratory Technician  
IANZ Accreditation No: 439  
Date of Issue: 10/04/92

*C. Kelly*

**IANZ**  
ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full.



**Fulton Hogan**

PITRUN FOR GRAVEL  
EMBANKMENTS

Canterbury Laboratory

325 Pound Rd, Yaldhurst, Christchurch  
PO Box 16-064, Christchurch 8441  
Telephone: +64 3 349 9142  
Facsimile: +64 3 349 9143  
www.fultonhogan.com  
0800 LABORATORY

Report No: MDD:CAN14S-11472

Issue No: 1

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



*Max Burford*

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No: 200  
Date of Issue: 03/06/14

### Sample Details

**Sample ID:** CAN14S-11472

**Material:** Pit Run

**Site/Sampled From:** KB Quarry Scalped over 53mm

**Specification:** No Specification

**Sampling Method:** Stated to be NZS 4407:1991 2.4.6.2.2

**Technician:** Greg Orr

**Client Sample ID:** 953081

**Sample Source:** Miscellaneous Material Source

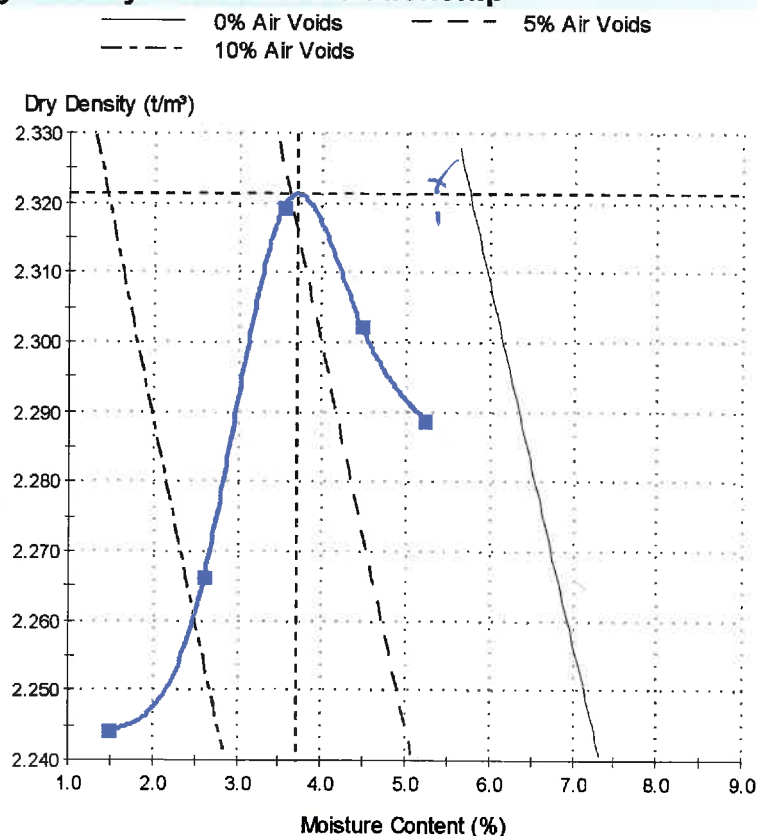
**Date Sampled:** 29/05/2014

**Sampled By:** Advised - See Comments

**Date Tested:** 03/06/2014

**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986

**Maximum Dry Density (t/m³):** 2.32

**Optimum Moisture Content (%):** 3.6

**Solid Density (t/m³):** 2.68 assumed

**Fraction Tested Passes (mm):** 37.5

**Material Removed (%):** 14

**Sample History:** Natural

### Comments

Sampled by Toni O'Regan

REF ID: A66000

Lab Reference: (1601, 114)  
(Test Number / Year)

(Test Number / Year)

EX

Material: PIT RUN MCLUANS ISLAND Gauge Used: 65636  
Location: CDL PRESTONS WEST SIDE LIFT II  
Client: KBS Contact Name: A HODGSON  
Tested By: L.S Date of Test: 11-7-14 Count Time: Fast (Normal) Slow

Familiar with City Care Health and Safety Plan: ☒

1. All Worksites                      7. Laboratory                      30. All Vehicles and Plant                      4. Office Work

(Eliminate / Isolate / Minimise) Any Site Specific Hazards and controls taken? (Sign into site, working plant, traffic etc.)

## PLATEAU TEST

Target Density: 2340 Lab Ref: \_\_\_\_\_ Date of Issue: \_\_\_\_\_

Moisture Standard: 693

Density Standard: 2313

[illegible]

Notes:

PIT RUN - MINORS  
QUARRY

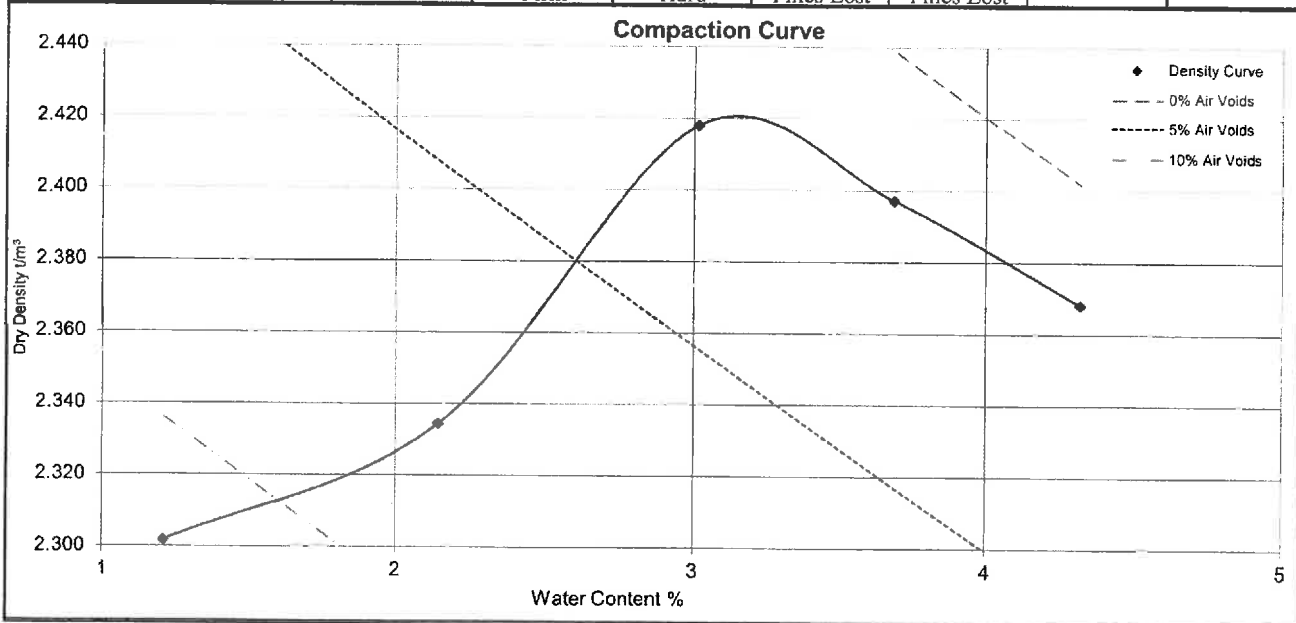
**DRY DENSITY / WATER CONTENT RELATIONSHIP  
VIBRATING COMPACTION**



Project : Quality Assurance  
Location : Prestons Road Subdivision  
Client : Coffey Geotechnical  
Contractor : Not Advised  
Sampled by : S Gardner  
Date sampled : 11 June 2014  
Sampling method : Not Advised  
Sample description : Pit Run  
Sample condition : Damp as Received  
Solid density : 2.68 t/m<sup>3</sup> (Assumed)  
Source : Prestons Road-KB's Quarries

Project No : 6-JCOFF.14/6LC  
Lab Ref No : 13379  
Client Ref No : A Wills

Test Results							
Maximum dry density	2.42	t/m <sup>3</sup>	Natural water content		-	%	
Optimum water content	3.2	%	Fraction tested		Passing 37.5mm Test Sieve		
Sample ID	1%	2%	3%	4%	5%		
Bulk density t/m <sup>3</sup>	2.330	2.385	2.491	2.486	2.470		
Water content %	1.2	2.1	3.0	3.7	4.3		
Dry density t/m <sup>3</sup>	2.302	2.334	2.418	2.397	2.368		
Sample condition	Dry Firm	Moist Firm	Moist Hard	Wet Fines Lost	Saturated Fines Lost		



Test Methods	Notes
Compaction NZS 4402 : 1986 : Test 4.1.3	

Date tested : 13 June 2014  
Date reported : 19 June 2014

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.  
This report may only be reproduced in full

IANZ Approved Signatory

*[Signature]*

Designation : Senior Civil Engineering Technician  
Date : 19 June 2014



Tests Indicated as not accredited are outside the scope of the laboratory's accreditation

**Report No: MDD:CAN14S-22802**
**Issue No: 1**

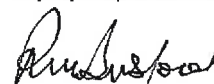
## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test(s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.

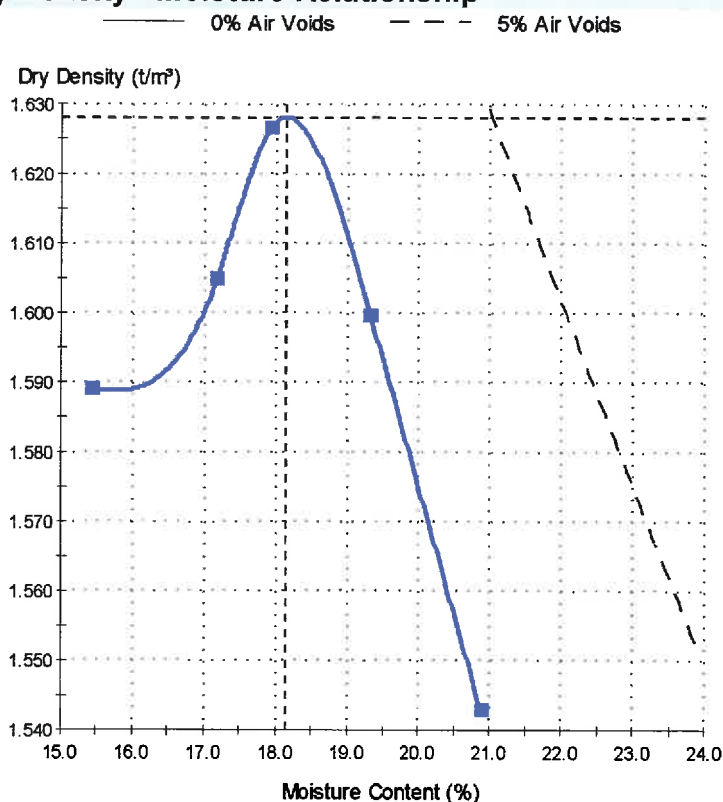
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 07/11/14

### Sample Details

**Sample ID:** CAN14S-22802  
**Material:** BEACH SAND  
**Site/Sampled From:** Ex CDL Prestons Road Lot 3096  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Max Burford

**Client Sample ID:** Lab Ref 2685/14  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 30/10/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 07/11/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

———— NZS 4402:1986 Test 4.1.3 - 1986 ————

**Maximum Dry Density (t/m³):** 1.62  
**Optimum Moisture Content (%):** 18  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Sampled by Toni O'Regan



PEAT AREA C



Canterbury Laboratory

325 Pound Rd, Yaldhurst, Christchurch  
PO Box 16-064, Christchurch 8441  
Telephone: +64 3 349 9142  
Facsimile: +64 3 349 9143  
www.fultonhogan.com  
0800 LABORATORY

Report No: MDD:CAN14S-12043

Issue No: 1

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test(s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



*Max Burford*

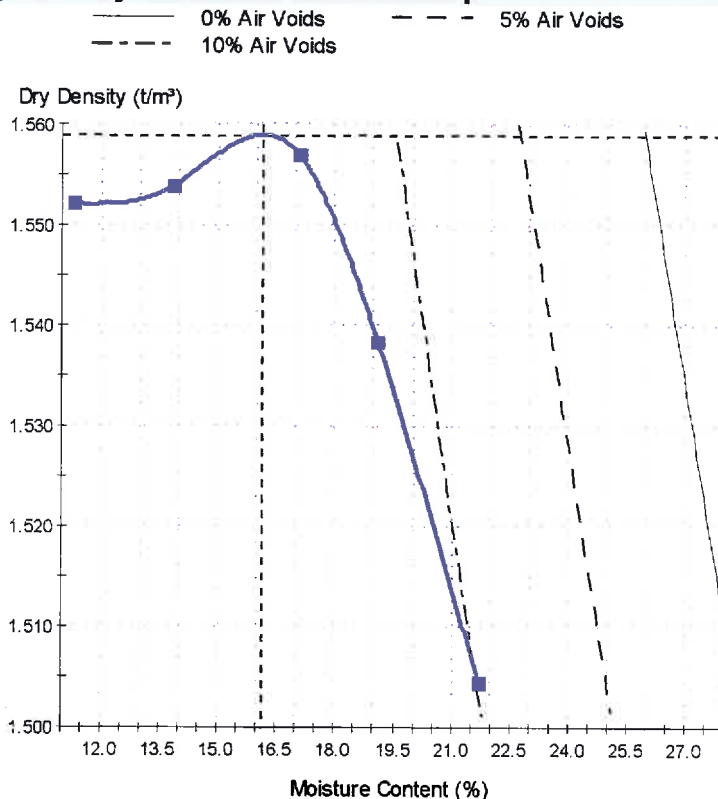
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No: 200  
Date of Issue: 11/06/14

### Sample Details

**Sample ID:** CAN14S-12043  
**Material:** BEACH SAND  
**Site/Sampled From:** CDL Prestons Rd Peat Area C  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Daniel Daly

**Client Sample ID:** Lab Ref 1322/14  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 06/06/2014  
**Sampled By:** Not Advised  
**Date Tested:** 11/06/2014  
**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 Content (%):** 16  
**Solid Density (t/m³):** 2.62 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Material is beach sand with a trace of organic

**Report No: MDD:CAN14S-08017**
**Issue No: 1**

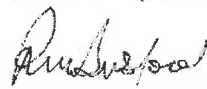
## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.

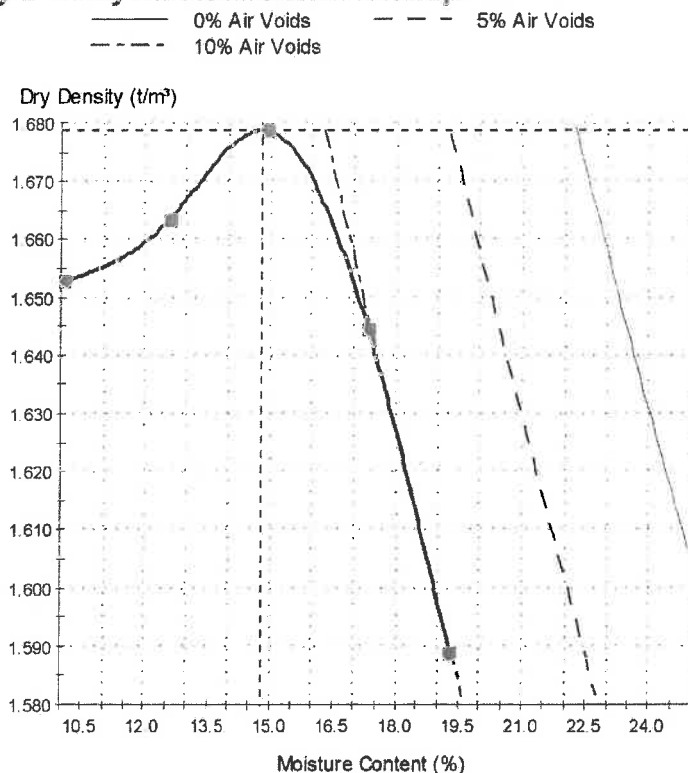
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No.200  
Date of Issue: 11/04/14

### Sample Details

**Sample ID:** CAN14S-08017  
**Material:** BEACH SAND  
**Site/Sampled From:** CDL Prestons Road, Peat Area E  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Greg Orr

**Client Sample ID:** 0830/14 - MF, LS  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 02/04/2014  
**Sampled By:** Mark Foster  
**Date Tested:** 11/04/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

N.Z.S 4402:1986 Test 4.1.3 - 1986  
**Maximum Dry Density (t/m³):** 1.68  
**Optimum Moisture Content (%):** 15  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Material is best described as FINE SAND with some medium sand and rare silt  
23% medium sand with 72% FINE SAND and 5% silt

**Report No: MDD:CAN14S-05060**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test(s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.



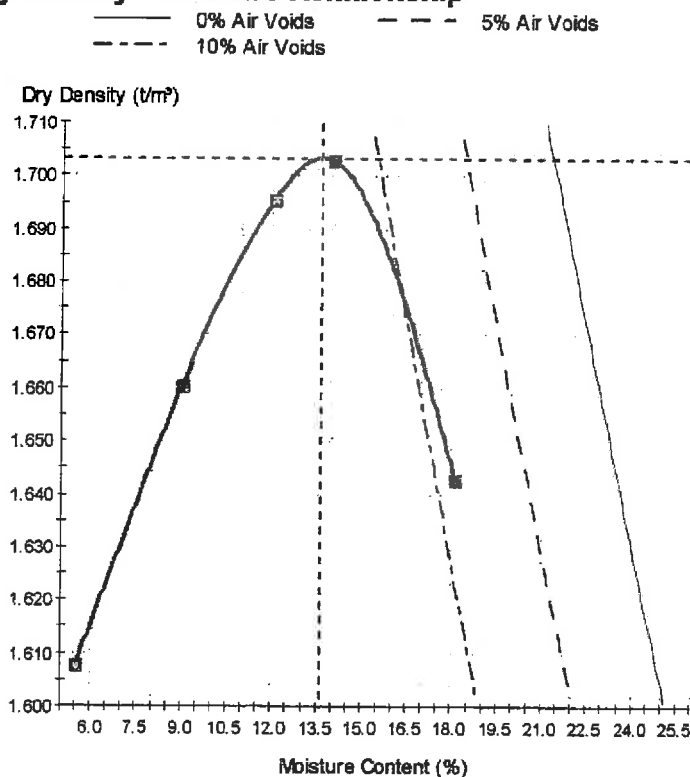

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 06/03/14

### Sample Details

**Sample ID:** CAN14S-05060  
**Material:** BEACH SAND  
**Site/Sampled From:** Prestons Road Alpine V Site A  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Daniel Daly

**Client Sample ID:** 0428/14 Site A  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 25/02/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 06/03/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986  
**Maximum Dry Density (t/m³):** 1.70  
**Optimum Moisture Content (%):** 14  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

80% MEDIUM SAND 18% fine sand &amp; 2% silt

## Maximum Dry Density Report

Report No: MDD:CAN14S-05061

Issue No: 1

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.



*Max Burford*

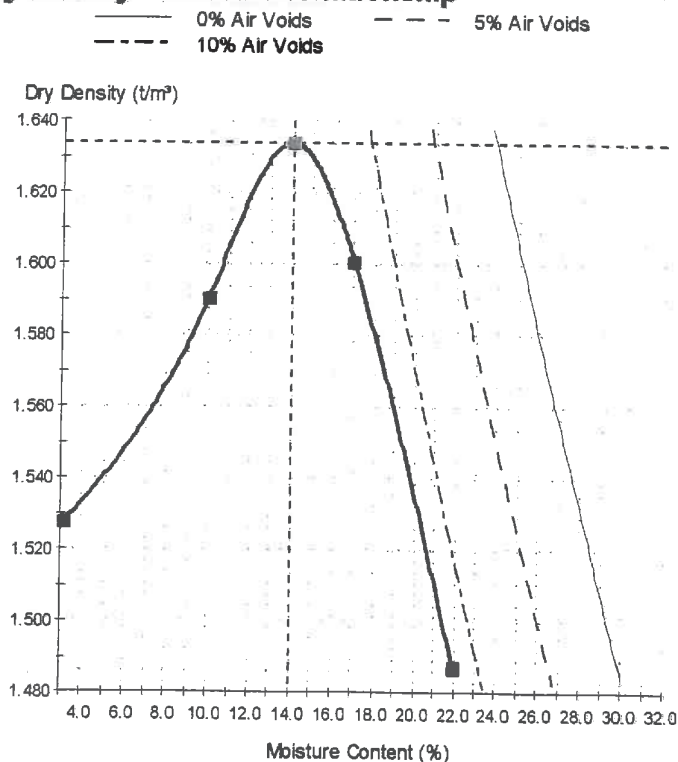
Approved Signatory: Max Burford  
 (Supervisor)  
 IANZ Accreditation No:200  
 Date of issue: 06/03/14

### Sample Details

**Sample ID:** CAN14S-05061  
**Material:** BEACH SAND  
**Site/Sampled From:** Prestons Road Alpine V Site B  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Daniel Daly

**Client Sample ID:** 0429/14 Site B  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 25/02/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 06/03/2014  
**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 Content (%):** 14  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

50% MEDIUM SAND 46% fine sand & 4% silt

**Report No: MDD:CAN14S-05062**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test(s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.



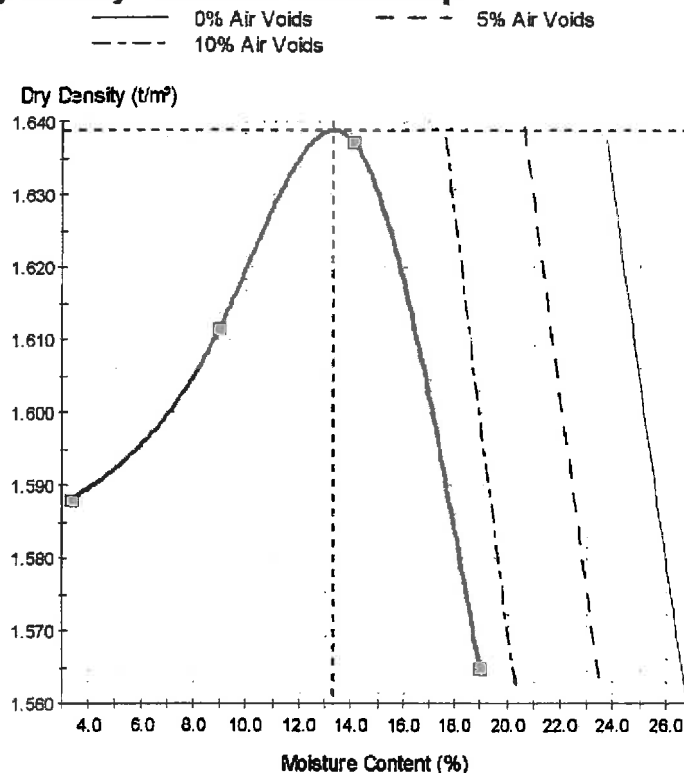

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 06/03/14

### Sample Details

**Sample ID:** CAN14S-05062  
**Material:** BEACH SAND  
**Site/Sampled From:** Prestons Road Alpine V Site C  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Daniel Daly

**Client Sample ID:** 0430/14 Site C  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 25/02/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 06/03/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986  
**Maximum Dry Density ( $t/m^3$ ):** 1.64  
**Optimum Moisture Content (%):** 13  
**Solid Density ( $t/m^3$ ):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

35% MEDIUM SAND 50% fine sand &amp; 15% silt



**Report No: MDD:CAN14S-08055**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.



*Max Burford*

Approved Signatory: Max Burford  
(Supervisor)

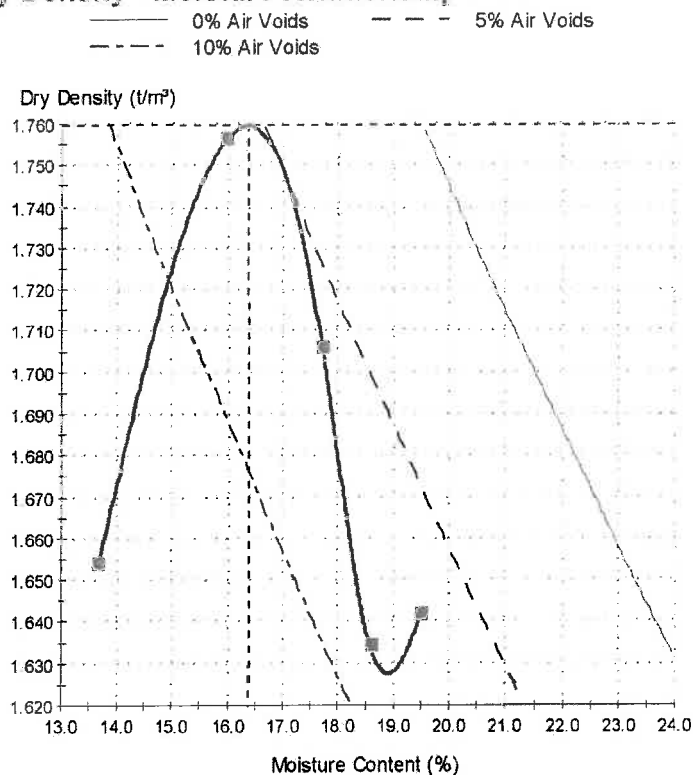
IANZ Accreditation No 200  
Date of Issue: 11/04/14

### Sample Details

**Sample ID:** CAN14S-08055  
**Material:** Silty Sand  
**Site/Sampled From:** CDL Prestons Road Site D  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Greg Orr

**Client Sample ID:** 0826/14 - MF, LS  
**Sample Source:** Miscellaneous Material Source  
**Date Sampled:** 02/04/2014  
**Sampled By:** Mark Foster  
**Date Tested:** 11/04/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986  
**Maximum Dry Density (t/m³):** 1.76  
**Optimum Moisture Content (%):** 16  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Material is best described as medium FINE SAND with some silt  
1% coarse sand 29% medium sand with 50% FINE SAND and 20% silt

**Report No: MDD:CAN14S-07948**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.



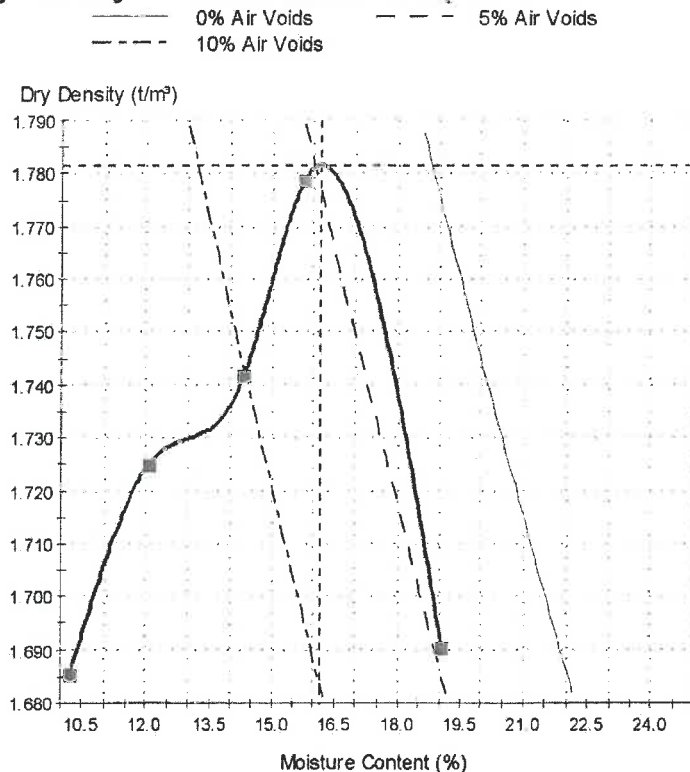

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 11/04/14

### Sample Details

**Sample ID:** CAN14S-07948  
**Material:** Silty Sand  
**Site/Sampled From:** CDL Prestons Road, Site E  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Greg Orr

**Client Sample ID:** 0827/14 - MF, LS  
**Sample Source:** Miscellaneous Material Source  
**Date Sampled:** 02/04/2014  
**Sampled By:** Mark Foster  
**Date Tested:** 09/04/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

**NZS 4402:1986 Test 4.1.3 - 1986**  
**Maximum Dry Density (t/m³):** 1.78  
**Optimum Moisture Content (%):** 16  
**Solid Density (t/m³):** 2.68  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Material is best described as silty FINE SAND  
30% silt and 70% fine sand

**Report No: MDD:CAN14S-08057**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test(s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.



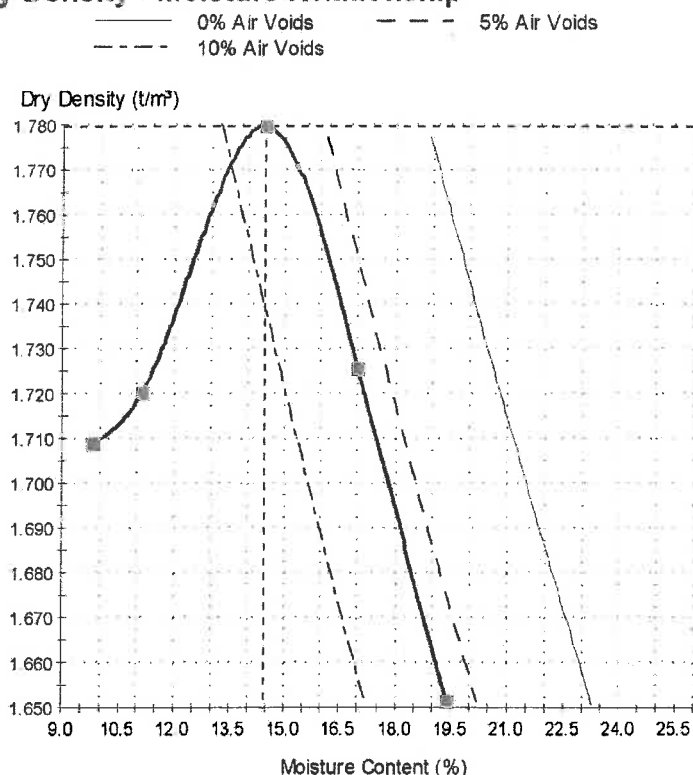
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 11/04/14

### Sample Details

**Sample ID:** CAN14S-08057  
**Material:** Silty SAND  
**Site/Sampled From:** CDL Prestons Road Site F  
**Specification:** No Specification (Fine)  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Greg Orr

**Client Sample ID:** 0828/14 - MF, LS  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 02/04/2014  
**Sampled By:** Mark Foster  
**Date Tested:** 11/04/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986  
**Maximum Dry Density (t/m³):** 1.78  
**Optimum Moisture Content (%):** 14  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Material is best described as silty FINE SAND  
28% silt 70% fine sand and 2% medium sand

## Maximum Dry Density Report

**Report No: MDD:CAN14S-08006**
**Issue No: 1**
**Client:** Toni O'Regan  
City Care Limited  
PO Box 7669  
Sydenham

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless indicated) have been performed in accordance with the laboratory's scope of accreditation. Results only apply to samples as received. This report must be reproduced in full.


*Max Burford*

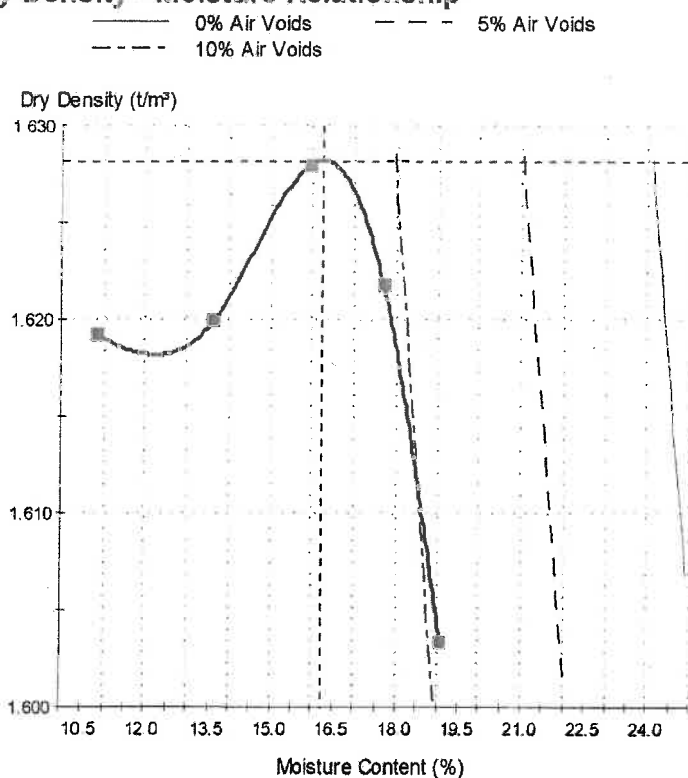
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 11/04/14

### Sample Details

**Sample ID:** CAN14S-08006  
**Material:** BEACH SAND  
**Site/Sampled From:** CDL Prestons Road, Site G  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Greg Orr

**Client Sample ID:** 0829/14 - MF, LS  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 02/04/2014  
**Sampled By:** Mark Foster  
**Date Tested:** 11/04/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986

**Maximum Dry Density (t/m³):** 1.62  
**Optimum Moisture Content (%):** 16  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Material is best described as BEACH SAND  
55% medium sand with 43% fine sand with 2% silt

**Report No: MDD:CAN14S-25525**
**Issue No: 1**

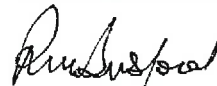
## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 15/12/14

### Sample Details

**Sample ID:** CAN14S-25525

**Material:** Sand

**Site/Sampled From:** Test Site # 1

**Specification:** No Specification (Fine)

**Sampling Method:** Not Advised - Not Accredited

**Technician:** Marc Bos

**Client Sample ID:** 3092/14

**Sample Source:** Field Sample [Taken From Site]

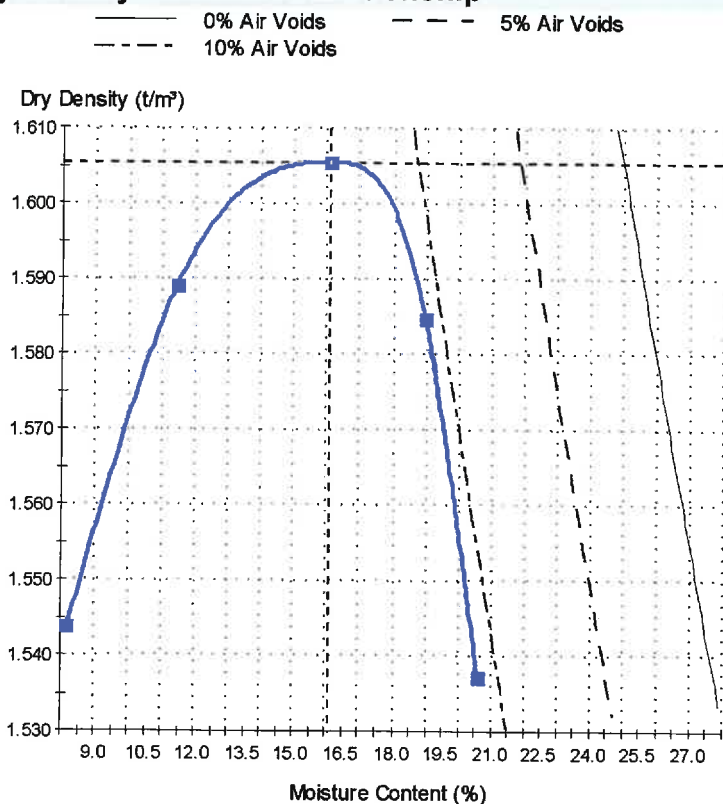
**Date Sampled:** 08/12/2014

**Sampled By:** Advised - See Comments

**Date Tested:** 15/12/2014

**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

\_\_\_\_\_ NZS 4402:1986 Test 4.1.3 - 1986 \_\_\_\_\_

**Maximum Dry Density (t/m³):** 1.60  
**Optimum Moisture Content (%):** 16  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Sampled by LS



**Report No: MDD:CAN14S-25526**
**Issue No: 1**

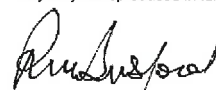
# Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.

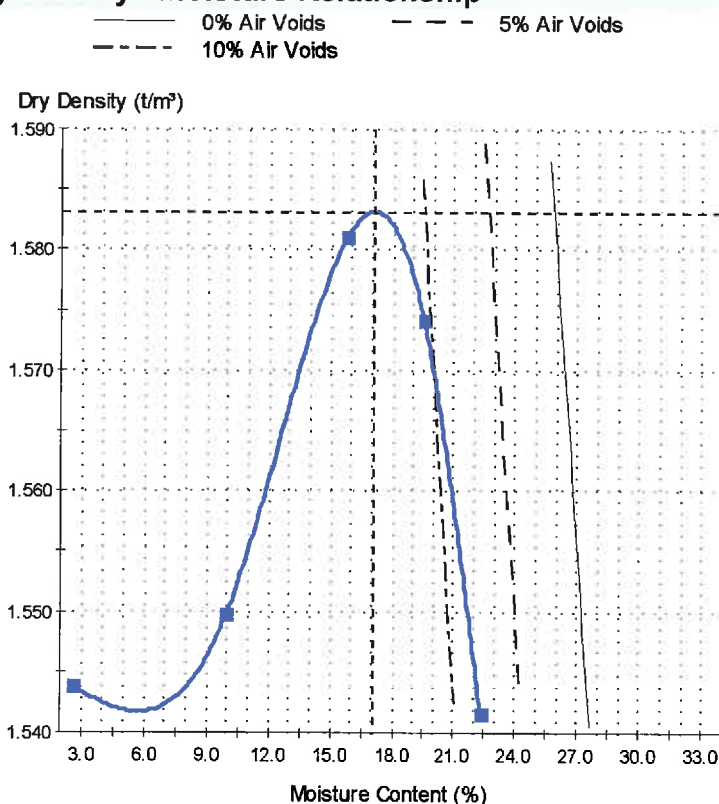
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 15/12/14

## Sample Details

**Sample ID:** CAN14S-25526  
**Material:** Sand  
**Site/Sampled From:** Site # J  
**Specification:** No Specification (Fine)  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Marc Bos

**Client Sample ID:** 3093/14  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 08/12/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 15/12/2014  
**Sampling Endorsed?:** No

## Dry Density - Moisture Relationship



## Test Results

——— NZS 4402:1986 Test 4.1.3 - 1986 ———  
**Maximum Dry Density (t/m³):** 1.58  
**Optimum Moisture Content (%):** 17  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

## Comments

Sampled by LS

**Report No: MDD:CAN14S-25527**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.


*Max Burford*

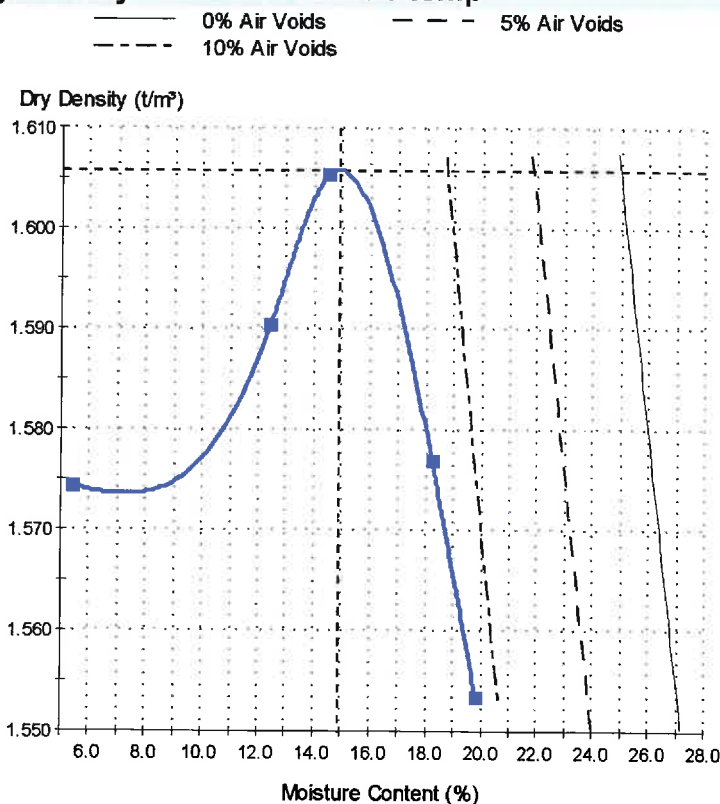
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 15/12/14

### Sample Details

**Sample ID:** CAN14S-25527  
**Material:** Sand  
**Site/Sampled From:** CDC Prestons Sample K  
**Specification:** No Specification (Fine)  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Marc Bos

**Client Sample ID:** 3094/14  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 08/12/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 15/12/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

**NZS 4402:1986 Test 4.1.3 - 1986**  
**Maximum Dry Density ( $t/m^3$ ):** 1.60  
**Optimum Moisture Content (%):** 15  
**Solid Density ( $t/m^3$ ):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Sampled by LS

SWALE AREA A



Canterbury Laboratory

325 Pound Rd, Yaldhurst, Christchurch  
PO Box 16-064, Christchurch 8441  
Telephone: +64 3 349 9142  
Facsimile: +64 3 349 9143  
www.fultonhogan.com  
0800 LABORATORY

Report No: MDD:CAN14S-11317

Issue No: 1

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



*Max Burford*

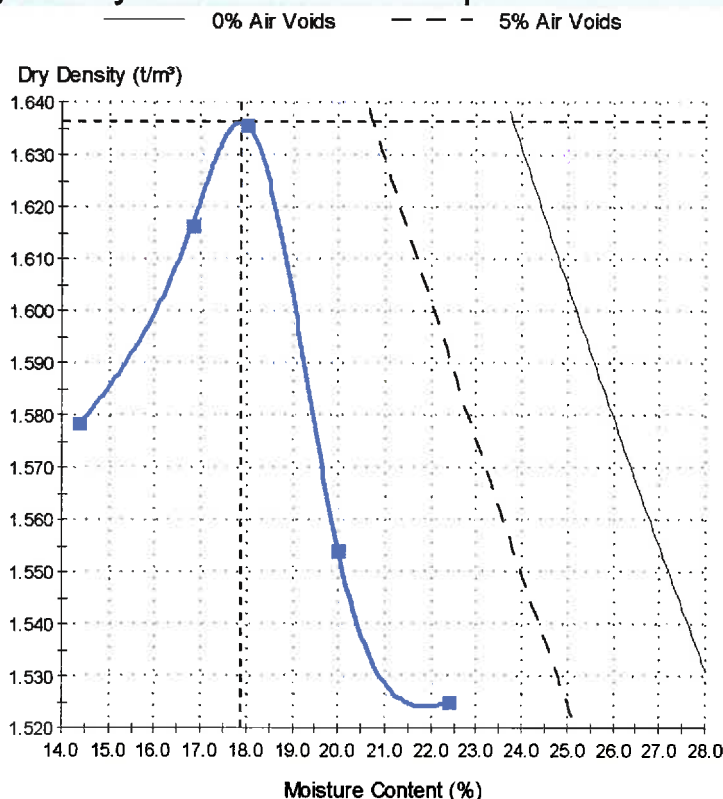
Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 30/05/14

### Sample Details

**Sample ID:** CAN14S-11317  
**Material:** BEACH SAND  
**Site/Sampled From:** CDL Prestons Rd, Swale Area A  
**Specification:** No Specification  
**Sampling Method:** As Received - Not Accredited  
**Technician:** Atu Rova

**Client Sample ID:** Lab Ref 1181/14  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 27/05/2014  
**Sampled By:** Mark Foster  
**Date Tested:** 30/05/2014  
**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 Content (%):** 18  
**Solid Density (t/m³):** 2.68 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

The material is best described as FINE SAND with less 5% of medium sand and silt

**Report No: MDD:CAN14S-15900**
**Issue No: 1**

## Maximum Dry Density Report

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

Christchurch 8240

**Project:** QA Testing - City Care Ltd

The test (s) reported herein (unless otherwise indicated) have been performed in accordance with the laboratory's scope of accreditation. This report may only be reproduced in full.



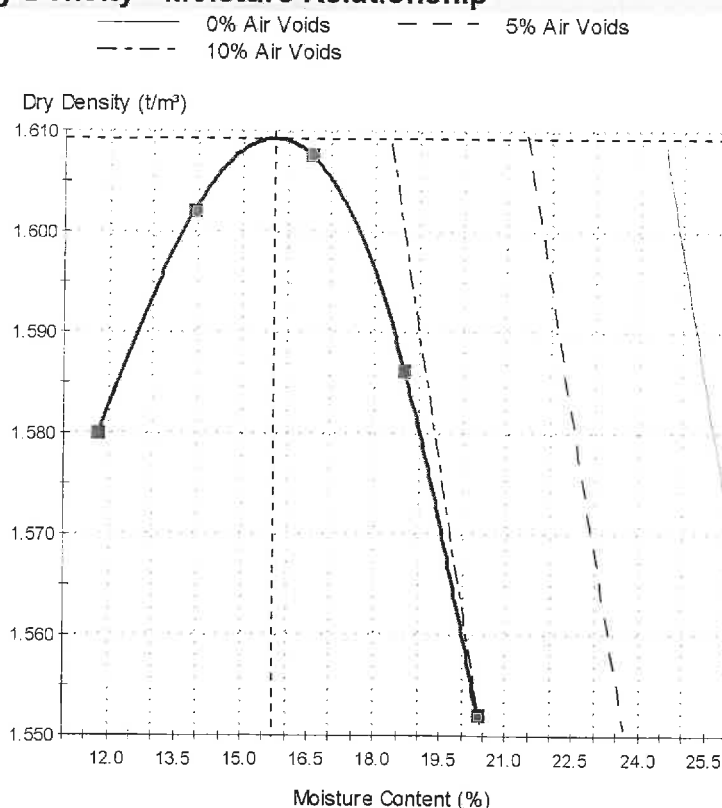

Approved Signatory: Max Burford  
(Supervisor)  
IANZ Accreditation No:200  
Date of Issue: 13/08/14

### Sample Details

**Sample ID:** CAN14S-15900  
**Material:** BEACH SAND  
**Site/Sampled From:** CDL Prestons Road Swale Area B  
**Specification:** No Specification  
**Sampling Method:** Stated to be NZS 4407:1991 2.4.6.2.2  
**Technician:** Max Burford

**Client Sample ID:** Lab ref:1833/14  
**Sample Source:** Field Sample [Taken From Site]  
**Date Sampled:** 07/08/2014  
**Sampled By:** Advised - See Comments  
**Date Tested:** 13/08/2014  
**Sampling Endorsed?:** No

### Dry Density - Moisture Relationship



### Test Results

NZS 4402:1986 Test 4.1.3 - 1986

**Maximum Dry Density (t/m³):** 1.60  
**Optimum Moisture Content (%):** 16  
**Solid Density (t/m³):** 2.66 assumed  
**Fraction Tested Passes (mm):** 37.5  
**Material Removed (%):** 0  
**Sample History:** Natural

### Comments

Sampled by RR  
Material is best described as FINE SAND with minor medium sand