### **Appendix 5**

### **Chandler Geotechnical Pty Ltd**

Acid Sulphate Soil Investigation April 2004

PO Box 5720 Port Macquarle NSW 2444 Phone (02)65810142 Fax (02)65810129

### **TEST BORE REPORT**

CLIENT:

Tuke & Co Pty Ltd

**PROJECT NO: 23159** 

BOREHOLE: 1

PROJECT: Rainbow Beach DATE: 14,4,04

METHOD OF

LOCATION: Bonny Hills

LEVEL:

Existing

ADVANCE: Spiral flight

LOCATION.	normy miles	auger
DEPTH METRES	SAMPLES TESTS	DESCRIPTION OF STRATA ( SQIL TYPE, STRENGTH, MOISTURE, COLOUR, ORIGIN )
		TOPSOIL. Silty SAND, dark brown, sands fine grained, low to non-plastic fines.
0.50 	"D" PM 6402	45
		SAND, pale grey, fine to medium grained.
_ 1.00	"D" PM 5403	
	"D" PM 5404	SAND, orange-yellow, fine to medium grained, wet.
1.50		
-	"D" PM 5405	
_ 2.00		
-	"D" PM 5406	Sity CLAY, pale grey, medium to high plasticity, sands fine grained, mc >> wp.
2.50	"D" PM 5407	Silty sandy CLAY, mottled grey & rad, medium to high plasticity, sands fine to medium grained, mc > wp.
F	1	
3.00	"D"PM 5408	
-		#
3.50	"D" PM 5409	
Ė.	11100	Borehola terminated 3.5 metres.
-		- N
4.00		

. . . . . . . . . . . . . . . . . . .

RIG:

LOGGED:

SC

GROUND WATER:

None encountered

REMARKS:

SAMPLES & TESTS

D Disturbed sample U Undisturbed tobal sample

A Bulk sample

pp pocket penetrameter

07/03

T27

ABN 83 066 029 329

PO Box 5720 Port Macquarie NSW 2444 Phona (02)65810142 Fax (02)65810129

### **TEST BORE REPORT**

CLIENT: Luke & Co Pty Ltd

PROJECT NO: 23159

BOREHOLE: 2 METHOD OF

PROJECT: Rainbow Beach LOCATION: Bonny Hills

DATE: 14.4.04
LEVEL: Existing

ADVANCE: Spiral flight

auger

		auger
DEPTH METRES	SAMPLES TESTS	DESCRIPTION OF STRATA (SOIL TYPE, STRENGTH, MOISTURE, COLOUR, ORIGIN)
0.50	"D" PM 5410	TOPSOIL. Silty SAND, dark grey, sands fine to medium grained, low to non-plastic fines.
1.00	"D" PM 5411	Silty CLAY, pale grey, medium to high placticity, sands fine grained, mc >> wp.
-	"D" PM 5412	
1.50 	"D" PM 5413	SAND, grey, fine to modium grained.
2.00 	"D" PM 5414	SAND, orange-yellow, fine to medium grained.
2,60	"D" PM 5416	SAND, pale grey, fine to medium grained.
3.60	"D" PM 5416	
3.50	"D" PM 5417	W.
4.00	"D" PM 6418	Borshole terminated 4,0 metres.

RIG:

Jacro

LOGGED:

SC

GROUND WATER:

None encountered

REMARKS:

SAMPLES & TESTS

O Dialuted edings U Underunbed tube sample

8 Bulk sample

pp pocket penalrometer

07/03

T27

ABN 83 066 029 329

PO Box 5720 Port Macquarie NSW 2444 Phone (02)65810142 Fax (02)65810129

### **TEST BORE REPORT**

CLIENT: Luke & Co Pty Ltd

**PROJECT NO: 23159** 

BOREHOLE: 3

PROJECT: Rainbow Beach DATE: 14.4.04

METHOD OF

LOCATION Honny Hills

LEVEL:

Existing

ADVANCE: Spiral flight

	•	auger
DEPTH METRES	SAMPLES TESTS	DESCRIPTION OF STRATA ( SOIL TYPE, STRENGTH, MOISTURE, COLOUR, ORIGIN )
SO IMIO		TOPSOIL. Silty SAND, dark grey, sands fine to medium grained.
- - - - -	"D" PM 5419	Silty CLAY, pale grey, medium to high plasticity, sands fine grained, mc > wp
- 1.00	"D" PM 5420	
1.50	"D" PM 5421	Sandy CLAY, gray with some orange staining, modium to high plasticity sands fine to medium grained, mc > wp.
2.00	"D" PM 5422	SAND, pale grey-brown, fine to medium grained.
2.60	"D" PM 5423	
3.00 	"D" PM 5424	
- 3.50 - -	"D" PM 5425	
- - 4.00	"D" PM 6426	Borehole terminated 4.0 metres.

RIG:

Jacro

LOGGED:

SC

GROUND WATER:

None encountered

REMARKS:

### SAMPLES & TESTS

D Disturbed sample U Undiaturbed tups sample

A Rollic asmpla

pp pockel penalromelar

ABN 83 066 029 329

PO Box 5720 Port Macquarie NSW 2444 Phone (02)85810142 Fax (02)65810129

### **TEST BORE REPORT**

CLIENT:

Luke & Co Pty Ltd

**PROJECT NO: 23159** 

BOREHOLE: 4

PROJECT: Rainbow Beach DATE: 14.4.04

METHOD OF

ADVANCE: Spiral flight

LOCATION: Bonny Hills

LEVEI .

Existing

auger

DEPTH METRES  SAMPLES TESTS  TOPSOIL. Slity SAND, dark grey, sands fine to medium grained.  SAND, pale grey-white, medium grained.  1.00  "D" PM 5428  SAND, dark brown, fine to medium grained wet.  2.00  "D" PM 5430  "D" PM 5431  3.00  "D" PM 6432	augu		
SAND, pale grey-white, medium grained.  1.00 "D" PM 5428  1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431	iiN )		
SAND, pale grey-white, medium grained.  1.00 "D" PM 5428  1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431			
1.00 "D" PM 5428  1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431	800 - 20-		
1.50 "D" PM 5429 SAND, dark brown, fine to modium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431		1	
1.50 "D" PM 5429 SAND, dark brown, fine to modium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431		1	
1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431		0 "D" PM 6427	_ 0.50
1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431			5
1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431			.0
1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431			•
1.50 "D" PM 5429 SAND, dark brown, fine to medium grained wet.  2.00 "D" PM 5430  2.50 "D" PM 5431		0 "D" PM 5428	1.00
2.00 "D" PM 5430 2.50 "D" PM 5431		D 7 (a) 3420	
2.00 "D" PM 5430 2.50 "D" PM 5431			
2.00 "D" PM 5430 2.50 "D" PM 5431			
2.00 "D" PM 5430 2.50 "D" PM 5431			
2.50 "D" PM 5431		0 "D" PM 5429	_ 1.50
2.50 "D" PM 5431			• [
2.50 "D" PM 5431			*1
2.50 "D" PM 5431			
		0 "D" PM 5430	2.00
			-
		0 "D" PM 5431	2.50
3.00 "D" PM 6432			
			-
3.00 "D" PM 6432		t:	
			7 200
		0 "D" PM 6432	_ 3.00
T I			0
			e ====================================
3.50 "D" PM 5433		0 "D" PM 5433	3.50
-		1	•
Silty CLAY, (marine mud) grey, high plasticity, mc >> wp.		F	• • }
Sitty CLAY, (marine mud) grey, ingli plasticity, inc >> wp.			-
4.00 "D" PM 5434 Borehole terminated 4.0 metres.		0 "D" PM 5434	4.00

RIG:

Jacro

LOGGED:

COMMUNICATION N. ..

SC

GROUND WATER:

None encountered

REMARKS:

### SAMPLES & TESTS

D Disturbed sample U Undisturbed tube semple

B Bulk sample

pp pocket penetrometer

07/03

T27

COMMUNICATION No. 41

## RESULTS OF ACID SULPHATE SOIL ANALYSIS (Page 1 of 2)

33 tampice tupplier by Chandler Geolechmas on 28rd April, 2004 - Lab. Job No. E1886 Analysis requested by Spaye Chandlan

	Total April	
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1		
_		

	-							Treed Street		Br. 28 US JAPAN	Maintraffing	COMPLAIN
(F)	Faglsto	- 18 18 18 18 18 18 18 18 18 18 18 18 18	22 SKREENIN	SIBLO SURGERING TECHNOLE	us.	Pactured translavia Suspirur (* chaminim reducibik .S)	<b>新</b>	Acklity (TAA)	Density Come Divini	6	Calculation Kg Limphy*	RE Chestituation as boboile and suichate sol (ABS) Dyead of ASC resulties
٦	Ingke 9)	Woler	portacion	pH chiese	Reschan	(#Sect   Dom 4:	1			1-		
	- I			100			40.4	9010	1.24	÷	40	NOT Potential ASS
_	Fine	4.10	4.35	0.25	2	•	17.4	2.00			6	MOT Potential ASS
	ŭ	17.6	4.07	0.36	٩p	0.00%	4.45	0.032	ct. 1	7.5	- 7	ANT DOLANDER ACS
	24	22.5	4.40	80.0	9	•	4.65	0.018	1.49	:	ტ 	SON TOP STORY
	isome i	1 1 1		250	\$		4.83	0.607	1.79	,	<b>6.</b> 0	Not repeting non
₩.	Mechum	4.25.44	, O	0.35	2 :	•	7	8000	1.44		0.0	NOT Poleriful ASS
2.2 N	Medium		4.4	62.0	2	3		000	. 46		9	NOT Potential ASS
-	ir. Blis	3.89	4.20	0,3	2	14	4,3	0.023	0 1	, ς		NOT Peredial ASS
-	<u>g</u>	3.61	3.95	0.34	S <sub>S</sub>	0.005	4.05	0.028	1.35	7, 6		NOT Potential ASS
) LG	7. 5	67.79	4.18	0.31	°Z	0,003	4.18	0.027	1.25	5.0	-	
												RACT Potential ASS
u c	Medium	4.43	4.28	-0.15	No	:	1		1.20		: ₹	MCIT Potential ASS
-	000	78	4	800.	S	0.012	4.05	0.180	1.09	±,	) i	000
	<u>.</u>	5	2 0		2	0 003	3 98	0.359	1 00	0.1	2.9	TO LEGISLATION
E'1	FIND	3.7.5	3.74	3	2 :	200.5	7 11 7		1.68	1	0.9	ROT Poreviol A.S.
5.	Coarse	4.16	4.25	0.07	2	<b>S</b>					0.8	MOT Paterhial ASS
2.0	Coase	4.27	4.21	800	2	*:	6.4					NOT Potential ASS
_	Course	4.62	4,60	-0.02	2	ŧ.	1		20.	:		I NOT Polential ASS
_	Medium	1.78	6,70	.0.06	No	•	٠	ż	75.	: ;	:	YES Potential ASS
100	Medium	4.82	3 89	-0.93	Ą	0.082	:		25.	r	: c	YES Potential ASS
2 V	Corre	4.79	3.91	-0 88	S	0.067	6.40	0.001	527	Filter New 6 B 7	Rofe	

2 - Samples analysed by POCAS enclode (a Peroxide Darlance - Contanga Askriv and Pulphato Version Liptorial published published provided and Chromism Reducible Sulphar' sechnique (Scr.- Wethod 22B) in stitutus is Din Yakuni (Un) samples tried and ground impediately upon titing furture cupplies doad and grithtiff

3 - Methods from Styne, Y. Aven Cit. and Blurden D. (1998). Acid Sulginare Soil Magual 1999, A3SMAC, Wellengsar, NSW.

4 - Total caban and total judphus determined using a Lecto CRB 2000 analysa

E. Bulk Herely was obsermited impressively on sorter to laboratory (from to built comety is preleased)

6 - Neutralising Piccuire went (based on NACP, chrominn reducible solicher or solicient) ≈ Kg 1,500,00 mm x būk denstry

7 - 1 🎀 neutraliskog (equinoment does nos snoùzide a súdaly mangin 'er complete neutrakailon (a jackor el 1.5 le oten reeconomendos)

11. Conductivity & CSm = 1 mission = 1000 usizem

9 - For Texture; COB to = stacks to likelity sours, modilion = sonty losins to light days; link = hinchen to heavy clays and sky days no. Neutralogism colorises for the light of the sum or other leads on On and TAA).
11 - The days authorize screening technique is compatily \$407 MATA registered.

(Chaselikation of potential soic sulphile mainfall it: opens Scr20.13%6; medhum Scr20.06%6; fine Scr20.1%6) (equivalent consertions - 0.03% a 2.019 acole/ Kg; 0.06%s = 0.037 male/ Kg; 0.1%s = 0.062 acole/ Kg}

Projects has distrib stood tunges of ASS toto with advance, a decialled number minited in may be required.



Environmental Analysis Ishoratory

## RESULTS OF ACID SULPHATE SOIL ANALYSIS (Page 2 of 2)

33 Simples supplies by Chandler Georgechiffica, on 2004 Agri, 2004 - Laio 3co No. E1988 Anaysis requested by Stews Chander.

							De-filtrand formanish	-	Total Actual .	Leb. Bulk	Keutralishng	Nontraksing	COMMENTS
Springle Site	Deptil	Texture	<u>a</u>	KEELES OF	RELO SCREDANO TECNINOLE	וש	anidine.	12	Achilly (TAN)	Danasky	Californian	Calcutation 5.4 theory	per clayer action as parenten acre welfambs acid (ASS) (because acid (ASS)
*	(E)	- 60 400	Majejek	Integral pH attel	oh charge	Rection	[% chremlum redocable 5) (%Snr) (note 2)	Ę.	Choles Mg	Tonna Diving	(bird on Caci)	(baset Gn TAA)	(skinter)
S-11-11-11-11-11-11-11-11-11-11-11-11-11													
4	e c	i.	4 22	4.10	-0.03	ź	2000	4.20	0.044	1.14	0.5	2.5	ACT Potential ASS
SH'S	5	, e	7.60	n (	200	: :		4 63	111	1 76	:	9.8	NCT Presental ASS
BH3	<u></u>	Medium	4.30	4,38	0.00	Ž		4.0				2.1	NCT Polential ASS
9H3	1.5	Madium	3.94	3,95	0.0	2	0,005	4.20	0.028	20.1	4.6	; +	200 Application ASS
EH3	2.0	Coarse	4.02	4.09	1 0.07	ŝ	0.005	4,38	0.015	1,56	7.4	-	Found Foundat ASS
274	, e	Coalse	4.63	4.84	0.21	No		:		1.59	1	7 )	One Jointon House
	i c	o day	4 5.4	A. R. R.	11 11	QN ON	0.005	4.86	0,008	1.67	e.0	5.5	
SHI .	7	200	, ,	200		2 4		1	1	1,73	*	t	NOT Polenilal ASS
BH3	(5) (2)	Coarse	4.62	4.53	\$ > >	2	12			80			NOT Potential ASS
BH3	4.0	Coarse	1 4.80	4.70	0.10	2	:	•		09.1	:		
								_					Nor Possile ASS
BHA	0,6	Coatse	_	4.98	0.21	2		:	:	1.46	•	;	Mot Poleulal ASS
BH4	1.0	Coarse	_	4.98	0,91	No	:	:	ŧ	1.45	: 3	: T	NAT Polential ASS
BHA	- L	Coarse	4.41	4.35	-0.06	Š	0,005	4.64	0,025	.20	Ç.2	ė: -	And the state of t
BH4	2.0	Coarse		4.60	0,0	No.	ŧ	3	*	٠ بر ي		;	MOT Potential ASS
RHA	9.0	Coarse		4.60	0.07	8	,	;	:	64.	: ]	; ;	Pological ASS
YIIG	i	Coarse		4.58	0.0	S N	0.007	4.98	0.005	1.48	. O. :	4.0	Sale land and
100	i r	Coares		3.10	-1.46	<u>89</u>	0.247	4.79	0.008	1,59	12.3	7.4	939 Tilliand 90 2
e de la	2 2	Charse	_	1 93	-2.05	<u> </u>	1.677	4.40	0.019	1.30	68.3	2	
	ž	1						ž.			Refer New 6 & 7	Relea Nation 6.6 F	

Paramontal Analysis I shoratoty

- Ali analysis is Dy worth (DW) - Samples they and protons amphibitions were limitess expliced death and proton

Z - Sarpies analysed by POGAS method (is Perceide Duidabon - Combroad Addily and Sulphare Vanion 3 wedsted peoblet probability and Chromum Pacticible Sulphare technique (Sur - Method 229)

3 - Maihods from State, Y. Angra CR, and Blurden E ("OUB). And Sulphate Soil Menual 1998. ASSIANC, Workingson, NEW

4 - Total cabor and book setting determined using a LECO GNS 2000 analyser

5 - Bulk Jensily was celatrathod infinitylately on arms to labeatory (in but density is pretatred)

d - Newmeigng Regulemenk (Joened on 1446.9, chroming reducibe sokonia on toal Bulphia) = Kg 14,504/kano x balk donsky

The nextraining requirement does not include a safety margin for extriplate neutralisation (a lactor of 1.5 is oden recommendes)

B · Conductivity 1 (Sim = 1 mStern = 1000 JSlom

8. For Toxique: corres = centre to loumy sensa, madium = sendy tosmisto light lays; fire = medium to heavy dayy and say days

10 - Neparalisation Calculation for mainfallation of actual and potential sciency (the surpressional transportation of calculation based on Creand TAA).

(Class)floation of potential soil sulphate majorist If: coates Sorzü.03%S; madium Sorzüü6%S; lins Scr20.1%S) (equivalent convanions - 0.03%S = 0.015 motel Kg; 0,08AS = 0.337 motel Kg; 0.1%S = 0,082 motel Kg)

\* Projecte Ital disurb > 1000 younes of ASS exis with 20.03% 9, & dewled monegonast plan may be mquinad.



100

Rainbow Beach Estate.

Client Like & Co	Project 25036
	Technician Ableserion Chook.
Sample Location Bonny	bills Lote.
Sample time 3:42	

vepth.	2.5m	2-0m	1.5m	1-0m	0.5m	0.0m.
Temp	19.97	21:31	25.26	25-47	25.52	25.55
Doolved	74.5	88.4	127.4	128.2	128.3	128.5
Ph	6.49	6.50	7-07	7.08	7-10	7-09.
ORP	139.8	143.7	139-6	1410	141.8	141.3
ms/cm <sup>3</sup>	0.200.	0.218.	105.0	0.199	0199	-0.203

Notes:		

Rambow Beach Estate.

Client Like & Go Project 25036

Date 13-10-5 Technician Chook & Many.

Sample Location Bray Centre of Lake.

Sample time 12:00

vepth	2.5m	2.0m	15m	1-0m	0.5m	0.0-
Temp	19:72	23.2	23.36	2.3.42	23.44	23.42
Disolved Oxygen	78.4	127.2	129.1	127.5	129.5	1260.
Ph	6.40	6.94	6.99	7.00	7.01	7.00
ORP	197-2	186-5	186-8	125-1	186-0	125.8.
ms/cm²	0-169	0.169	0.169	0-169	0.169	0.169

Notes:	
*	

Rambow Beach Estate.

Client Like & Co Project 25036 Date 29/9/05 Technician Noces & Chack. Sample Location Boay Contre of Lake.

Sample time 13:00

vepth.	2.5m	2.0m	1.5m	1-0m	0.5m	0.0m.
Temp	17-45	18.75	19.85	21.20	21.50	22.0
Doolved Onger	63-5	88.8	104-0	117.7	116-7	100-1
Ph	6.34	6.44	6.60	6-78	6.80	6-83
ORP	310.6	287.1	261-2	222.0	211.7	200.0
ms/cm3.	0.165	0.165	0-165	0.165	0.164	-0.165

Notes:	. A		

### **Coffey Geosciences Pty Ltd**

trading as

### **Chandler Geotechnical**

Unit 1/37 Jindalee Road, Port Macquarie NSW 2444 Telephone (02) 65810142 Fax (02) 65810129

### **WATER TEST RESULTS**

**CLIENT:** 

Luke & Co

**PROJECT No:** 

PML032

**PROJECT:** 

Rainbow Beach Lake

**REPORT No:** 

PML032-1

**LOCATION:** 

Bonny Hills

DATE:

17.2.06

Depth (metres)	Surface	0.5m	1.0m	1.5m	2.0m	2.5m
Temperature °c		24.7	24.7	24.7	24.7	24.6
Dissolved Oxygen %		74.4	81.2	70.6	72.1	45.5
рН		6.96	7.07	6.91	7.40	7.01
ORP		53.0	82.1	50.9	76.2	74.3
Conductivity mS/cm		0.221	0.216	0.221	0.217	0.219

Equipment Used
YSI 556 Multi Probe System/Data Logger

S.Chandler

### checked:

# RESULTS OF WATER ANALYSIS (Page 1 of 1)

1 sample supplied by Chandler Geotechnical Pty Ltd on the 23rd February 2006 - Lab. Job No. E5292

Analysis requested by Steve Chandler - Your Project: PML032, Rainbow Beach

PARAMETER	METHODS REFERENCE	Sample 1 PM6873
	Job No.	E5292/1
TOTAL PHOSPHORUS (mg/L P)	APHA 4500 P-H	0.02
TOTAL NITROGEN (mg/L N)	APHA 4500 N-C	0.62

### Notes:

- 1. 1 mg/L (milligram per litre) = 1 ppm (part per million) =  $1000 \, \mu \text{g/L}$  (micrograms per litre)=  $1000 \, \text{ppb}$  (part per billion)
- 2. Analysis performed according to APHA, 1998, "Standard Methods for the Examination of Water & Wastewater", 20th Edition, except where stated otherwise.
  - 3. Analysis conducted between sample arrival date and Report provision date
- 4. \*\* denotes these test procedures are as yet not NATA registered but quality control data is available

