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SPECIALISTS MANAGING THE EARTH

PRELIMINARY GEOTECHNICAL ASSESSMENT
PROPOSED RURAL RESIDENTIAL SUBDIVISION
600 SEAHAM ROAD, NELSONS PLAINS NSW

Le Mottee Group Pty Ltd

GEOTWARA22010AA-AB
5 April 2013

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
19 Warabrook Boulevard Warabrook NSW 2304 Australia

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SPECIALISTS MANAGING THE EARTH

5 April 2013

Le Mottee Group Pty Ltd
199 Adelaide Street
RAYMOND TERRACE NSW 2324

Attention: Nicole Gerrard

Dear Nicole

RE: PRELIMINARY GEOTECHNICAL ASSESSMENT
PROPOSED RURAL RESIDENTIAL SUBDIVISION
600 SEAHAM ROAD, NELSONS PLAINS NSW

1 INTRODUCTION

At the request of Le Mottee Group Pty Ltd, Coffey Geotechnics Pty Ltd (Coffey) has undertaken a preliminary assessment of on-site effluent disposal capability and geotechnical constraints for Lot 1, DP 1014480, 600 Seaham Road, Nelsons Plains NSW.

The proposed development of the site is understood to comprise the subdivision of approximately 114ha into 50 small holding lots, each having an area of 4000m^2 on the western portion of the site and one large 40ha lot on the eastern portion of the site, it is understood no development is proposed on this eastern portion.

The objectives of this preliminary assessment, which was commissioned by Le Mottee Group Pty Ltd, were as follows:

- Provide a preliminary assessment of the suitability of the land for on-site effluent disposal from residential dwelling;
- Geotechnical constraints to development.

Coffey conducted the assessment in general accordance with our fee proposal, reference GEOTWARA22010AA-AA dated 18 February 2013.

2 SITE EVALUATION

2.1 Evaluation Procedure

The evaluation involved the following steps:

- Desk top study involving a review of available geological, topographical and soil maps, published information and relevant reports held within Coffey files;
- Drilling of four hand auger boreholes widely spaced across the site;
- Observation of surface conditions over the site and the immediate surrounding area by an experienced geotechnical engineer from Coffey. Some of the observed features are shown on Figure 1 in the attachments to this report.

2.2 Site Conditions

The site is located at 600 Seaham Road, Nelsons Plains and is about 114 hectares in area.

At the time of the field investigation vegetation comprised thick grass that covered the majority of the site, which made assessment of geological (such as rock outcrops) or other surface features (eg. erosion scouring) difficult. The approximate extent of areas inundated by water, over the eastern portion of the site, is presented in Figure 1 attached. It is understood that these wet areas are a result of recent rain. . Surface slopes across the site ranged from near level to about 9 degrees, but were generally in the order of 5 degrees, as presented in Figure 1. No erodible/dispersive surface soils were noted during the field investigation. Photographs of the site are shown in Photo 1 to Photo 3 below.

Photo 1 – Looking east from centre of site

Photo 2 – Looking south east from centre of site

Photo 3 – Looking west towards north western corner of site

2.3 Site Geology

Reference to the Newcastle 1:100 000 Geology Map indicates that the western portion of the site is underlain by the Branxton Formation of the Maitland Group which is noted to comprise conglomerate, sandstone and siltstone and the eastern portion of the site is underlain by Quaternary aged alluvium which is noted to comprise silt, sand and gravel.

3 SOIL EVALUATION

3.1 Evaluation Procedure

Soil and subsurface profile evaluation involved:

- Desktop study, including review of geological and soil maps;
- Limited subsurface investigation comprising the excavation of four hand auger boreholes.

- Engineering logs of the boreholes are presented in Appendix B together with explanation sheets defining the terms and symbols used in their preparation. The approximate locations of the boreholes are shown in Figure 1 Appendix A.

3.2 Soil and Subsurface Conditions

Subsurface materials encountered in the boreholes are presented on the Engineering Logs in Appendix B and are summarised in Table 1 below:

TABLE 1 - SUMMARY OF SUBSURFACE CONDITIONS

BOREHOLE	DEPTH OF TOPSOIL (M)	SUMMARY OF SOIL PROFILE	DEPTH TO HAND AUGER REFUSAL WHERE ENCOUNTERED (M)	DEPTH TO GROUND WATER INFLOW (M)	COMMENTS
HA01	0.20	Sandy Clay and Clayey Sand, low plasticity, medium to coarse grained, brown, trace of gravel, colluvium and Clay and Sandy Clay, high plasticity, brown and orange, trace of gravel, residual	1.75	0.7	Located outside of proposed development area
HA02	0.30	Clay and Sandy Clay, high plasticity, very stiff, pale brown to orange, trace of sand and gravel, residual	0.80	Not observed	
HA03	0.35	Clay and Sandy Clay, stiff to hard, pale brown to orange and brown to red mottled pale grey, trace of sand, residual	>1.5(no refusal)	Not observed	
HA04	0.15	Clay, high plasticity, stiff to very stiff, brown to orange, with a trace of sand, residual	0.95	Not observed	

Hand auger boreholes HA01, HA02 and HA04 were terminated due to hand auger refusal on inferred rock at depths ranging from 0.8m to 1.75m. HA03 was terminated at a depth of 1.50m and did not encounter refusal.

Groundwater inflow was encountered in borehole HA01 at a depth of 0.7m. No groundwater was encountered in the other boreholes during the investigation.

4 SELECTION OF EFFLUENT DISPOSAL SYSTEM

The following onsite systems are commonly used in NSW for disposal of treated domestic effluent where a reticulated sewer system is not available:

- Absorption beds or trenches;
- Evapotranspiration assisted trenches or beds;
- Irrigation areas;
- Mound Systems.

It is assumed that the effluent has been chemically treated and or aerated in holding tanks before disposal by one or more of the above methods, or in the case of primary treatment only(ie.by septic tank) a 100% reserve would need to be placed over the disposal site. Limiting factors encountered by the site and soil evaluation will have a strong bearing on the type of system preferred. Factors influencing system selection are summarised in Table 2 below. Also, surface water ponding or inundation is not desirable for any of the above systems and site drainage would need to be improved in the areas affected by inundation during development to ensure that effluent storage and disposal areas are not located where inundation remains possible.

Based on the information contained in Section 2 and 3 of this report and the limiting factors presented in Table 2, mound systems would be considered feasible for the site.

Conventional absorption trench systems would not be recommended due to the shallow soil profile and slopes of greater than 5%. Evapotranspiration assisted irrigation systems would also not be recommended due to the shallow soil profile.

TABLE 2 - TYPICAL LIMITING FACTORS INFLUENCING SYSTEM SELECTION

SYSTEM	TYPICAL LIMITING FACTOR
Conventional absorption trench/bed or subsurface irrigation system	Trenches difficult on slopes >5% slope.
	Require soil depth > 1.2m.
	Low permeability (Category 5 or 6) soils require impractical trench lengths particularly for conventional septic tank.
	Require water table >1.2m deep.
	Dispersive soils require impractical trench lengths.
	High rock or cobble content inhibits absorption.
	Large lots required. 100% reserve area required for primary treated effluent disposal (ie. septic tank)
Evapotranspiration assisted absorption bed/trench or irrigation area	5% recommended maximum slope for bed or surface irrigation.
	Up to 25% slope acceptable for trench or subsoil irrigation.

	Minimum soil depth 1.2m for trench or bed, minimum 0.4m below lines for irrigation.
	Soil categories 4-6 preferred.
	Require >1.2m depth to water table.
	Dispersive soils a limitation require treatment.
	High cobble or boulder content inhibits infiltration.
	Water balance required.
	Lot size – require sufficient area for disposal and buffer. Partial reserve area recommended for low permeability soils.
Mound Systems	Maximum practical slope 15% steeper slopes require large quantity of imported sand and induce risk of soil seepage.
	Soil depth not important.
	Can be used for all soil categories 1-6.
	Preferred >0.6m to water table. Can design for shallower water table if required.
	Cobble, stone or boulder content not important
	Lot Size – can occupy small area on flat land. Require large area on steep slope.

5 LOCATION AND CONSTRUCTION

Buffer distance requirements vary with local government regulations. For most areas of NSW, the buffer distances shown in Table 3 below would be acceptable.

TABLE 3 - TYPICAL BUFFER DISTANCES FOR LOCATION OF DISPOSAL AREA

SYSTEM	BUFFER DISTANCE
All On-Site Disposal Systems	100m to permanent surface waters (eg. River, streams, lakes etc).
	250m to a domestic groundwater well.
	40m to other waters (eg. Farm dams, intermittent waterways and drainage channels etc).
Spray Irrigation System	6m if area up gradient and 3m if area down gradient of property boundaries and driveways.
	15m from dwellings.

SYSTEM	BUFFER DISTANCE
	6m to swimming pools.
	3m to paths and walkways.
Amended Soil Systems and Subsurface/Trickle Irrigation Systems	6m if area up gradient and 3m if area down gradient of property boundaries, buildings and swimming pools and driveways.

Construction of the system should comply with Appendix L7 of AS/NZS 1547:2012. Wet weather storage should comply with local government regulations.

6 FOUNDATIONS

Foundations at the site conventional single or two storey brick veneer or light clad houses could be expected to comprise high level footings founded on uniformly in stiff or better residual clay or uniformly in weathered rock. All foundations should be founded on similar strata to minimize differential settlement. An allowable bearing capacity of 100kPa should be feasible for the stiff to very stiff clays and 250 for hard clays or extremely weathered rock, however this would require confirmation by further investigation. Site classifications to AS2870-2011would also need to be confirmed by further investigation.

7 SLOPE STABILITY

The risk of slope instability has been assessed from the site conditions, in accordance with the classification system formulated by Australian Geomechanics Society and published in Australian Geomechanics News No 10, 1985. The site is assessed to have an overall Low Risk of slope instability, and it is considered that the site is appropriate for the proposed development with regard to slope instability. Selection of individual building sites within lots will need to be assessed in detail by an experienced geotechnical engineer..

8 PAVEMENTS

From a geotechnical view point there is no significant constraint to construction of pavements at this site provided adequate drainage of all pavements is provided. A CBR of between 2% and 4% has been estimated for the soils at this site based on visual assessment and textural classification of samples from the test locations. Further testing should be undertaken for subgrade evaluation and pavement design.

9 ACID SULFATE SOILS

Reference to published acid sulfate soils maps indicate there is no known occurrence of acid sulfate soils in the proposed development area. It is indicated that there is a high probability of acid sulfate soil occurrence to the east of the existing residence within alluvial or estuarine deposits towards the river but it is understood that no development is proposed in this area.

10 LIMITATIONS

The extent of testing associated with this assessment is limited to discrete borehole locations, and variations in ground conditions can occur between and away from such locations. If conditions other than those described in this report are excavated during construction, further advice should be sought without delay.

Further discussion on the uses and limitations of this report are presented in the attached document, Important Information About Your Coffey Report.

For and on behalf of Coffey Geotechnics Pty Ltd

Stephen Board

Senior Engineering Geologist

REFERENCES:

1. AS1547:2012 Australian / New Zealand Standard, On-site domestic wastewater management;

2. Environment & Health Protection Guidelines, On-site Sewage Management for Single Households, New South Wales Government, February 1998;

3. Australian Geomechanics News No 10 , Australian Geomechanics Society, 1985.

CONTENTS

CONTENTS

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Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

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Important information about your **Coffey** Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.
Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

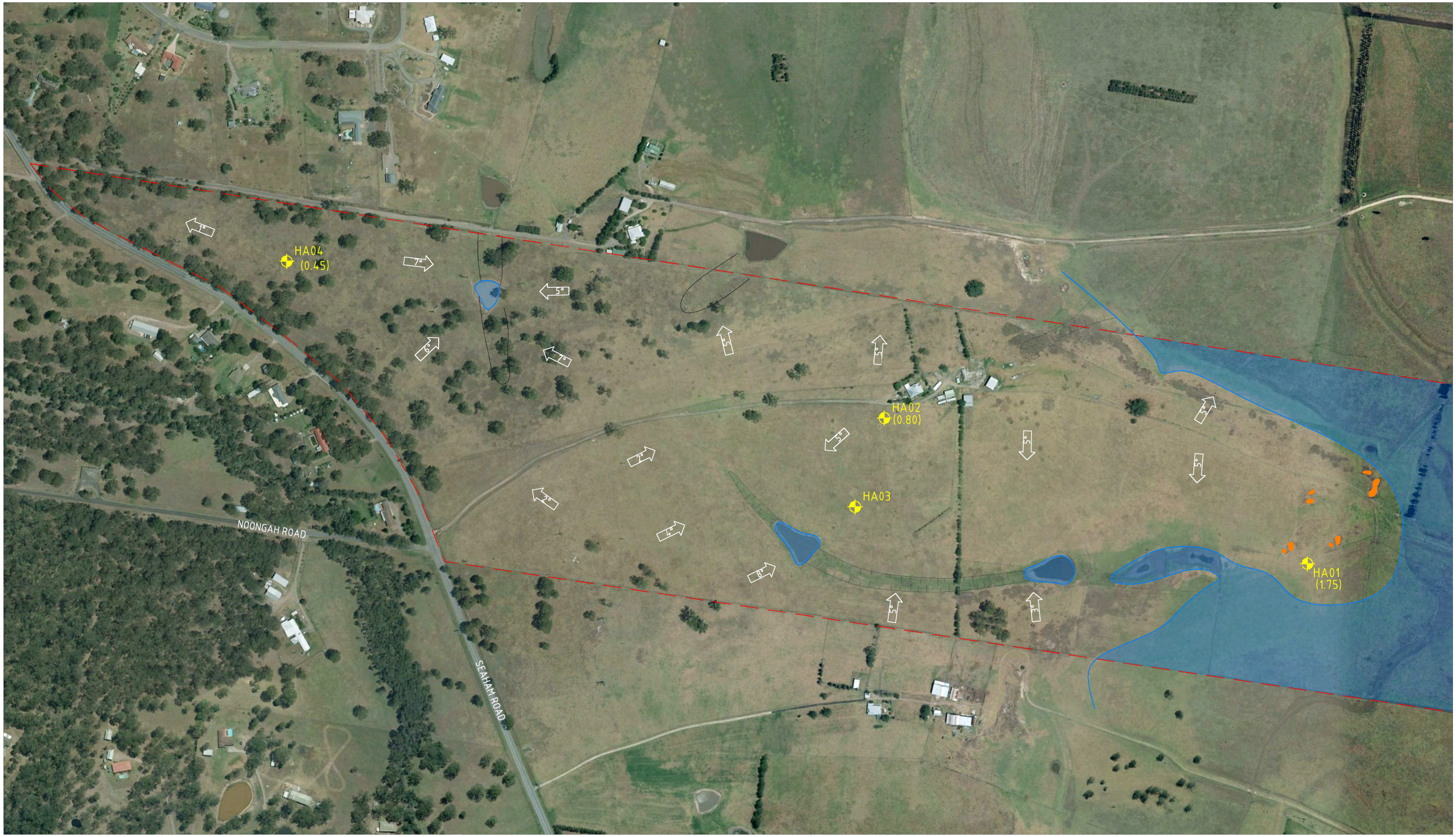
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.

Figures



LEGEND

HA01 (0.80) **BOREHOLE LOCATION AND APPROXIMATE DEPTH TO WEATHERED ROCK**

APPROXIMATE GROUND SLOPE IN DEGREESAND DIRECTION

WATER

ROCK OUTCROP (SANDSTONE)

N

0 50 100 200 300

Scale (metres)

drawn	NLS
approved	JR
date	14-03-2013
scale	1:5000
original size	A3

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client: **LE MOTTEE GROUP PTY LTD**

project: **PROPOSED RURAL RESIDENTIAL SUBDIVISION 600 SEAHAM ROAD, NELSONS PLAINS REZONING STUDIES**

title: **SITE PLAN**

project no: **GEOTWARA22010AA**

figure no: **FIGURE 1**

Appendix A

Engineering Borehole Logs

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Engineering Log - Borehole

Borehole ID.	**HA01**
sheet:	1 of 1
project no.	**GEOTWARA22010AA**
client: **Le Motte Group Pty Ltd**	date started: **05 Mar 2013**
principal:	date completed: **05 Mar 2013**
project: **Proposed 50 Lot Subdivision**	logged by: **JR**
location: **Nelsons Plains**	checked by:

position: E: 380992; N: 6380019 (MGA94 Zone 56) surface elevation : - angle from horizontal: 90°

drill model: Hand Auger mounting: hole diameter : 70 mm

drilling information						material substance						
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
HA		05/03/13 11:20	D				CL	**TOPSOIL: CLAY**: low plasticity, dark brown, some fine to medium grained sand and rootlets.	>Wp	F - St		TOPSOIL
			D				CL	**Sandy CLAY**: low plasticity, dark brown mottled brown, sand fine to coarse grained, trace fine to medium grained subrounded - subangular gravel.				COLLUVIUM
			D				SC	**CLAYEY SAND**: medium to coarse, brown, some fine to medium grained, subrounded - subangular gravel.	W			
			D				CH	**CLAY**: high plasticity, pale brown - orange, trace medium to coarse grained sand.	>Wp	St		RESIDUAL
			D		1		CH	**Sandy CLAY**: high plasticity, brown mottled orange, medium to coarse grained sand, trace fine to medium grained, subrounded - subangular gravel. 1.1 m: Becoming extremely weathered sandstone?		VSt		
								Borehole HA01 terminated at 1.75 m Refusal				

CDF_0_9_04AH.GLB Log COF BOREHOLE: NON CORED GEOTWARA22010AA.GPJ <<DrawingFile>> 05/04/2013 11:45

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud N nil
C casing

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shearpeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**HA02**
sheet:	1 of 1
project no.	**GEOTWARA22010AA**
client:	***Le Motte Group Pty Ltd***
date started:	***05 Mar 2013***
principal:	
date completed:	***05 Mar 2013***
project:	***Proposed 50 Lot Subdivision***
logged by:	***JR***
location:	***Nelsons Plains***
checked by:	BS

position: E: 380420; N: 6380216 (MGA94 Zone 56) surface elevation : - angle from horizontal: 90°

drill model: Hand Auger mounting: hole diameter : 50 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
HA		Not Observed	D				SC	**TOPSOIL: CLAYEY SAND**: fine to coarse, dark brown, trace fine to medium grained gravel, some rootlets and organics.	M			TOPSOIL
			D				CH	**CLAY**: high plasticity, pale brown - orange, trace fine to coarse grained sand and fine grained gravel.	>Wp	VSt		RESIDUAL
			D				CH	**Sandy CLAY**: high plasticity, pale brown - orange mottled grey, fine to coarse grained sand, trace fine subrounded - subangular gravel.				
								Becoming extremely weathered sandstone, fine to coarse grained, pale brown - orange.				
					1			Borehole HA02 terminated at 0.80 m Refusal				

CDF_0_9_04AH.GLB Log COF BOREHOLE: NON CORED GEOTWARA22010AA.GPJ <<DrawingFile>> 05/04/2013 11:46

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud N nil
C casing

penetration
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shearpeak/remouded (uncorrected kPa)
R refusal

classification symbol & soil description
based on Unified Classification System

moisture
D dry
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consistency / relative density

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VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**HA03**
sheet:	1 of 1
project no.	**GEOTWARA22010AA**
client:	***Le Motte Group Pty Ltd***
date started:	***05 Mar 2013***
principal:	
date completed:	***05 Mar 2013***
project:	***Proposed 50 Lot Subdivision***
logged by:	***JR***
location:	***Nelsons Plains***
checked by:	

position: E: 380380; N: 6380096 (MGA94 Zone 56) surface elevation : - angle from horizontal: 90°

drill model: Hand Auger mounting: hole diameter : 50 mm

drilling information						material substance						
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetro-meter (kPa) 100 200 300 400	structure and additional observations
HA		Not Observed	D					**TOPSOIL: CLAYEY SAND**: fine to coarse, pale brown, some fine grained subrounded - subangular gravel, trace rootlets.	M			**TOPSOIL / COLLUVIUM**
			D					**CLAY**: high plasticity, pale brown - orange, trace fine to medium grained sand.	>Wp	St - VSt		**RESIDUAL**
			D		1			**Sandy CLAY**: high plasticity, brown to red mottled pale grey, fine to medium grained sand.	<Wp	VSt		
								1.3 m: colour change to pale grey mottled brown - red		VSt - H		
								Borehole HA03 terminated at 1.50 m				

CDF_0_9_04AH.GLB Log COF BOREHOLE: NON CORED GEOTWARA22010AA.GPJ <<DrawingFile>> 05/04/2013 11:46

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

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M mud N nil
C casing

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
U## undisturbed sample ##mm diameter
D disturbed sample
B bulk disturbed sample
E environmental sample
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classification symbol & soil description
based on Unified Classification System

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S	soft
F	firm
St	stiff
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Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**HA04**
sheet:	1 of 1
project no.	**GEOTWARA22010AA**
client:	***Le Motte Group Pty Ltd***
date started:	***05 Mar 2013***
principal:	
date completed:	***05 Mar 2013***
project:	***Proposed 50 Lot Subdivision***
logged by:	***JR***
location:	***Nelsons Plains***
checked by:	

position: E: 379611; N: 6380428 (MGA94 Zone 56) surface elevation : - angle from horizontal: 90°

drill model: Hand Auger mounting: hole diameter : 50 mm

drilling information						material substance						
method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetro-meter (kPa) 100 200 300 400	structure and additional observations
HA		Not Observed	D					**TOPSOIL: CLAY**: low plasticity, dark brown, trace fine to medium grained sand and fine grained gravel, trace rootlets.	>Wp	F - St		TOPSOIL
			D					**CLAY**: high plasticity, brown - orange, trace fine to medium grained sand (<5%).		St - VSt		RESIDUAL
			D					**CLAY**: high plasticity, brown - orange mottled pale grey, trace fine to medium grained sand (<5%).	=Wp	VSt		
			D					**CLAY**: high plasticity, pale brown - orange mottled pale grey, some fine grained sand.	<Wp	H - Fb		
					1			Borehole HA04 terminated at 0.95 m Refusal				

CDF_0_9_04AH.GLB Log COF BOREHOLE: NON CORED GEOTWARA22010AA.GPJ <<DrawingFile>> 05/04/2013 11:46

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
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1 2 3 no resistance ranging to refusal

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F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense