

APPENDIX H

Stage 1 Site Contamination & Geotechnical Investigation

**D.Y. SURVEYORS
PROPOSED RESIDENTIAL SUBDIVISION
LOT 100 & 101 DP 1157883
26 DOWNES PLACE,
JAMBEROO
PRELIMINARY GEOTECHNICAL ASSESMENT
AND
STAGE 1 CONTAMINATION ASSESSMENT
REPORT W07/1966-Ar JANUARY 2013**

W07/1966-Ar MA:ma
17 January, 2013

D.Y. Surveyors
PO Box 178
KIAMA NSW 2533

Attention: David Yates

Dear Sir

**Re: Proposed Residential Subdivision, Lot 100 & 101 DP 1157883
Downes Place, Jamberoo: Preliminary Geotechnical assessment
and Stage 1 Contamination Assessment.**

This report presents the findings of a Stage 1 Site Contamination Assessment, and preliminary geotechnical assessment comprising interim AS2870 Lot classification, slope instability assessment and comments on footing design on proposed buildings relevant for the above project.

This report should be read in conjunction with the attached General Notes. Please contact the undersigned should you have any queries.

For and on behalf of
Network Geotechnics Pty Ltd

A handwritten signature in black ink, appearing to read 'V W de Silva', with a horizontal line extending to the right.

V W de Silva *BScEng, MEng, SMIE Aust, CPEng, NPER*
Principal Geotechnical Engineer

EXECUTIVE SUMMARY

Network Geotechnics Pty Ltd (NG) was commissioned by D.Y. Surveyors to undertake a Geotechnical Assessment for a proposed residential subdivisional at Lots 100 & 101 Downes Place, Jamberoo. The investigation included a Stage 1 Contamination Assessment of the proposed site and geotechnical aspects relevant for development consent for the proposed subdivision. The investigation was carried out in accordance with NG Proposal dated 3rd August, 2012.

The Stage 1 Contamination Assessment for the site was based on walk over inspection, historical title search and review of historical aerial photographs.

Based on the site history, aerial photographs, fieldwork and Laboratory results, the following comments were noted:

- The site has been used mostly for a dairy farm and other farming purposes up to present.
- The aerial photographs and other records reviewed indicated a low risk of potential contamination within the proposed site.

It is assessed that the risk of site contamination to be low and that a Stage 2 detailed contamination assessment would not be required.

The proposed building sites are provided AS2870-2011 lot classification of H1 (Highly reactive) on account of proposed cut/fill earthworks.

It is assessed that the site has a very low risk of landslide risk and land subsidence.

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1.0 INTRODUCTION

1.1 General

Network Geotechnics Pty Ltd (NG) was commissioned by D.Y. Surveyors to undertake a Geotechnical Assessment for a proposed subdivision at Lots 100 & 101 DP 1157883 Downes Place, Jamberoo. The investigation also included a Stage 1 Contamination Assessment of the site and other geotechnical aspects relevant for the project development consent. The investigation was carried out in accordance with NG Proposal dated 3rd August, 2012.

The geotechnical advice provided by this report is as follows:

- Investigation of subsurface soil and rock profiles across the site, including the presence of groundwater.
- Geotechnical recommendations and lot classification as per AS2870-2011 including footing types.
- Recommendations on drainage for proposed works.
- The potential for site contamination.

A site plan is shown on the attached Drawing No W07/1966-1.

1.2 Scope of Work

The following scope of work was agreed to with the client:

- Desk study involving review of historical land titles and aerial photographs to facilitate identification of potential site contamination.
- Excavating 4 test pits (TP1 to TP4) to 2.0m depth or to prior refusal on rock using a 5 tonne excavator with 600mm tooth bucket attached, logging and sampling for laboratory testing.
- Evaluation of findings and preparation of a Stage 1 Contamination Assessment.
- Geotechnical assessment covering footing design and AS2870-2011 lot classification.

2.0 SITE IDENTIFICATION

The site is located on the southern corner of Downes Place and Drualla Road in Jamberoo. The site is described as Lots 100 & Lot 101 in DP 1157883 and has an approximate area of 6640m². The site is located in Kiama Local Government Area (LGA) and is bounded by:

- Drualla Road to the North
- Downes Place to the east
- Farm land to the West and South.

Based on Satellite photographs, the approximate site co-ordinates are given below:

Easting
Northing

295475.15 m E
6164040.16 m S

Reference to Cadastral Records Enquiry Report indicates the site is within the Parish of Kiama, County of Camden.

3.0 SITE HISTORY

3.1 Zoning

Council zoning plans identifies the land Lots 100 & 101 in DP 1157883 Downes Place, Jamberoo with ***Rural Landscape Zoning (RU2)*** based on Kiama LEP 2011. The objective of the zone is to encourage sustainable primary industry production by maintaining and enhancing the natural resource base, to maintain the rural landscape character of the land.

3.2 Land Use

Based on Aerial Photographs and title records, the site has been mostly used as farmland since 1903 to present. William Geoffrey Downes and Margaret Elizabeth Downes have been joint tenants from 1999 to present. Since 1999 the land seems to have been used for residential purposes and some minor farming.

3.3 Council Rezoning

No records were available on rezoning of the site. The site is proposed to be rezoned for Low Density Residential.

3.4 Historical Site Usage

Based on title records and aerial photographs, the following historical uses could be identified:

Table 3.4.1 – Historical Land Use

1903 – Present	Farming/Dairy Farm
1897-1903	Unknown

3.5 Title Records

A record of ownership/leasing as can be inferred from title records is given in Table 3.5.1 below.

Table 3.5.1 Historical Ownership/Leasing

<i>Date</i>	<i>Lot /DP Number</i>	<i>Volume/Folio</i>	<i>Remarks</i>
17 September, 1897		No. 737 Book. 606	John Conway, occupation farmer, vendor to Australian Bank Limited, Purchaser.
20 May, 1903		No. 343 Book. 735	John Wilson (storekeeper) vendor to Stanley Dudgeon (Farmer)
20 June, 1932		No. 58 Book. 1643	Joseph Smith (farmer) vendor to Arthur William Downes (Farmer) purchaser.
23 November, 1971		Vol. 466 Fol. 3135	Arthur William Downes (Dairy Farmer) to A.W. Downes Pty Ltd (Dairy Farm Company).
22 April, 1999	2/781683, 124 &125/834573		Transferred from A.W. Downes Pty Ltd (in liquidation) to William Geoffrey Downes and Margaret Elizabeth Downes as join tenants

3.6 Aerial Photographs

Aerial photographs for Lots 100 & 101 in DP 1157883 Downes Place, Jamberoo were purchased from NSW Department of Lands. A summary of findings are presented in Table 3.7.1

Table 3.6.1 Summary of Aerial Photograph Review

<i>Year of Photo</i>	<i>Scale</i>	<i>Colour</i>	<i>Site Description</i>
1949	1:30000	Black & White	Only visible structure near the site is the dairy shed outside the southern corner of site.
1963	1:38000	Black & White	Three new sheds at the southern corner of Drualla Road and north east to the site.
1974	1:40000	Black & White	- Geoffrey Downes Residence newly built. - Three sheds are still visible
1984	1:40000	Black & White	- Geoffrey Downes residence is the only residence within the close vicinity asides for the dairy shed at the southern corner. - Three sheds were removed
1993	1:25000	Colour	- Downes Place did not exist - New Residences built on the southern corner of Drualla road
2002	1:25000	Colour	- More New Residences built on the southern corner of Drualla road - Downes Place was constructed due to new residences - New swimming pool constructed on Geoffrey Downes residence
2010	Ref: Google Earth	Colour	No other obvious change

3.7 Potential Contamination

Based on the review of aerial photographs, title records and a walk over assessment at the time of the fieldwork, the site appears to have a low possibility of potential contamination. The only structure present within the site is the residence. Dairy sheds were located outside the proposed subdivision. However the use of fill materials to level the building/shed pads and the gravel access road to the dairy shed is assessed to be sources of potential contamination with unknown contaminants.

There is assessed to be low risks of any contamination migrating in to the site from off site sources.

4.0 SITE CONDITION & SURROUNDING ENVIRONMENT

4.1 Topography

The site is located at the southern corner Downes Place, Jamberoo with a gentle western north western facing slope, as observed from the centre of the site. The site is mostly covered with grass with a several medium size trees and tall grassland and weeds throughout. A small dirt road from Downes Place had been constructed for access to the dairy shed south of the proposed works, which comprises 14mm Gravel (100mm layer) overlying residual CLAY.

4.2 Visible Signs of Contamination

During the site visit on 28th November, 2012 the following observations were made:

- The site contains a single storey brick dwelling and outbuilding with a rain water tank and a work shed on the western corner of the existing dwelling.
- Gravel driveway from Downes Place to the dairy shed which is located south of the proposed works. Access way comprises gravel of unknown origin.
- Majority of the site is covered in grass and appears to have had little disturbance from the remainder of the site.
- Medium to large trees were located on the west and north west of the existing dwelling.
- It is likely that all run-off would flow to the west and north west of the existing dwelling.

There was no visible staining of soils or gravel surfaces. Additionally there were no visible signs of contamination such as bare soil patches and plant stress.

The surface soils mainly contained silty clayey SAND topsoil.

4.3 Flood Potential

It is not likely the land would be subject to flooding. The nearest surface water body is Colyers Creek located about 350m to the south east of the site.

4.4 Geology & Hydrogeology

Reference to Sydney Basin 1:500000 Geological Series Sheet (Special) indicates the site to be underlain by Shoalhaven Group, Gerringong Volcanics which comprise Latite, Tuff, Tuffaceous Sandstone and Sandstone.

The subsurface conditions interpreted from the boreholes (TP1 and TP4) are summarised in Table 4.1:

Table 4.1 Subsurface Lithology of Boreholes Encountered

<i>Layer/Description</i>	<i>Depth to Base of Layer (m)</i>
TOPSOIL: Silty Clayey SAND, fine to medium grained, dark grey	0.2
RESIDUAL: CLAY, medium plasticity, light brown.	>0.9 – 1.4
WEATHERED ROCK: SANDSTONE, extremely weathered, orange	1.0 - >1.5

Groundwater was not encountered in boreholes TP1 to TP4 during the time of the investigation. It is pointed out that groundwater levels and seepages may fluctuate with variations in rainfall, temperature and other factors.

5.0 LABORATORY TESTING

Laboratory testing comprised two Atterberg Limit and Linear Shrinkage tests and four Field Moisture Tests (FMC) tests on samples recovered from boreholes TP1 to TP4, in order to assess the plasticity characteristics and soil reactivity.

Laboratory test reports are attached at the end of this report and are discussed in Section 7.0.

6.0 CONTAMINATION ASSESSMENT

6.1 Summary of Desk Study

Based on the desktop study, the following observations are made:

- The aerial photographs and other records indicated a low potential for site contamination.
- The site may contain fill in the area occupied by the existing residence and in work shed located west of the existing residence that could have potential for soil contamination. The access driveway for the dairy shed south of the proposed residences contains gravel from unknown sources that could have potential for soil contamination.

In general, there is assessed to be a low risk of potential contamination over the area outside the existing residence and work shed.

6.2 Test Pit Logs & Visual Assessment

Samples recovered from test pits were examined in NG laboratory. There was no visible discoloration nor any odours that would raise concern for contamination in the samples recovered.

7.0 GEOTECHNICAL PARAMETERS & RECOMMENDATIONS

7.1 General

The generalised subsurface profile within the area investigated may be represented by up to 0.2m topsoil underlain by residual CLAY to depths up to 1.4m overlying extremely weathered Sandstone.

Laboratory field moisture content test results on 4 samples ranged from 12.3% to 21.1%. Liquid limit of two samples tested recorded 68% and 85%. Based on the above, it is assessed the residual clay to be highly reactive. The laboratory results are included in Appendix B and are summarised as follows:

Table 7.1.1 – Laboratory Test Results

<i>Borehole No/ Depth (m)</i>	<i>LL</i>	<i>PL</i>	<i>PI</i>	<i>LS</i>	<i>FMC (%)</i>
TP1 (0.3-0.6m)	68	26	42	17	19.4
TP2 (0.4-0.6m)	-	-	-	-	21.1
TP2 (1.2-1.3m)	-	-	-	-	12.3
TP4 (0.5-0.7m)	85	25	60	20.5	16.2

Note: LL (Liquid Limit), PL (Plastic Limit), PI (Plastic Index), FMC % (Field Moisture Content), LS (Linear Shrinkage)

Dynamic Penetration Tests (DCP) on CLAY below 0.2m depth in test pits TP1 and TP3 recorded 9 to 25 blows per 150mm penetration, indicating stiff to very stiff consistency.

7.2 AS2870 Classifications

Surface movement due to reactivity has been assessed assuming a soil suction change at the surface of 1.2pF and a suction change depth of 1.5m.

Based on the above, surface movement due to moisture changes was assessed in accordance with AS2870-2011 "Residential Slabs and Footings." It is assessed that the surface movement to be in the range of 40mm to 60mm for the undeveloped site.

The natural site prior to earthworks is assessed as Class H1 in accordance with AS2870-2011 Residential Slabs and Footings.

The classifications and recommendations presented in this report are provided on the basis that the performance expectations set out in Appendix B of AS2870-2011 are acceptable and that future site maintenance complies with CSIRO Sheet BTF-18, a copy of which is attached. In particular, the site should be maintained in stable moisture conditions by providing adequate drainage.

7.3 Footings

Stiffened raft and other high level footing systems may be considered for the proposed lots and should be designed and constructed in accordance with the requirements of the above Standard.

Placement of reactive fill may increase the severity of classifications. Therefore, advice should be sought if fill earthworks exceeding about 0.4m depth is to be carried out on any of the lots in order to verify that the classification remains valid.

The footing systems should be designed with generous provision for structural articulation to reduce potential effects of differential movement between areas of varying fill thickness and residual soil and rock exposed by earthworks.

7.4 Landslide Risk and Subsidence

The risk of landslide is assessed to be very low based on the overall ground slopes and depth to bed rock of about 1m.

The site is not known to have been subjected to underground mining and therefore the risk of subsidence is assessed to be very low.

There was no evidence the site contains uncontrolled fill in excess of 600mm depth or cuts deeper than 600mm.

Any proposed cuttings not more than 1.5m height should be formed not steeper than 2H:1V for short term stability.

Cuts/fill deeper than 1.5m should be supported by engineer designed retaining walls assuming a coefficient of earth pressure at rest of 0.55 and an angle of friction for Clay of 25degrees.

Any permanent unsupported batters less than 1.5m height should be formed not steeper than 3H:1V and protected by suitable ground cover or geofabric.

7.5 Drainage

Drainage measures that should be implemented at this site include:

- Provision of concrete lined cut-off drains (or similarly lined drains) at the crest of batters over 1.5 m in height.
- Provision of subsurface drainage behind any retaining walls.
- All stormwater should be collected and discharged from the site via pipes into designated drainage paths and not allowed to flow on to the ground.
- Subsoil drains under the kerbs on proposed roads.

The site should be maintained in good condition without allowing water ponding. Any landscape features to be constructed such as ponds, retaining walls, etc, should be approved by a geotechnical consultant.

8.0 CONCLUSION

Based on the desk study, field investigation and laboratory tests the following conclusions are made:

- The site is assessed to be of low risk of contamination. It is assessed that a Stage 2 Contamination Assessment is not required for the proposed subdivision.
- Stripping of topsoil for construction of the subdivision should be carried out under the supervision of an experienced consultant and any foreign objects/materials identified should be subjected to further investigation.
- The proposed building sites are provided interim AS2870-2011 classification of Class H1 (Highly reactive) classification.

This report should be read in conjunction with the attached General Notes. Please contact the undersigned if you require further assistance.

For and on behalf of

Network Geotechnics Pty Ltd

Reviewed by



Mehran Asadabadi *B.Eng (Civil)*
Geotechnical Engineer



V W de Silva *BScEng, MEng, SMIE Aust, CPEng NPER*
Principal Geotechnical Engineer

GENERAL

Geotechnical reports present the results of investigations carried out for a specific project and usually for a specific phase of the project (e.g. preliminary design). The report may not be relevant for other phases of the project (e.g. construction), or where project details change.

SOIL AND ROCK DESCRIPTIONS

Soil and rock descriptions are based on AS 1726 – 1993, using visual and tactile assessment except at discrete locations where field and / or laboratory tests have been carried out. Refer to the terms and symbols sheet for definitions.

GROUNDWATER

The water levels indicated on the logs are taken at the time of measurement and depending on material permeability may not reflect the actual groundwater level at those specific locations. Also, groundwater levels can vary with time due to seasonal or tidal fluctuations and construction activities.

INTERPRETATION OF RESULTS

The discussion and recommendations in the accompanying report are based on extrapolation / interpolation from data obtained at discrete locations. The actual interface between the materials may be far more gradual or abrupt than indicated. Also, actual conditions in areas not sampled may differ from those predicted.

CHANGE IN CONDITIONS

Subsurface conditions can change with time and can vary between test locations. Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations can also affect subsurface conditions.

REPRODUCTION OF REPORTS

This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of this firm. Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimise the likelihood of misinterpretation from logs.

FURTHER ADVICE

Network Geotechnics would be pleased to further discuss how any of the above issues could affect your specific project. We would also be pleased to provide further advice or assistance including:

- assessment of suitability of designs and construction techniques;
- contract documentation and specification;
- construction control testing (earthworks, pavement materials, concrete);
- construction advice (foundation assessments, excavation support).

ACN 069 211 561
Unit 12/9-15 Gundah Road
Mt Kuring-Gai NSW 2080
02 8438 0300
02 8438 0310

Job No: W07/1966

Hole No: TP1

Sheet: PAGE 1 / 1

Client:	D. Y. Surveyors
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Started:	28/11/12
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Project:	Proposed Subdivision
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Finished:	28/11/12
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Location:	Downs Place, Jamberoo GPS
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Logged:	MA
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Checked:	VDS
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Equipment Type:	5t Excavator
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RL Surface:

Bucket Size:

Inclination:

Bearing:

Datum:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/ relative density	comments notes, structure, and additional observations
BH	None Encountered					SC	Silty Clayey SAND fine to medium grained, grey	M/D	-	TOPSOIL
			12		CI	CLAY medium plasticity, brown	<Wp	-	RESIDUAL	
			15							
			18							
			18							
			1.0							
					-	SANDSTONE extremely to moderately weathered, orange	-	-	WEATHERED ROCK	
						TP1 Terminated at 1.5 m				
				2.0						
				3.0						
				4.0						

TEST PIT LOG

Client: D. Y. Surveyors		Job No: W07/1966
Project: Proposed Subdivision		Hole No: TP2
Location: Downs Place, Jamberoo GPS		Sheet: PAGE 1 / 1
Equipment Type: 5t Excavator		Started: 28/11/12
Bucket Size:		Finished: 28/11/12
Inclination:		Logged: MA
Bearing:		Checked: VDS
Datum:		RL Surface:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
BH	None Encountered			1.0		SC	Silty Clayey SAND fine to medium grained, grey	M/D	-	TOPSOIL
						CI	CLAY medium plasticity, brown	<Wp	-	RESIDUAL
						-	SANDSTONE extremely weathered, orange	-	-	WEATHERED ROCK
							TP2 Terminated at 1.2 m			

Client: D. Y. Surveyors

Started: 28/11/12

Project: Proposed Subdivision

Finished: 28/11/12

Location: Downs Place, Jamberoo
GPS

Logged: MA

Checked: VDS

Equipment Type: 5t Excavator

RL Surface:

Bucket Size:

Inclination:

Bearing:

Datum:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
BH	None Encountered					SC	Silty Clayey SAND fine to medium grained, grey	M/D	-	TOPSOIL
			9			CI	CLAY medium plasticity, brown	<Wp	-	RESIDUAL
			12							
			18							
			25							
				1.0						
						-	SANDSTONE extremely weathered, orange	-	-	WEATHERED ROCK
							TP3 Terminated at 1.2 m			
				2.0						
				3.0						
				4.0						

TEST PIT LOG

ACN 069 211 561
Unit 12/9-15 Gundah Road
Mt Kuring-Gai NSW 2080
02 8438 0300
02 8438 0310

Job No: W07/1966

Hole No: TP4

Sheet: PAGE 1 / 1

Client: D. Y. Surveyors

Started: 28/11/12

Project: Proposed Subdivision

Finished: 28/11/12

Location: Downs Place, Jamberoo
GPS

Logged: MA

Checked: VDS

Equipment Type: 5t Excavator

RL Surface:

Bucket Size:

Inclination:

Bearing:

Datum:

method	water	samples, tests etc	DCP Blows per 150 mm	depth (m)	graphic log	USCS symbol	Material Description	Moisture condition	Consistency/relative density	comments notes, structure, and additional observations
None Encountered				1.0		SC	Silty Clayey SAND fine to medium grained, grey	M/D	-	TOPSOIL
						CI	CLAY medium plasticity, brown	<Wp	-	RESIDUAL
						-	SANDSTONE extremely weathered	-	-	WEATHERED ROCK
							TP4 Terminated at 1 m			
				2.0						
				3.0						
				4.0						

SOIL DESCRIPTIONS

Moisture Condition

D	Dry
M	Moist
W	Wet
Wp	Plastic Limit
WL	Liquid Limit
MC	Moisture Content

Consistency

		Qu (kPa)
VS	Very Soft	< 25
S	Soft	25 – 50
F	Firm	50 – 100
St	Stiff	100 – 200
VSt	Very Stiff	200 – 400
H	Hard	> 400
Fb	Friable	

Density Index

		I _D (%)
VL	Very Loose	< 15
L	Loose	15 – 35
MD	Medium Dense	35 – 65
D	Dense	65 – 85
VD	Very Dense	> 85

ROCK DESCRIPTIONS

Weathering

Rs	Residual Soil
XW	Extremely Weathered
HW	Highly Weathered
MW	Moderately Weathered
DW	Distinctly Weathered
SW	Slightly Weathered
FR	Fresh
(DW covers both HW & MW)	

Strength

		Is (50) MPa
EL	Extremely Low	< 0.03
VL	Very Low	0.03 – 0.1
L	Low	0.1 – 0.3
M	Medium	0.3 – 1
H	High	1 – 3
VH	Very High	3 – 10
EH	Extremely High	> 10

Structure

	Spacing
Thinly Laminated	< 6mm
Laminated	6 – 20mm
Very thinly bedded	20 – 60mm
Thinly bedded	60 – 200mm
Medium bedded	0.2 – 0.6m
Thickly bedded	0.6 – 2.0m
Very thickly bedded	> 2.0m

NOTE: Soil And rock descriptions are based on AS 1726 - 1993

Natural Fractures

Type		Shape	
JT	Joint	pl	Planar
BP	Bedding plane	cu	Curved
SM	Seam	un	Undulose

FZ	Fractured zone	st	Stepped
SZ	Shear zone	ir	Irregular
VN	Vein		
Infill or Coating		Roughness	
Cn	Clean	pol	Polished
Cl	Clay	slk	Slickensided
Ca	Calcite	smo	Smooth
Fe	Iron oxide	rou	Rough
Mi	Micaceous	vro	Very rough
Qz	Quartz		

EXCAVATION/DRILLING METHOD & CASING

BH	Backhoe/excavator bucket
NE	Natural exposure
HE	Hand excavation
AS	Auger Screwing *
AD	Auger Drilling *
R	Roller/Tricone
W	Washbore
* denotes bit shown by suffix	
B	Blank Bit
V	"V" Shaped Bit
T	Tungsten Carbide Bit
LB	Large Bore Push Tube Drilling
MC	Macro Core Push Tube Drilling
DT	Dual Push Tube Drilling

NMLC	NMLC Core Drilling
NQ/HQ	Wireline Core Drilling

C	Casing
M	Mud

SAMPLES/TESTS

B	Bulk sample
D	Disturbed sample
U50	Thin-walled tube sample (50mm diameter)
PP	Pocket penetrometer (kPa)
N*	SPT (blows per 300mm)
*denotes sample taken	
Nc	SPT with solid cone
R	SPT refusal

VANE SHEAR TESTS

S _u	Vane shear strength Peak/residual (kPa) and Vane size (mm)
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WATER MEASUREMENTS

	Water level at the time of drilling
	Water level after drilling
	Water inflow
	Water outflow

PUSH TUBE DRILLING

Degree of Resistance	Factor
No percussion	0
Fast push with percussion	1
Medium push with percussion	2
Slow push with percussion	3
Very slow – nearing refusal	4

TEST REPORT

Client:	DY Surveyors	Job No:	W07/1966	Sheet:	1 of 1
Principal:	-				
Project:	Proposed Subdivision	Tested By:	PB	Date:	28.11.12
Location:	Downs Place, Jamberoo	Checked By:	HU	Date:	4.12.12

Sample Procedure: AS1289.1.2.1 (CI 6.5.4) - Machine
Excavated Pit/Trench

MOISTURE CONTENT - AS1289 2.1.1

Sample Number	Sample Description	Sample Location	Test Results
W39873	CLAY	TP1 (0.3 - 0.6m)	19.4%
W39876	CLAY	TP4 (0.5 - 0.7m)	16.2%
W39874	Sandstone	TP2 (1.2 - 1.3m)	21.1%
W39875	CLAY	TP2 (0.4 - 0.6m)	12.3%

REMARKS:



This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025

Wollongong Laboratory 1318



APPROVED SIGNATORY
Harry Ubungen

DATE 4/12/12

TEST REPORT

Client: DY Surveyors
 Project: Proposed Residential Subdivision
 Location: Jamberoo
 GTR Number:

Sheet: 1 of 2
 Job No: W07/1966
 Report No: 1
 Report Date: 4/12/2012
 Tested By: Philip Baltoski

Sample Identification

Sample Description :	CLAY, brown	Sampling Procedure:	AS1289.1.2.1 (Cl6.5.4) Machine Excavated Pit Trench
Sample Number:	TP1 (0.3 - 0.6m)	Date Sampled:	23/11/2012
Laboratory Number:	W39873	Sample History:	Oven Dried
Client Number:	-	Preparation Method:	Dry
		Shrinkage Mould Length:	250 (mm)

ATTERBERG LIMITS & LINEAR SHRINKAGE

TEST PROCEDURE		TEST RESULTS	SPECIFICATION
Liquid Limit (W_L)	%	68	
AS1289.3.1.1			
Plastic Limit (W_P)	%	26	
AS1289.3.2.1			
Plasticity Index (I_P)	%	42	
AS1289.3.3.1			
Linear Shrinkage (L_S)	%	17.0	
AS1289.3.4.1			
Moisture Content Method:			
AS1289.2.1.1			

REMARKS:



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Wollongong Laboratory 1318

APPROVED SIGNATORY
 Harry Ubungen

DATE
 4/12/2012

TEST REPORT

Client: DY Surveyors
 Project: Proposed Residential Subdivision
 Location: Jamberoo
 GTR Number:

Sheet: 2 of 2
 Job No: W07/1966
 Report No: 1
 Report Date: 4/12/2012
 Tested By: Philip Baltoski

Sample Identification

Sample Description :	CLAY, brown	Sampling Procedure:	AS1289.1.2.1 (Cl6.5.4) Machine Excavated Pit Trench
Sample Number:	TP4 (0.5 - 0.7m)	Date Sampled:	23/11/2012
Laboratory Number:	W39874	Sample History:	Oven Dried
Client Number:	-	Preparation Method:	Dry
		Shrinkage Mould Length:	250 (mm)

ATTERBERG LIMITS & LINEAR SHRINKAGE

TEST PROCEDURE		TEST RESULTS	SPECIFICATION
Liquid Limit (W_L)	%	85	
AS1289.3.1.1			
Plastic Limit (W_P)	%	25	
AS1289.3.2.1			
Plasticity Index (I_P)	%	60	
AS1289.3.3.1			
Linear Shrinkage (L_S)	%	20.5	
AS1289.3.4.1			
Moisture Content Method:			
AS1289.2.1.1			

REMARKS:

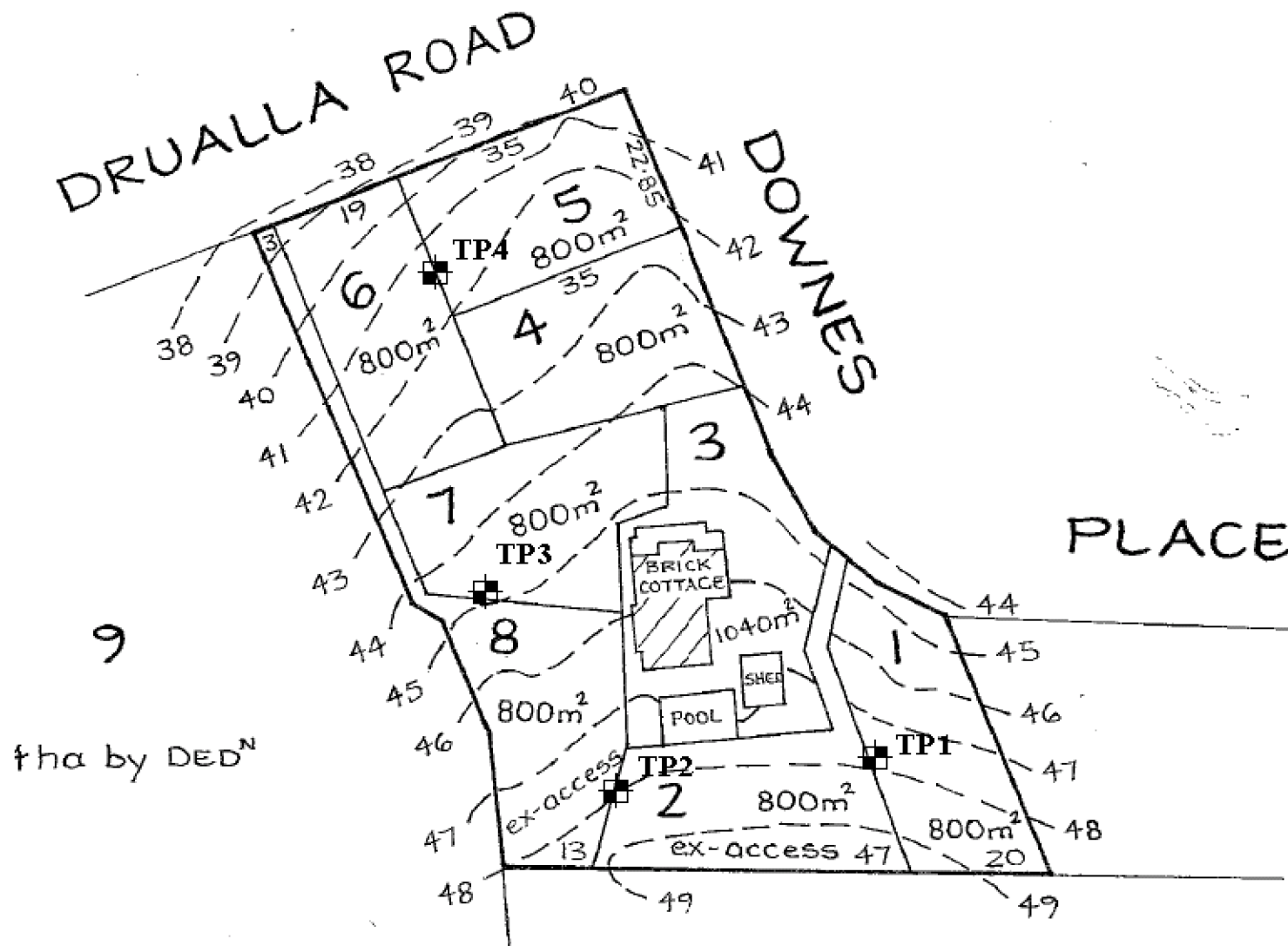


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Wollongong Laboratory 1318

APPROVED SIGNATORY
 Harry Ubungen

DATE
 4/12/2012



12/9-15 Gundah Rd, Mt. Kuring-Gai NSW 2529
 Tel: (02) 8438 0312
 Fax: (02) 8438 0310
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Scale: A4 - NOT TO SCALE

Date: 6/12/12

Drawing: MA

Drawing No: W07/1966-1

Client: D.Y. Surveyors

Project: Proposed Residential Subdivision

Location: LOT 100 & 101 DP 1157883, Downes Place, JAMBEROO

SITE PLAN