Golder Associates Pty Ltd
NORTH QUEENSLAND LABORATORY
216 Draper Street, CAIRNS, QLD, 4870
NATA Accreditation No: 1961

PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12105 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7067	**Sample Identification**	TP5 2.9-3.6m

Laboratory Specimen Description (AS1726, App A, Sect 2) CH CLAY, high plasticity, pale grey and pale red brown, with trace of sand.

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

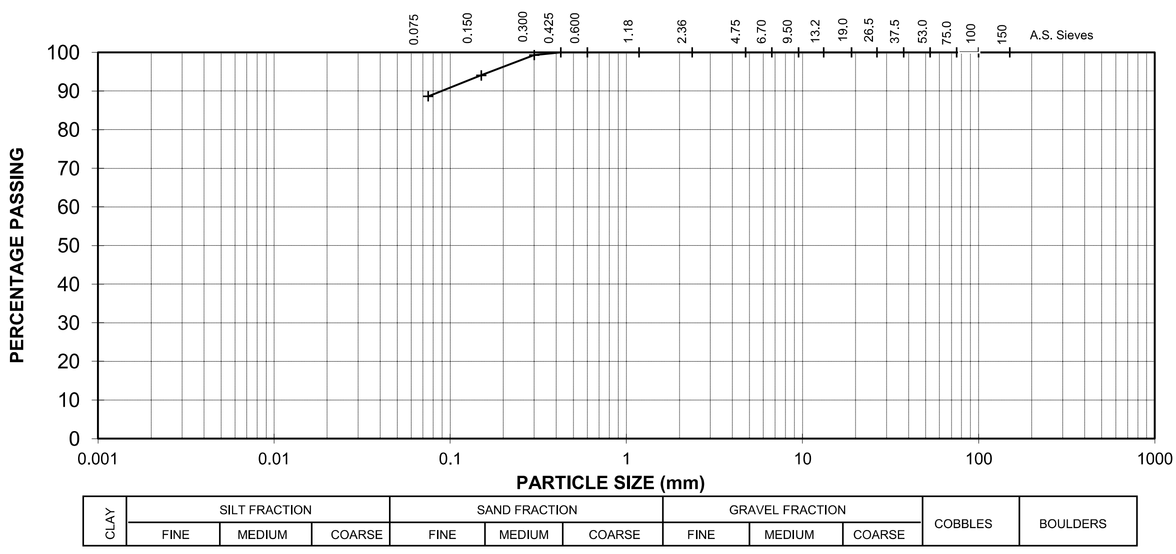
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	100		
0.600mm	100		
0.425mm	100		
0.300mm	99		
0.150mm	94		
0.075mm	89		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	65		
Plastic Limit	%	AS1289 3.2.1	18		
Plasticity Index	%	AS1289 3.3.1	47		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	30.5		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12104 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7066	**Sample Identification**	TP5 2.5-2.9m

Laboratory Specimen Description (AS1726, App A, Sect 2): CH CLAY, high plasticity, grey, with trace of sand.

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

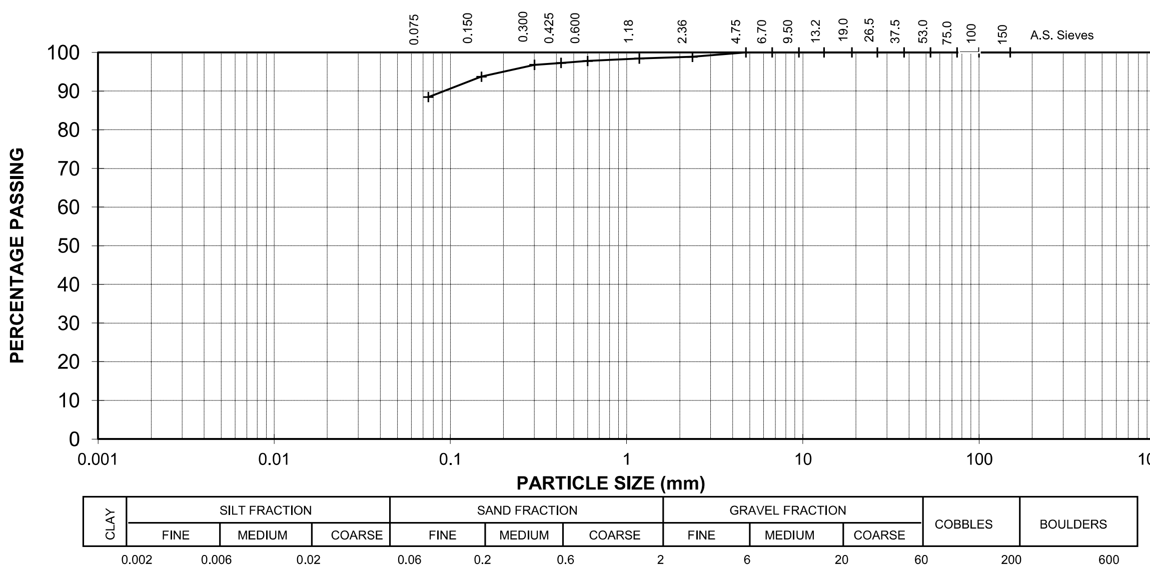
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	99		
1.18 mm	98		
0.600mm	98		
0.425mm	97		
0.300mm	97		
0.150mm	94		
0.075mm	88		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	59		
Plastic Limit	%	AS1289 3.2.1	19		
Plasticity Index	%	AS1289 3.3.1	40		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	76.4		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12103 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7065	**Sample Identification**	TP4 3.3-3.4m

Laboratory Specimen Description CH CLAY, high plasticity, dark grey.
(AS1726, App A, Sect 2)

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

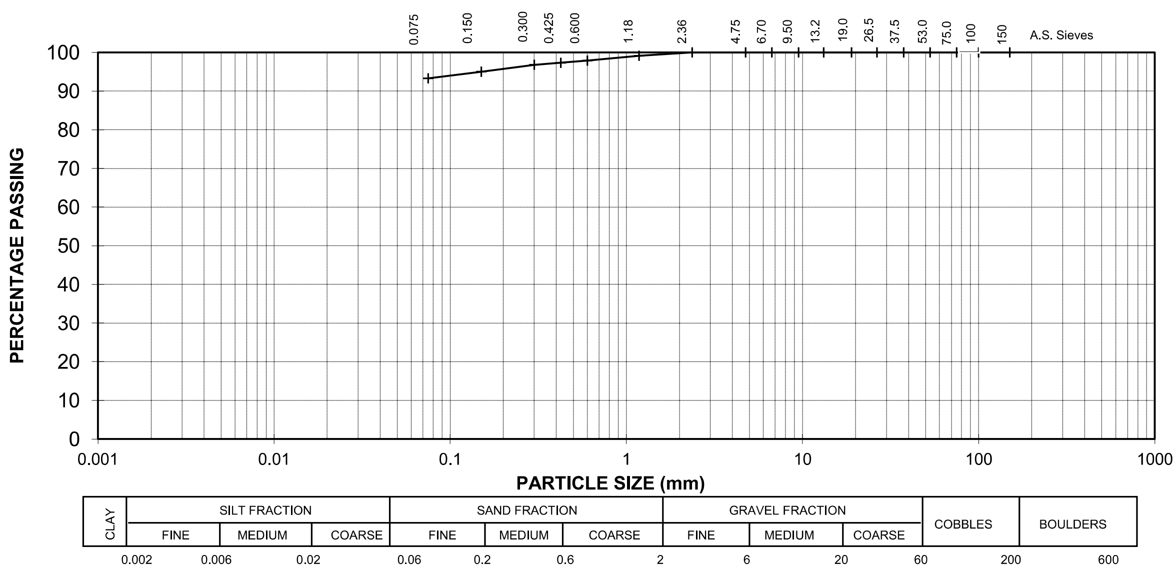
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	99		
0.600mm	98		
0.425mm	97		
0.300mm	97		
0.150mm	95		
0.075mm	93		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	68		
Plastic Limit	%	AS1289 3.2.1	23		
Plasticity Index	%	AS1289 3.3.1	45		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	106.6		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000	
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12	
Project	Dredge Material Assessment	**Report Number**	NQ-12102	Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory	
Lab Ref No.	12/7064	**Sample Identification**	TP3 2.8-3.2m	

Laboratory Specimen Description CH CLAY, high plasticity, grey.
(AS1726, App A, Sect 2)

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

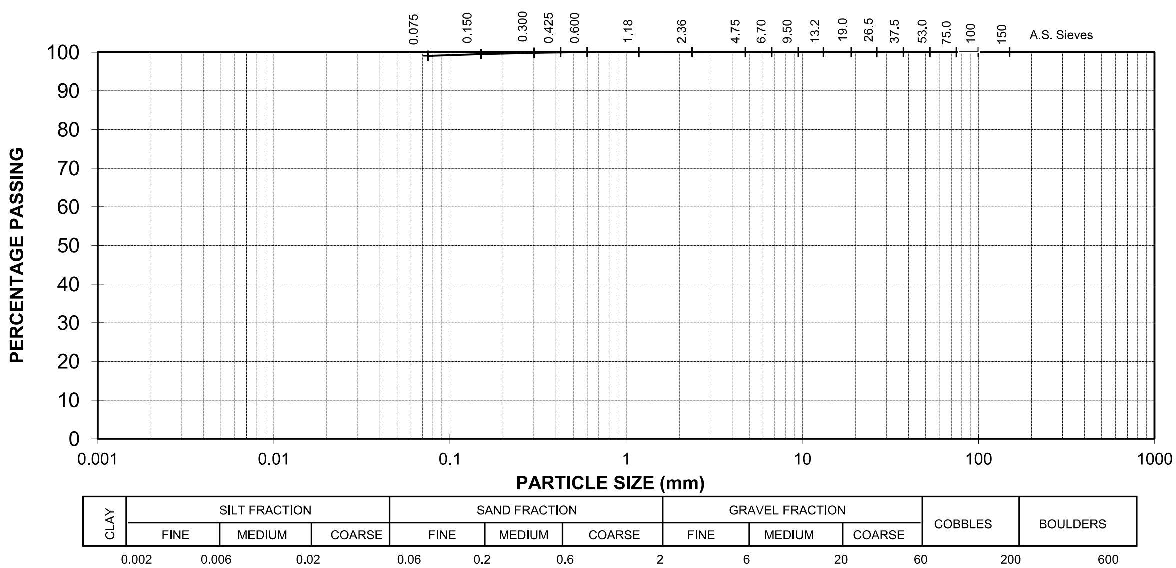
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	100		
0.600mm	100		
0.425mm	100		
0.300mm	100		
0.150mm	100		
0.075mm	99		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	75		
Plastic Limit	%	AS1289 3.2.1	22		
Plasticity Index	%	AS1289 3.3.1	53		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	69.4		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12101 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7063	**Sample Identification**	TP3 1.5-2.8m

Laboratory Specimen Description (AS1726, App A, Sect 2) CH CLAY, high plasticity, grey.

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

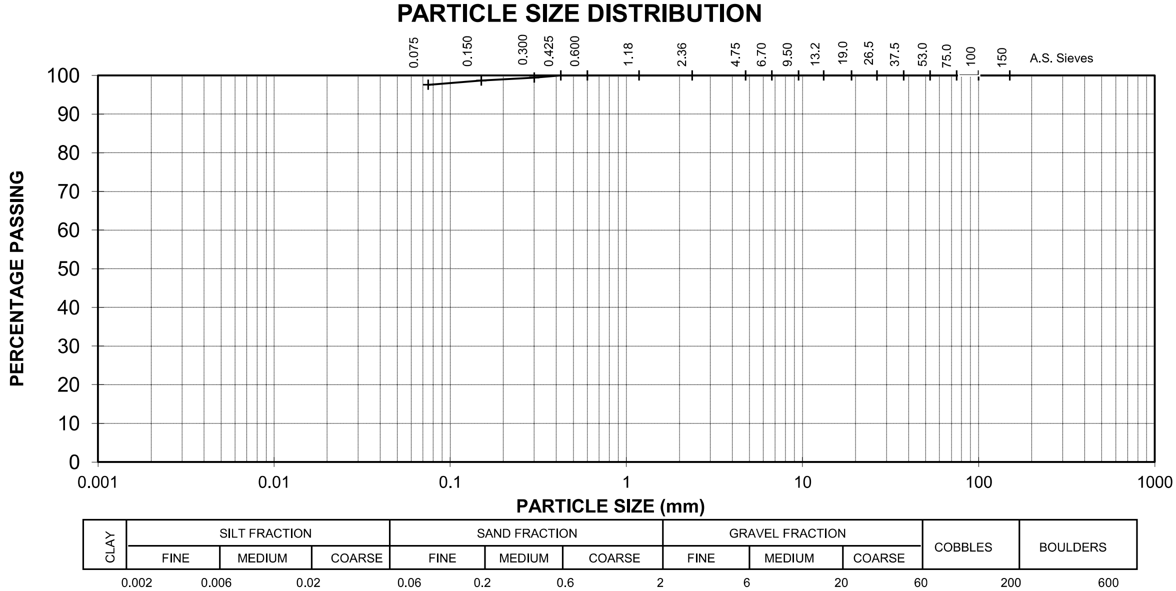
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	100		
0.600mm	100		
0.425mm	100		
0.300mm	99		
0.150mm	99		
0.075mm	98		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	73		
Plastic Limit	%	AS1289 3.2.1	20		
Plasticity Index	%	AS1289 3.3.1	53		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	67.5		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12100 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7062	**Sample Identification**	TP2 1.6-1.7m

Laboratory Specimen Description (AS1726, App A, Sect 2) CI CLAY, medium plasticity, pale grey, with trace of sand.

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

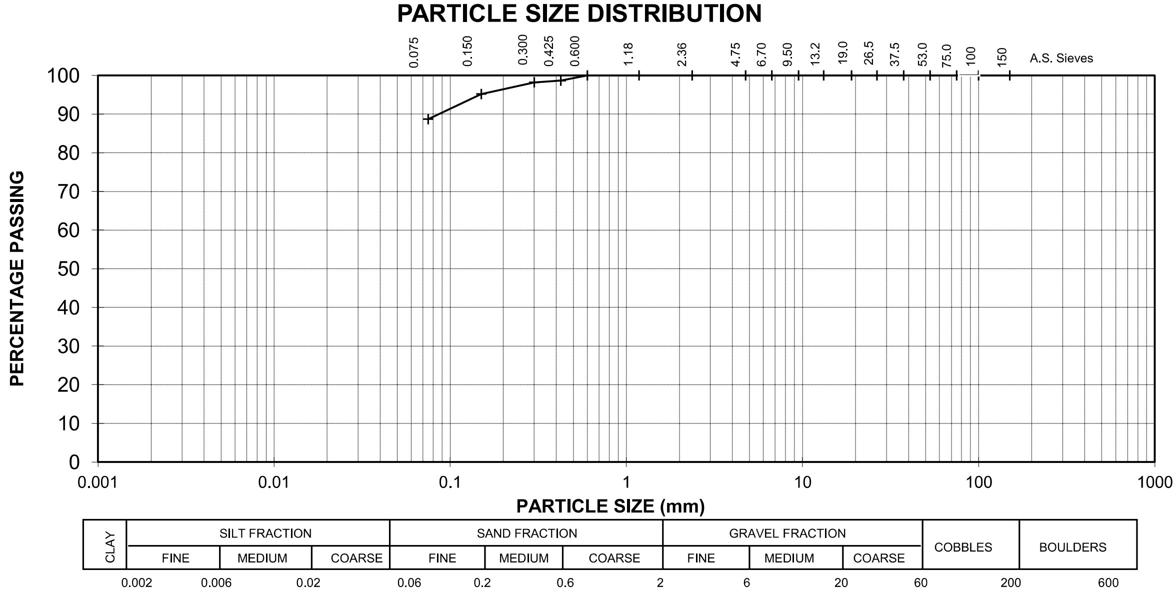
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	100		
0.600mm	100		
0.425mm	99		
0.300mm	98		
0.150mm	95		
0.075mm	89		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	40		
Plastic Limit	%	AS1289 3.2.1	18		
Plasticity Index	%	AS1289 3.3.1	22		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	29.7		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12099 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7061	**Sample Identification**	TP2 0.0-0.0.7m

Laboratory Specimen Description (AS1726, App A, Sect 2) CI CLAY, medium plasticity, pale grey brown, with trace of sand.

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

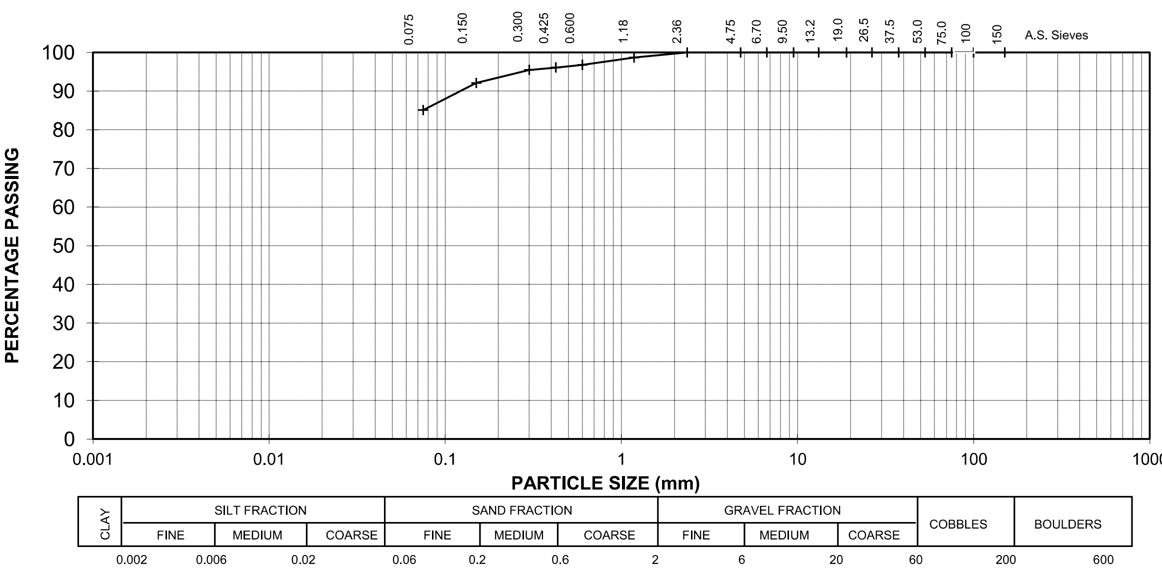
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	99		
0.600mm	97		
0.425mm	96		
0.300mm	95		
0.150mm	92		
0.075mm	85		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	37		
Plastic Limit	%	AS1289 3.2.1	18		
Plasticity Index	%	AS1289 3.3.1	19		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	27.0		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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PARTICLE SIZE DISTRIBUTION & CONSISTENCY LIMITS TEST REPORT

Client	Ports North	**Job Number**	107672522-5000
Client Address	Cnr Grafton and Hartley Streets, Cairns, Qld 4870	**Date**	16-Mar-12
Project	Dredge Material Assessment	**Report Number**	NQ-12098 Page No 1 of 1
Location	Cairns Shipping Channel	**Sampling Method**	As Supplied to Laboratory
Lab Ref No.	12/7060	**Sample Identification**	TP1 0.0-0.05m

Laboratory Specimen Description (AS1726, App A, Sect 2): CH CLAY, high plasticity, pale grey and pale brown, with trace of sand.

PARTICLE SIZE DISTRIBUTION AS1289 3.6.1

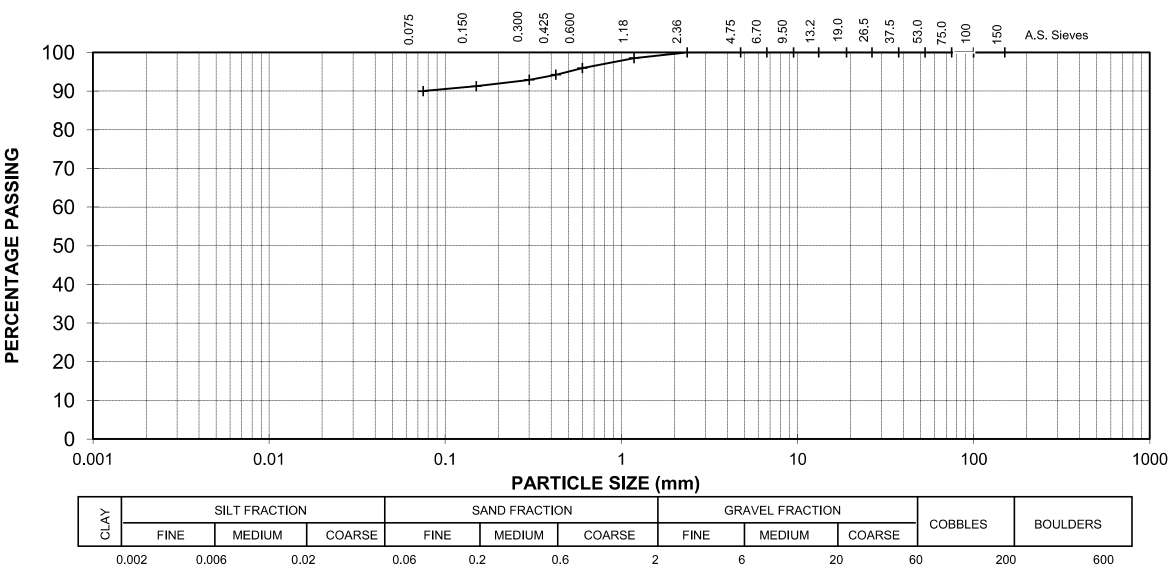
Sieve Size	% Passing	Spec. Lower	Spec. Upper
150 mm	100		
100 mm	100		
75 mm	100		
53 mm	100		
37.5 mm	100		
26.5 mm	100		
19.0 mm	100		
13.2 mm	100		
9.5 mm	100		
6.7 mm	100		
4.75 mm	100		
2.36 mm	100		
1.18 mm	99		
0.600mm	96		
0.425mm	94		
0.300mm	93		
0.150mm	91		
0.075mm	90		

CLASSIFICATION LIMITS AND MOISTURE CONTENT

Test		Method	Result	Spec. Lower	Spec. Upper
Liquid Limit	%	AS1289 3.1.2	57		
Plastic Limit	%	AS1289 3.2.1	17		
Plasticity Index	%	AS1289 3.3.1	40		
Linear Shrinkage	%	AS1289 3.4.1	ND		
Moisture Content	%	AS1289 2.1.1	35.0		

Sample History : Low Temp Oven Dried
Preparation Method : Dry sieved
Crumbling / Curling of Linear Shrinkage : -
Linear Shrinkage Mould Length : -
NP = non-plastic NO = not obtainable ND = not determined

PARTICLE SIZE DISTRIBUTION



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LABORATORY REPORT COVERSHEET

Date: 16 March 2012

To: Golder Associates Pty Ltd
PO Box 5823
CAIRNS QLD 4870

Attention: Jo Parisi

Your Reference: 107672522 Cairns Shipping Lane
Laboratory Report No: CE76936

Samples Received: 13/03/2012
Samples / Quantity: 8 Soils

The above samples were received intact and analysed according to your written instructions. Unless otherwise stated, solid samples are reported on a dry weight basis and liquid samples as received.

Jon Dicker
Manager
CAIRNS

Shey Goddard
Administration Manager
CAIRNS

SGS Australia Pty Ltd
ABN 44 000 964 278
Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

CLIENT: Golder Associates Pty Ltd **Laboratory Report No:** CE76936
PROJECT: 107672522 Cairns Shipping Lane

LABORATORY REPORT

Chromium Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE76936-1 TP1-001 Soil 2/03/2012	CE76936-2 TP2-001 Soil 2/03/2012	CE76936-3 TP2-003 Soil 2/03/2012
Date Extracted		13/03/2012	13/03/2012	13/03/2012
Date Analysed		13/03/2012	13/03/2012	13/03/2012
Moisture	% w/w	25	21	23
pH KCl	pH Units	9.3	7.7	7.7
TAA pH 6.5	kg H_2SO_4/tonne	<0.5	<0.5	<0.5
Chromium Reducible Sulfur (SCR)	% w/w	0.012	0.11	0.14
SHCl	% w/w	NA	NA	NA
S KCl	% w/w	NA	NA	NA
S NAS	% w/w	NA	NA	NA
Acid Neutralisation Capacity ANCBT	% $CaCO_3$	NA	1.6	1.1

CLIENT: Golder Associates Pty Ltd **Laboratory Report No:** CE76936
PROJECT: 107672522 Cairns Shipping Lane

LABORATORY REPORT

Chromium Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE76936-4 TP3-001 Soil 1/03/2012	CE76936-5 TP3-003 Soil 1/03/2012	CE76936-6 TP4-001 Soil 1/03/2012
Date Extracted		13/03/2012	13/03/2012	13/03/2012
Date Analysed		13/03/2012	13/03/2012	13/03/2012
Moisture	% w/w	39	42	51
pH KCl	pH Units	8.7	8.7	9.0
TAA pH 6.5	kg H_2SO_4/tonne	<0.5	<0.5	<0.5
Chromium Reducible Sulfur (SCR)	% w/w	1.7	1.7	0.40
SHCl	% w/w	NA	NA	NA
S KCl	% w/w	NA	NA	NA
S NAS	% w/w	NA	NA	NA
Acid Neutralisation Capacity ANCBT	% $CaCO_3$	2.2	3.0	9.0

Chromium Suite Our Reference Your Reference Type of Sample Date Sampled	Units	CE76936-7 TP5-001 Soil 1/03/2012	CE76936-8 TP5-003 Soil 1/03/2012
Date Extracted		13/03/2012	13/03/2012
Date Analysed		13/03/2012	13/03/2012
Moisture	% w/w	42	25
pH KCl	pH Units	8.7	7.9
TAA pH 6.5	kg H_2SO_4/tonne	<0.5	<0.5
Chromium Reducible Sulfur (SCR)	% w/w	1.4	1.1
SHCl	% w/w	NA	NA
S KCl	% w/w	NA	NA
S NAS	% w/w	NA	NA
Acid Neutralisation Capacity ANCBT	% $CaCO_3$	4.4	0.6

CLIENT: Golder Associates Pty Ltd **Laboratory Report No:** CE76936
PROJECT: 107672522 Cairns Shipping Lane

LABORATORY REPORT

TEST PARAMETERS	UNITS	LOR	METHOD
Chromium Suite			
Date Extracted			
Date Analysed			
Moisture	% w/w	0.1	AN002 RL2A1
pH KCl	pH Units	0.1	AS4969.2 / AN219
TAA pH 6.5	kg H_2SO_4/tonne	0.5	AS4969.2 / AN219
Chromium Reducible Sulfur (S_{CR})	% w/w	0.005	AS4969.7
S_{HCl}	% w/w	0.005	AS4969.8 / AN014
S KCl	% w/w	0.005	AS4969.4
S NAS	% w/w	0.005	AS4969.11
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	0.1	AN214

CLIENT: Golder Associates Pty Ltd **Laboratory Report No:** CE76936
PROJECT: 107672522 Cairns Shipping Lane

LABORATORY REPORT

QUALITY CONTROL	UNITS	Blank	Duplicate Sm#	Duplicate Sample||Duplicate	Spike	CMS Recovery
Date Extracted		13/03/12	CE76936-1	13/03/2012 || 13/03/2012	Batch Spike	13/03/12
Date Analysed		13/03/12	CE76936-1	13/03/2012 || 13/03/2012	Batch Spike	13/03/12
Moisture	% w/w	-	CE76936-1	25 || [N/T]	Batch Spike	-
pH KCl	pH Units	5.2	CE76936-1	9.3 || 9.4 || RPD: 1	Batch Spike	99%
TAA pH 6.5	kg H_2SO_4 /tonne	-	CE76936-1	<0.5 || <0.5	Batch Spike	93%
Chromium Reducible Sulfur (S_{CR})	% w/w	-	CE76936-1	0.012 || 0.015 || RPD: 22	Batch Spike	100%
S_{HCl}	% w/w	-	CE76936-1	NA || NA	Batch Spike	-
S KCl	% w/w	-	CE76936-1	NA || NA	Batch Spike	-
S NAS	% w/w	-	CE76936-1	NA || NA	Batch Spike	-
Acid Neutralisation Capacity ANC_{BT}	% $CaCO_3$	-	CE76936-1	NA || NA	Batch Spike	-

CLIENT: Golder Associates Pty Ltd **Laboratory Report No:** CE76936
PROJECT: 107672522 Cairns Shipping Lane

LABORATORY REPORT

NOTES:
LOR - Limit of Reporting.
The significance of all reported results are defined by their analytical limit of reporting.

Liming rate calculated using a Fineness factor of 1.5 (which is equivalent to finely divided Ag Lime <0.5mm) and Neutralising Value (NV) of 100%
If using Liming Material <100% NV, then Liming Rate can be adusted as follows:
Actual Liming Rate equals Calculated Liming Rate times 100 divided by NV of actual Liming Material
Bulk Density of Material of 1g/cm3 assumed.
If Bulk Density differs from 1g/cm3 then Liming rate can be adjusted as follows:
Actual Liming Rate equals Calculated Liming Rate times Actual Bulk Density
Geneva Legal Comment

ISO 17025

Analysis Date: **Between** 13/03/12 **and** 16/03/12

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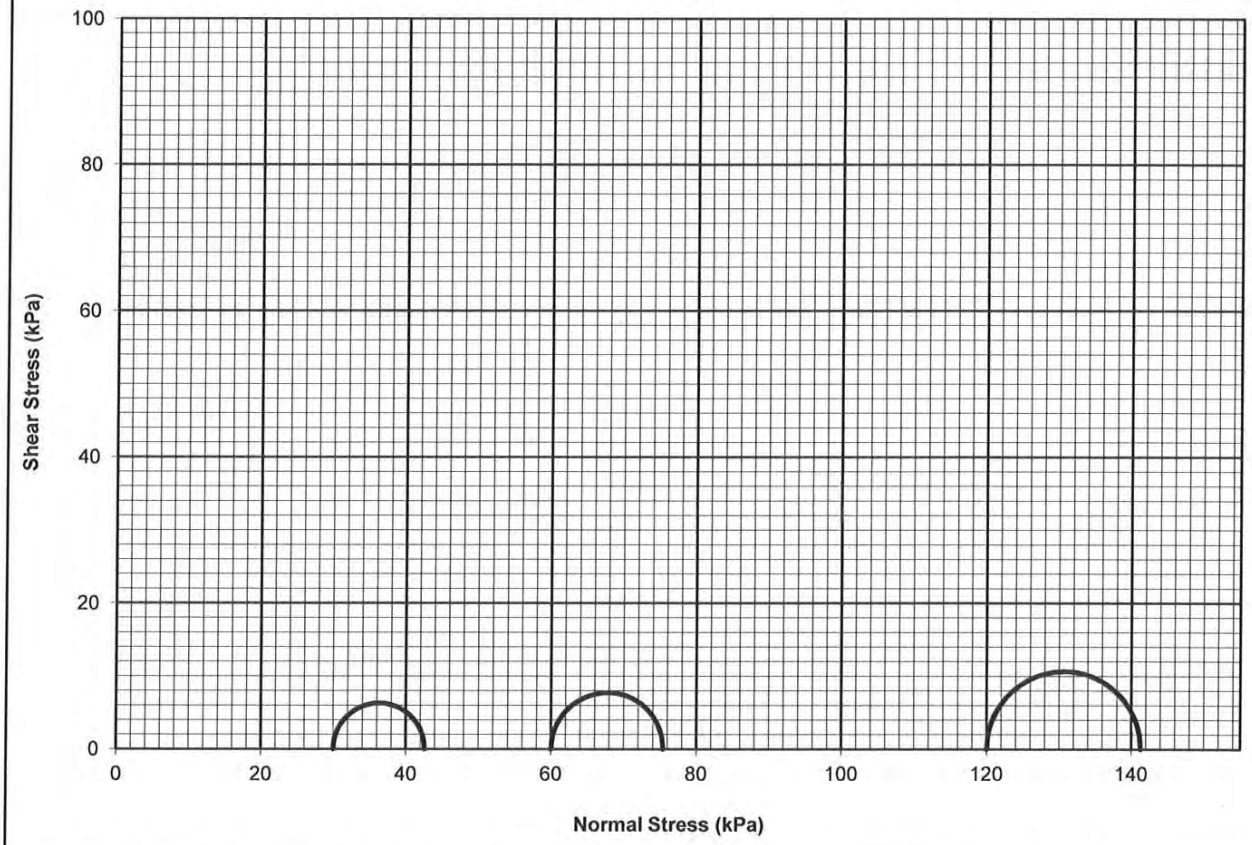
TRIAXIAL SHEAR TEST

Client :	Ports North	Report No. :	R12466
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301151
Location :	PN-TP3-003, CH 17683 (10.9m)	Sample No. :	
Date of Test :	20/03/12	Sampled By :	Client
Type of test :	Unsaturated, Unconsolidated, Undrained, Staged		
Sample Type :	Undisturbed	Strain Rate :	0.50 mm/min
Specimen Diameter :	47.0 mm	Specimen Height :	94.5 mm
Initial Moisture Content :	64.3 %	Initial Saturation :	98 %
Initial Dry Density :	0.97 t/m³		



Stage	Initial Cell Pressure (kPa)	Maximum Principal Stress (kPa) σ_1	Minimum Principal Stress (kPa) σ_3	Maximum Deviator Stress (kPa)	Failure Strain (%)
1	30	43	30	13	0.8
2	60	75	60	15	2.1
3	120	141	120	21	19.0

Failure Criteria :	Maximum Shear Stress
Remarks :	Shear plane at 45° after test.
Material Description :	(CH) Silty CLAY, dark grey
Test Procedure :	AS1289.6.4.1
Prepared by NK	Checked by MH

This document is issued in accordance with NATA's accreditation requirements.

NATA

22/3/12

Nick Farrer — Approved Signatory

Senior Technical Officer — NATA Accred. No. : 1961

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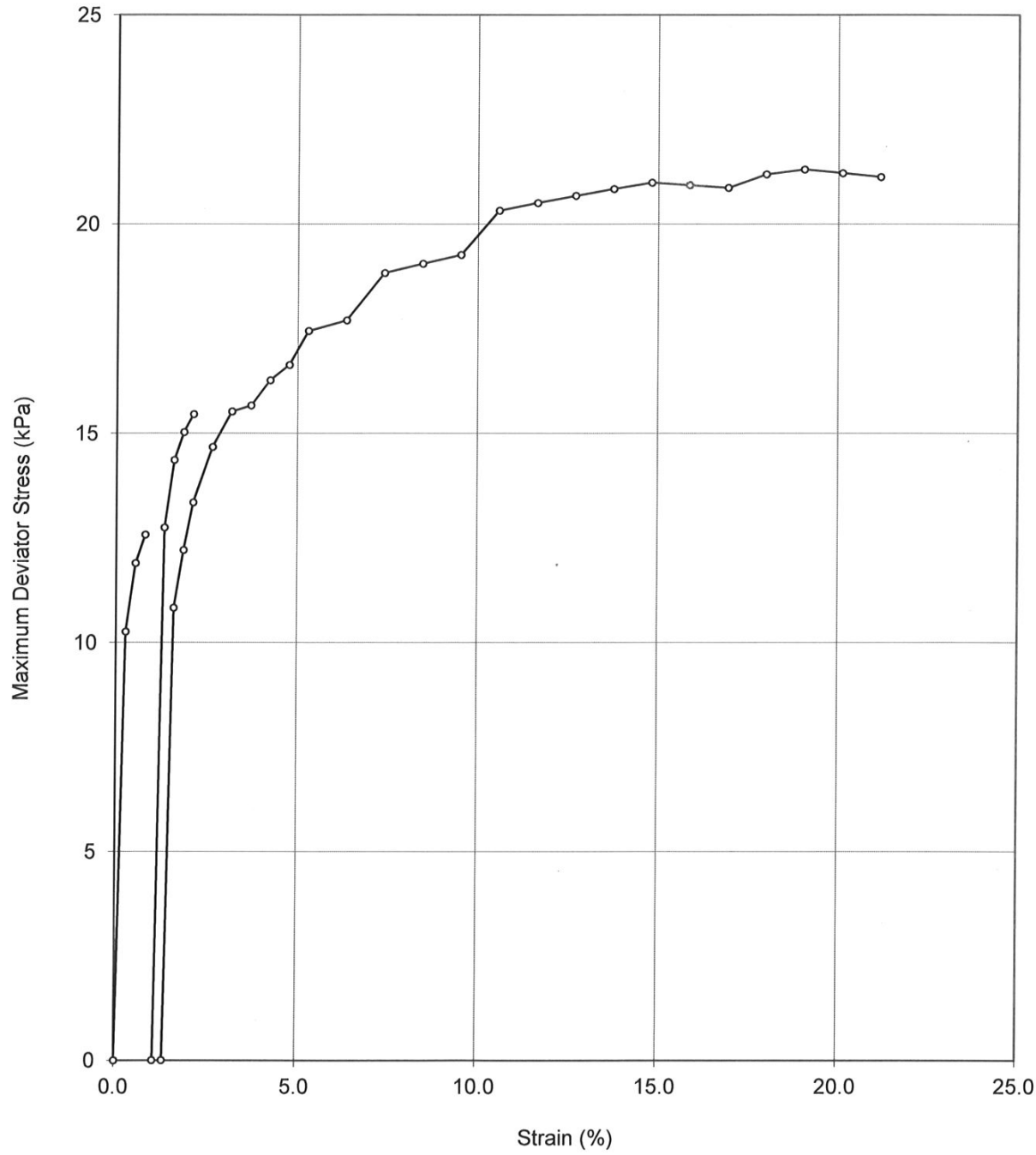
TRIAXIAL SHEAR TEST (STRESS STRAIN GRAPH)

Client :	Ports North	Report No. :	R12466
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301151
Location :	PN-TP3-003, CH 17683 (10.9m)	Sample No. :	
		Sampled By :	Client



Prepared by	Checked by

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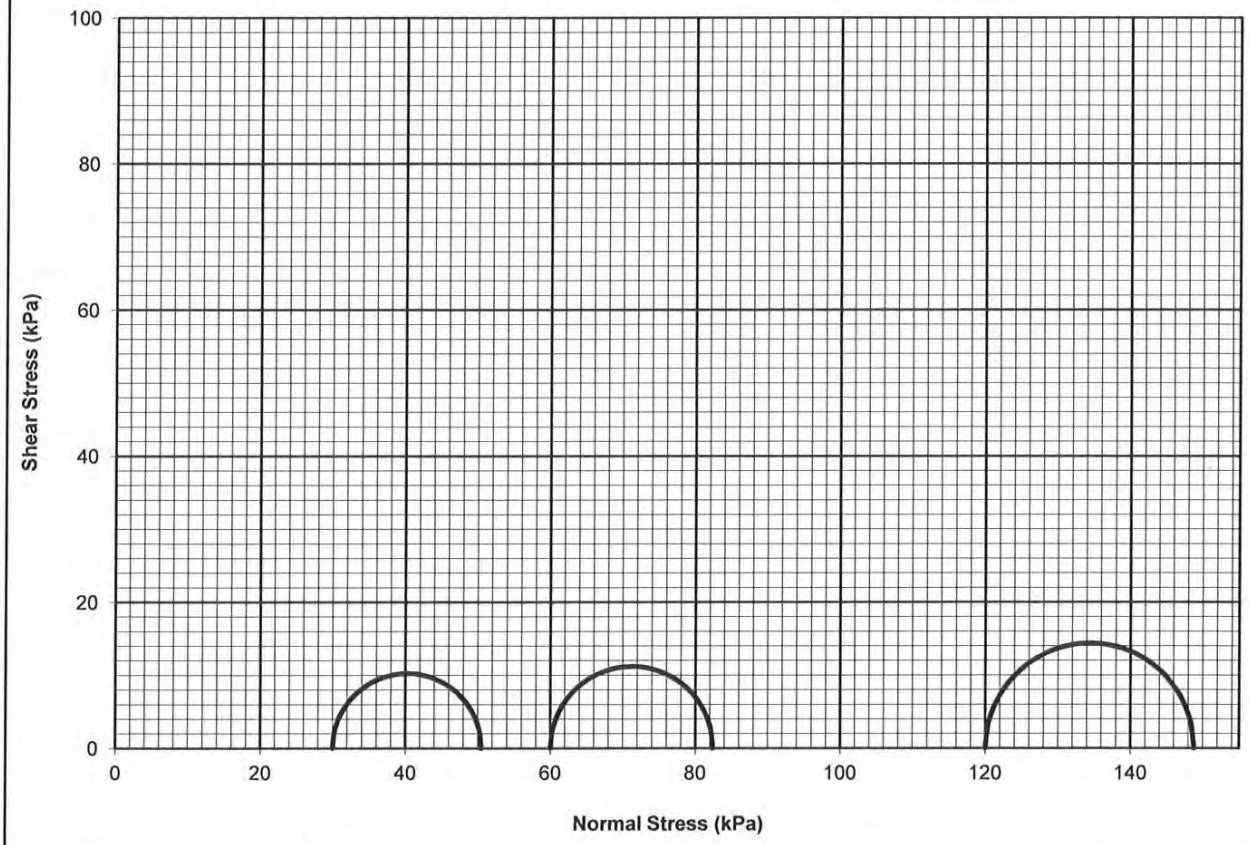
TRIAXIAL SHEAR TEST

Client :	Ports North	Report No. :	R12467
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301152
Location :	PN-TP3-004, CH 17683 (12.7m)	Sample No. :	
Date of Test :	21/03/12	Sampled By :	Client
Type of test :	Unsaturated, Unconsolidated, Undrained, Staged		

Sample Type :	Undisturbed	Strain Rate :	0.50 mm/min
Specimen Diameter :	47.0 mm	Specimen Height :	94.7 mm
Initial Moisture Content :	63.0 %	Initial Saturation :	100 %
Initial Dry Density :	1.00 t/m³		



Stage	Initial Cell Pressure (kPa)	Maximum Principal Stress (kPa) σ_1	Minimum Principal Stress (kPa) σ_3	Maximum Deviator Stress (kPa)	Failure Strain (%)
1	30	50	30	20	1.6
2	60	82	60	22	2.4
3	120	149	120	29	9.5

Failure Criteria :	Maximum Shear Stress
Remarks :	Shear plane at 45° after test.
Material Description :	(CH) Silty CLAY, dark grey
Test Procedure :	AS1289.6.4.1
Prepared by NK	Checked by GH

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22/3/12

Nick Farrer — Senior Technical Officer

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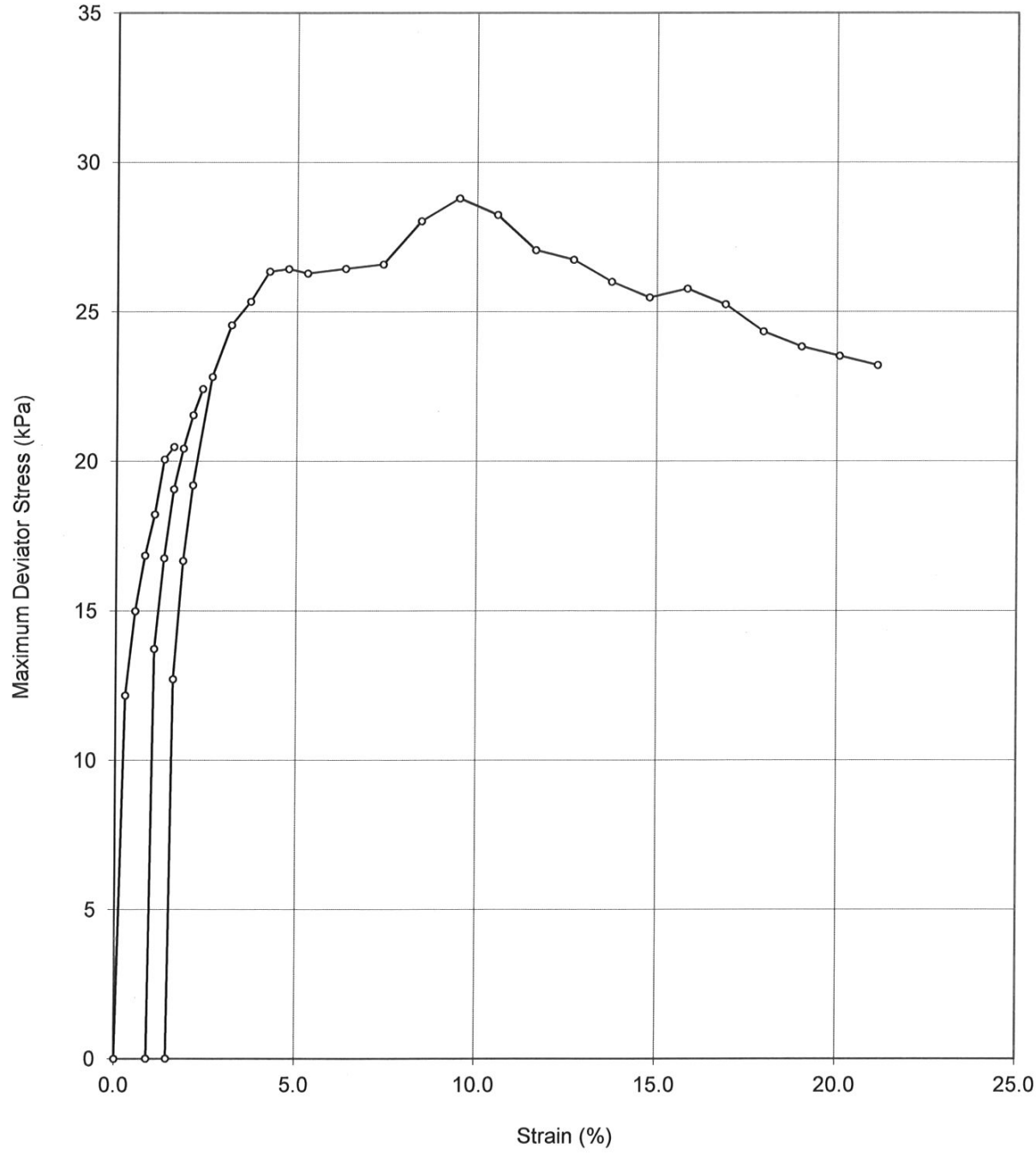
TRIAXIAL SHEAR TEST (STRESS STRAIN GRAPH)

Client :	Ports North	Report No. :	R12467
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301152
Location :	PN-TP3-004, CH 17683 (12.7m)	Sample No. :	
		Sampled By :	Client



Prepared by MF	Checked by GH

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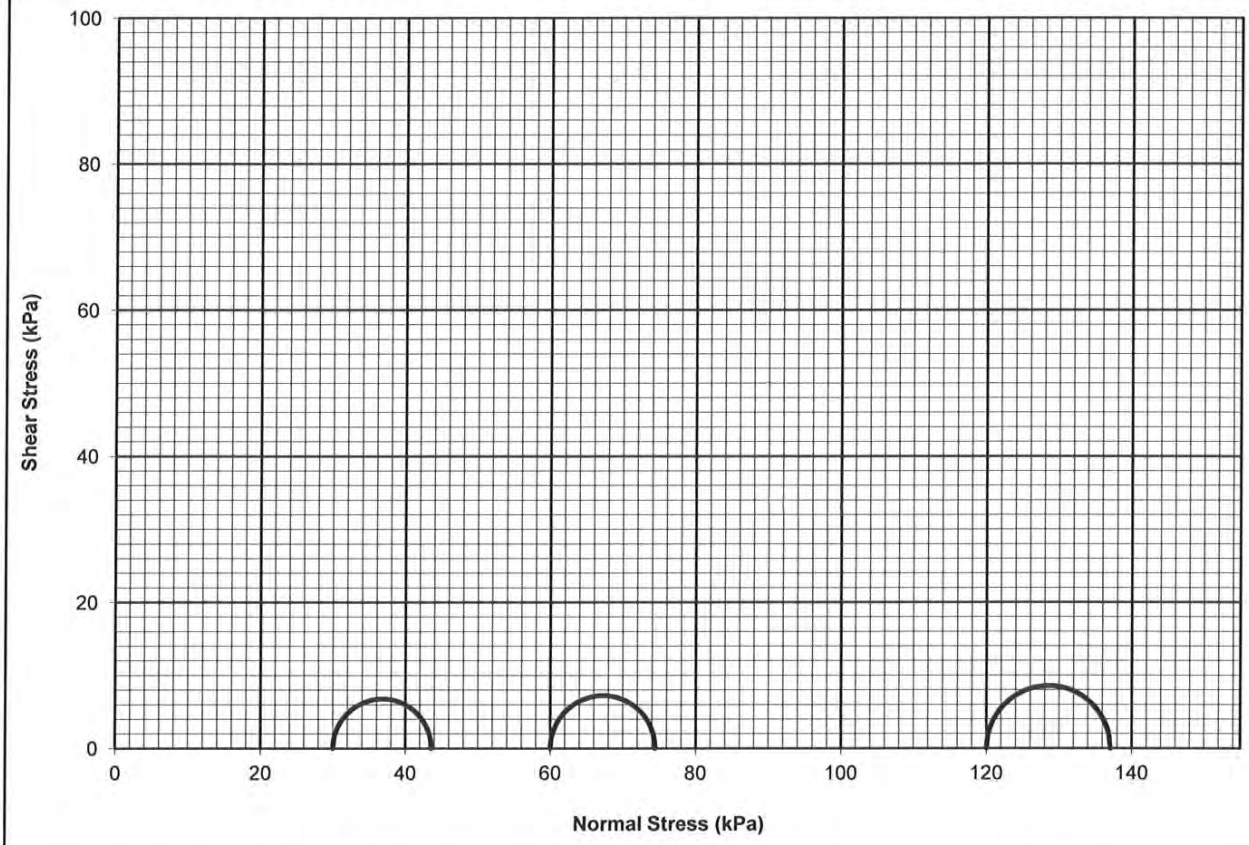
TRIAXIAL SHEAR TEST

Client :	Ports North	Report No. :	R12468
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301153
Location :	PN-TP5-002, CH 22508 (12.1m)	Sample No. :	
Date of Test :	21/03/12	Sampled By :	Client
Type of test :	Unsaturated, Unconsolidated, Undrained, Staged		
Sample Type :	Undisturbed	Strain Rate :	0.50 mm/min
Specimen Diameter :	47.0 mm	Specimen Height :	94.4 mm
Initial Moisture Content :	85.9 %	Initial Saturation :	98 %
Initial Dry Density :	0.80 t/m³		



Stage	Initial Cell Pressure (kPa)	Maximum Principal Stress (kPa) σ_1	Minimum Principal Stress (kPa) σ_3	Maximum Deviator Stress (kPa)	Failure Strain (%)
1	30	44	30	14	0.5
2	60	74	60	14	1.1
3	120	137	120	17	7.4

Failure Criteria :	Maximum Shear Stress
Remarks :	Shear plane at 45° after test.
Material Description :	(CH) Silty CLAY, dark grey
Test Procedure :	AS1289.6.4.1
Prepared by NK	Checked by RH

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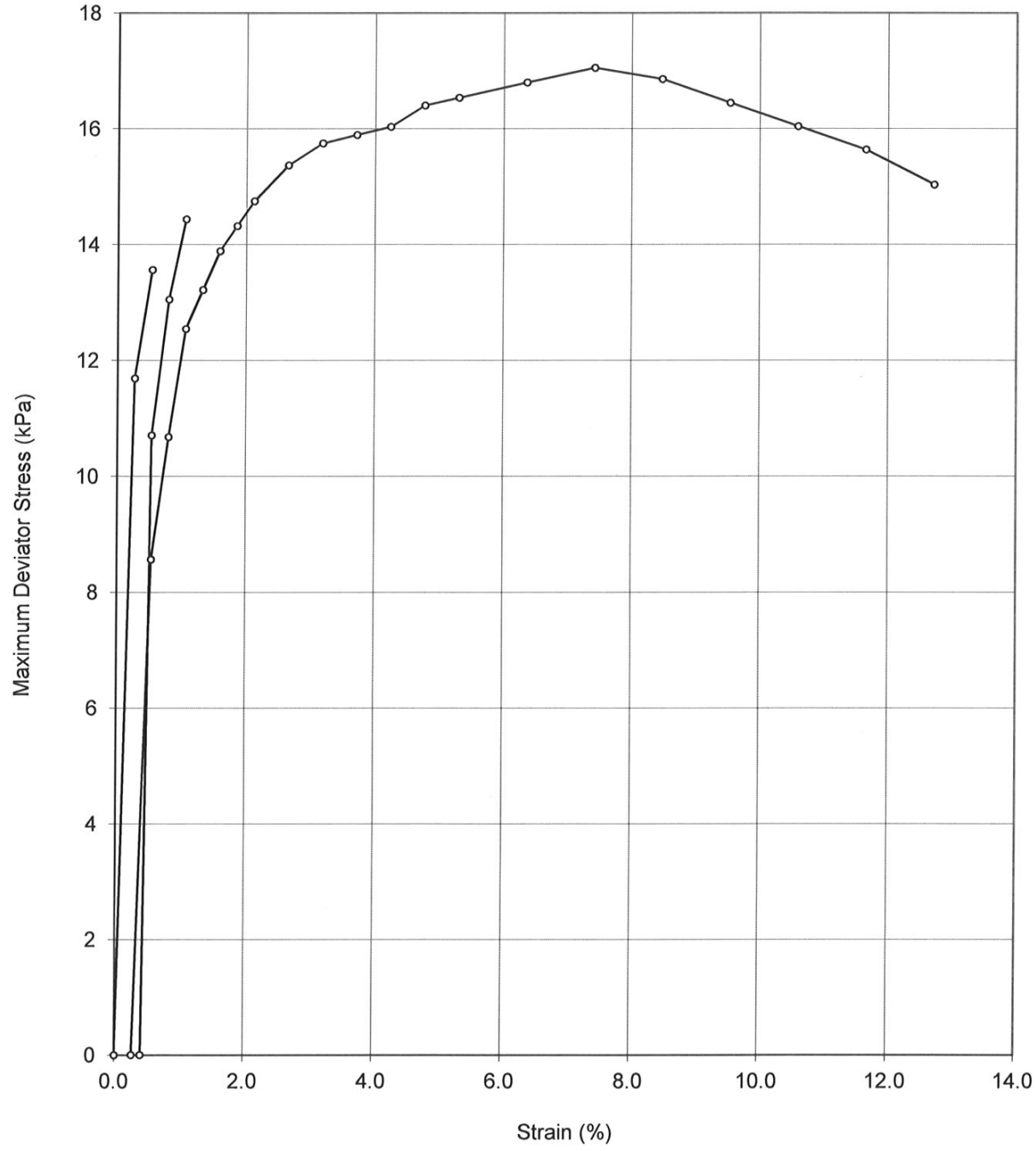
TRIAXIAL SHEAR TEST (STRESS STRAIN GRAPH)

Client :	Ports North	Report No. :	R12468
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301153
Location :	PN-TP5-002, CH 22508 (12.1m)	Sample No. :	
		Sampled By :	Client



Prepared by MC

Checked by

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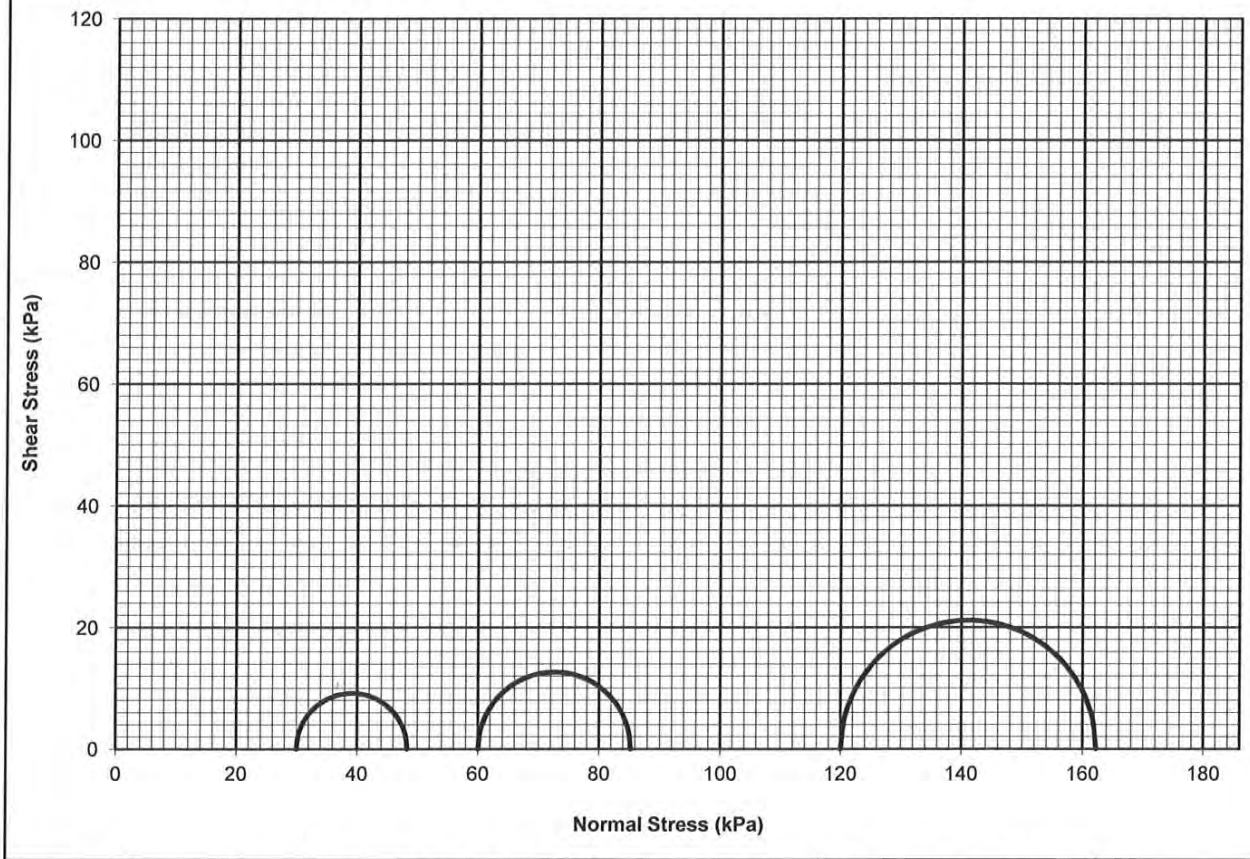
TRIAXIAL SHEAR TEST

Client :	Ports North	Report No. :	R12469
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301154
Location :	PN-TP5-004, CH 22508 (12.75m)	Sample No. :	
Date of Test :	21/03/12	Sampled By :	Client
Type of test :	Unsaturated, Unconsolidated, Undrained, Staged		
Sample Type :	Undisturbed	Strain Rate :	0.50 mm/min
Specimen Diameter :	47.0 mm	Specimen Height :	94.4 mm
Initial Moisture Content :	35.8 %	Initial Saturation :	66 %
Initial Dry Density :	1.10 t/m³		



Stage	Initial Cell Pressure (kPa)	Maximum Principal Stress (kPa) σ_1	Minimum Principal Stress (kPa) σ_3	Maximum Deviator Stress (kPa)	Failure Strain (%)
1	30	48	30	18	0.5
2	60	85	60	25	1.3
3	120	162	120	42	15.9

Failure Criteria :	Maximum Shear Stress
Remarks :	Shear plane at 45° after test.
Material Description :	(CH) Silty CLAY, dark grey
Test Procedure :	AS1289.6.4.1
Prepared by MK	Checked by GH

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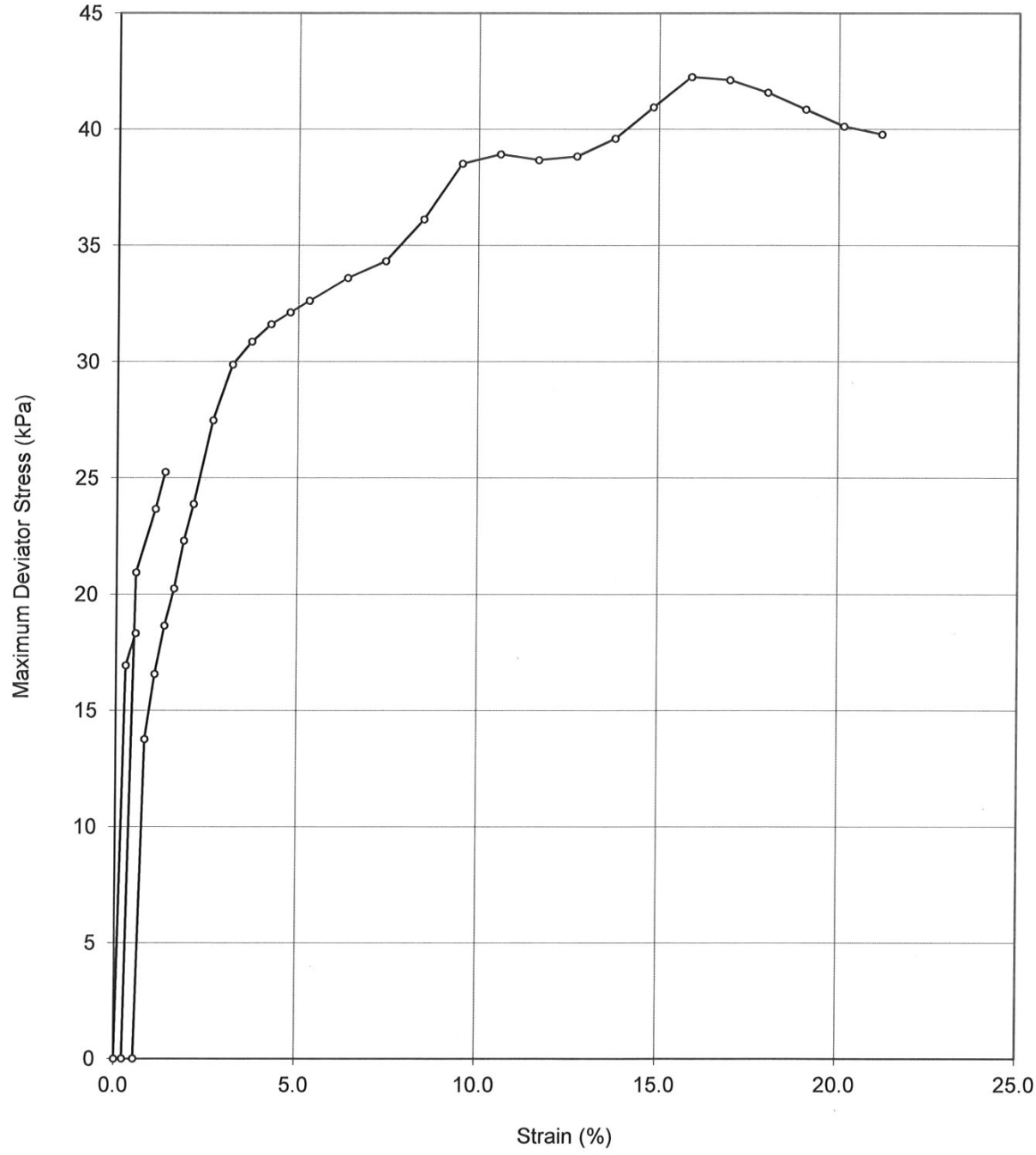
TRIAXIAL SHEAR TEST (STRESS STRAIN GRAPH)

Client :	Ports North	Report No. :	R12469
Address :	Corner Grafton & Hartley Streets, Cairns	Job No. :	107672522-5000
Project :	Dredge Material Assessment	Reg'n No. :	12301154
Location :	PN-TP5-004, CH 22508 (12.75m)	Sample No. :	
		Sampled By :	Client



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Checked by

Test Location	Depth Range (m - BGL)	Material Description	pH_{FIELD}	pH_{KCl}	TAA (kg H_2SO_4 /tonne)	sTAA Converted to %S*	S_{NAS} (if pH less than 4.5)	Existing Acidity %S (sTAA + 0.75 x S_{NAS})	Chromium Reducible Sulfur (S_{CR}) %S	Acid Neutralising Capacity %CaCO3 (if pH more than 6.5)	Net Acidity %S (S_{CR}+Existing Acidity - ANC/FF)	Is This AASS	Is This PASS	Liming Rate for Net Acidity (Neutralises both AASS & PASS) (kg/m3)
PN-TP1-001	0.0-0.5	CLAY, CH	8.27	9.3	< 0.5	< 0.016		0.000	0.012	0	0.012	No	No	NA
PN-TP2-001	0.0-0.7	CLAY, CI	6.76	7.7	< 0.5	< 0.016		0.000	0.110	1.6	-0.232	No	YES	No Additional Lime Required
PN-TP2-003	1.6-1.7	CLAY, CI	6.76	7.7	< 0.5	< 0.016		0.000	0.140	1.1	-0.095	No	YES	No Additional Lime Required
PN-TP3-001	1.5-2.8	CLAY, CH	7.39	8.7	< 0.5	< 0.016		0.000	1.700	2.2	1.230	No	YES	93.0
PN-TP3-003	2.8-3.2	CLAY, CH	7.23	8.7	< 0.5	< 0.016		0.000	1.700	3	1.059	No	YES	80.1
PN-TP4-001	3.3-3.4	CLAY, CH	7.76	9.0	< 0.5	< 0.016		0.000	0.400	9	-1.522	No	YES	No Additional Lime Required
PN-TP5-001	2.5-2.9	CLAY, CH	7.59	8.7	< 0.5	< 0.016		0.000	1.400	4.4	0.460	No	YES	34.8
PN-TP5-003	2.9-3.6	CLAY, CH	6.23	7.9	< 0.5	< 0.016		0.000	1.100	0.6	0.972	No	YES	73.5

Note: * Equivalent oxidisable sulfur calculated as TAA/30.59

Liming rates assume a bulk density of 1.60 t/m3

Fineness Factor = 1.5

TABLE 1
SUMMARY OF ACID SULFATE TEST RESULTS

Client Ports North

Job Title Dredge Material Assessment

Location Cairns Shipping Channel

pH FIELD TESTS

Method: As per the Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998.

Client :	**Ports North**	**Project Number :**	**107672522 - 5000**
Project :	**South Foreshore - Dredge Assess**	**Tested By/Date :**	CWG - 8/03/2012
Location :	**Trinity Inlet Shipping Lane**	**Checked By / Date :**	

pH Meter No. :	Gac501	**pH Peroxide :**	4.05
Date pH Meter Calibrated :	**8/01/2012**	**pH Distilled Water :**	5.92

Hole No.	Depth (m)	Soil Type	pH	pH fox	reaction	PASS Potential high	PASS Potential medium	PASS Potential low
PN-TP1-001	0.0-0.5m	soft clay	8.3	6.4	very slight			
PN-TP2-001	0.0-0.7m	soft clay	6.8	5.4	slight			
PN-TP2-003	1.6-1.7m	firm clay	6.8	4.4	slight			
PN-TP-3-001	1.5-2.8m	soft clay	7.4	4.9	veryreactive			
PN-TP-3-003	2.8-3.2m	firm clay	7.2	3.0	veryreactive			
PN-TP4-001	3.3-3.4m	soft clay	7.8	5.8	moderatlyreactive			
PN-TP5-001	2.5-2.9m	soft clay	7.6	5.1	veryreactive			
PN-TP3-003	2.9-3.6m	firm clay	6.2	2.8	veryreactive			

Input By:BAG
Date: 3/04/2012
Checked By: PKS
Date: 3/04/2012

Golder Boreholes 2013

28 October 2016
Report No. 1546223-006-R-Rev2