SMART ASSOCIATES LTD

PO Box 57
31 George Street
Blenheim, New Zealand

Tel +64 (3) 577 7487
Fax +64 (3) 577 7485

Email design@smartassociates.co.nz
www.smartassociates.co.nz

Geotechnical Report

Proposed Dwelling

Lot 10 DP 2219
Ruakaka Bay
Queen Charlotte Sound

for

David & Rosie White

Dave Dravitzki
Engineering Geologist
Smart Associates Ltd
21 August 2006

Project W06-1761

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A SYNOPSIS

1. Scope of Investigation

1.1. A geotechnical site investigation was requested by the client in order to address the geotechnical considerations relating to a proposed new dwelling to be constructed at the site. This report addresses the geological and geotechnical conditions relating to the subject site, and in adjacent areas where such areas are considered relevant to the subject site, in order to provide an assessment of the land stability and foundation conditions as they relate to the proposed development at the site.

1.2 A characterisation of subsoils and landform elements has been included to provide the requisite database for wastewater design and stormwater management.

1.3 The plans and sections presented with this report are for geotechnical purposes only.

1.4 The site assessment was carried out on the 9th August 2006 by Mr Malcolm Maxwell of Petrographic Services and Mr Dave Dravitzki of this office.

1.5. This report has been prepared in terms of the Marlborough District Council Requirements for the Provision of Geotechnical Reports, File C270-12, dated January 2005.

2. Summary and Conclusions

2.1 The proposed building locations and suggested location for the associated wastewater LAA is presented on drawing 1761/1. Given compliance with the recommendations of this report, the location of the buildings and wastewater LAA may be changed without further foundation site assessment.

2.2 The foundation footing soil is stable and of adequate strength and bearing capacity for residential construction, at the designated minimum depth for foundation footings of approximately 0.6 m.

2.3 The assessed foundation envelope is located within an area of gently sloping ground ground, with weak natural drainage vectors to the SW which should be able to accommodate an appropriately designed dispersed storm-water discharge to the foreshore.

2.4 Primary access is solely by water, to the head of Ruakaka Bay. All possible access routes from the foreshore will traverse stable ground that are expected to maintain gradients not steeper than 1:6.

2.5 The Development Risk is assessed as LOW (geotechnical risk matrix).

3. Recommendations

3.1 The control and discharge of stormwater must be approved by an engineer.

3.2 Foundation footings should be seated at a minimum depth of approximately 0.6 m and be founded in materials with a soil bearing resistance of greater than 100 kPa. It is recommended that compliance be confirmed by an engineer, prior to foundation installation.

B. REPORT

1. Site Description

1.1 Geological Setting

The New Zealand Geological Map (Begg and Johnston 2000) indicates that the subject site is located within a regional NE trending zone of Marlborough SCHIST (Caples Group), with well-developed foliation (textural sub-zone 2), locally outcropping at 010° and dipping at 20° to the north. In the foundation area investigated for this report, the Schist bedrock is overlain by valley fill colluvium. No active faults are indicated in the vicinity of the subject site.

1.2 Landform Elements and Natural Drainage

The subject site is located on the northeast of Ruakaka Bay on a gentle southwest facing slope that generally slopes at between 7° and 12° to the horizontal. A small stream that flows into Ruakaka Bay is located to the west of the subject site.

At the time of this report, approximately half the site had been cleared, with the balance of the site being vegetated in sparse regenerating bush, as indicated on the attached Smart Associates drawing 1761/1.

1.3 Recent and Historic Instability

No evidence of active or historic slope instability was identified at the site at the time investigation reported herein.

2. Geotechnical Investigations

The character of the subsoil underlying the proposed foundation area was determined by extrapolation from the nature of cuttings obtained from auger drill holes at foundation and LAA sites.

Three hand augered boreholes, numbered AG1 to AG3 inclusive, were drilled for foundation assessment. Three pits were dug by spade and auger, to depths of 0.6m, for wastewater soil assessment (numbered W1 to W3 inclusive). Logs for the hand augered boreholes and wastewater soil assessment pits are attached to this report. The locations of AG1 to AG3 and W1 to W3 are shown on drawing 1761/1.

A single Scala Penetrometer test, numbered P1, was put down adjacent to the location of Borehole AG1, within the approximate centre of the identified platform. The test results for P1 are attached to this report.

Section profile AA was drawn from data obtained by tape-and-compass traverse along the line shown on drawing 1761/1. Slope angles were measured using a hand-held laser rangefinder.

There is no record of any previous site-specific geotechnical assessment.

3. Geotechnical Assessment

3.1 Foundation Conditions

The supporting landform comprises slightly gravelly sandy and silt loam valley fill colluvium. On the basis of recorded compactness, the soil bearing resistence (scala penetrometer) will consistently exceed 100 kPa at depths exceeding approximately 0.6 m. The subsoil profile recorded at the centre of the foundation envelope is

presented on the appended data sheet. The scala test results indicate that the hand augered boreholes were terminated on boulders within the colluvium, and not on schist bedrock materials.

The foundation envelope shown on drawing 1761/1 is an approximate inferred location based on the requirement for the LAA to be set back from the creek and foreshore. Given compliance with boundary and LAA separation requirements, it is considered that the final dwelling location may be changed, without further foundation site assessment being required.

3.2 Land Application Area (Wastewater)

Our brief for this report was only to provide an indicative location for an on-site wastewater disposal system, which has been achieved by the drilling of wastewater pits W1 to W3, as shown on drawing 1761/1. Logs for W1 to W3 are attached to this report.

Any further assessment of the LAA location and the design of a system for the proposed dwelling has not been carried out and is therefore specifically excluded from this report.

3.3 Access

Primary access is solely by water, to the head of Ruakaka Bay. All feasible access routes will traverse stable ground, and the most-likely access will be an existing partially formed track that maintains gradients not exceeding 1:6.

3.4 Stormwater disposal

Natural drainage is slight to moderate towards the foreshore reserve with weak natural drainage vectors to the SW which should be able to accommodate an appropriately designed dispersed storm-water discharge to the foreshore.

3.5 Development Impact

The development risk is assessed as LOW (geotechnical risk matrix).

4. Control Measures

4.1 The control and discharge of stormwater must be approved by an engineer.

4.2 Foundation footings should be seated at a minimum depth of approximately 0.6 m and be founded in materials with a soil bearing resistance of greater than 100 kPa. It is recommended that compliance be confirmed by an engineer, prior to foundation installation.

5. Management Plans

There are no geotechnical issues associated with the proposed development that require the implementation of any MDC management plan additional to those already in force.

6. Limitations

This report is valid for two years from the date of issue and covers the geotechnical conditions underlying the proposed dwelling at the subject site. Any other areas are outside the scope of this report.

The reliance by other parties on the information or opinions in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

7. References

1. Begg, J.G. and Johnston, M.R. (compilers) 2000. New Zealand Geological Map 10: Geology of the Wellington area, 1:250,000.

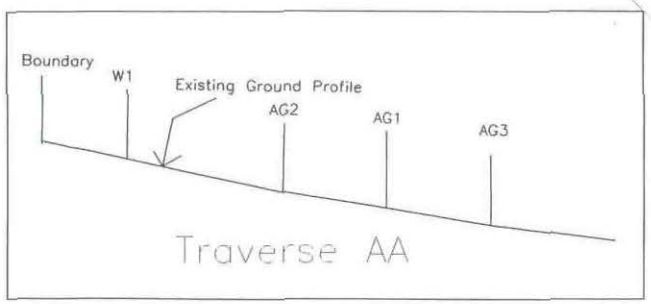
Dave Dravitzki, Engineering Geologist
B.Sc, M.Sc
21 August 2006

REVISIONS

NOTE: HEIGHTS ARE ASSUMED
BASED ON APPROX M.H.W.M
THIS DRAWING HAS BEEN ADOPTED FROM
GILBERT, HAMES & ASSOCIATES DRAWING
7407, DATED 1 JUNE 2006

LEGEND
- AG3 — Hand Auger Test Sites
- W3 — Wastewater Test Sites
- P1 — Penetrometer Test Sites

LEGAL ROAD
APPROX BUSH EDGE
CREEK
POWER POLE
STAY
LOT 12 DP2219
W2
IRON TUBE ON BOUNDARY
PROPOSED BUILDINGS
W1
AG2
AG1
AG3
P1
W3
DECK
BACH
BOUNDARY
RECENT TRACK FORMATION
BUSH EDGE
LOT 10 DP2219
OLP PEG 2.77m R.L.
BUSH
SHED
TOP OF BANK
GRASSED TRACK
DECK
LOT 11 DP2219
Ruakaka Bay
M.H.W.M.
BOAT SHED



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CONSULTING ENGINEERS
31 George Street
P.O.Box 57
Blenheim, N.Z.
Tel: ++64 3 577 7487
Fax: ++64 3 577 7485
design@smartassociates.co.nz
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D & R WHITE
LOT 10 DP 2219
RUAKAKA BAY

PROJECT No. **W06-1761**

NOTES
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SITE PLAN

DRAWING No. **1761/1**

DRAWN DD | CHECKED JIS | SCALE (A3) Approx 1:300 | DATE 11.08.06

COMPUTER FILE: drawings\ | REVISION /

SMART ASSOCIATES Ltd.
ENGINEERS & ARCHITECTS
31 George Street
P.O.Box 57
Blenheim, N.Z.
Tel: (03) 577 7487
Fax: (03) 577 7485
design@smartassociates.co.nz
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Auger Borehole AG1

Project:	**D & R White**		
Date:	**09.08.06**	**Project No:**	**W06-1761**
Bore Ø:	**50mm**	**Drilled by:**	**M. Maxwell**

Graphic Log	Description	Depth (m)	Comments
	Sandy loam, dark brown, loose, soft	0.2	Topsoil
	Silty loam, pale brown, 5% fine gravel, loose, firm	0.7	Colluvium
	Increase to 20% schist fragments, orange-brown mottled pale brown	0.9	
	Becomes wet	1.2	
	Borehole Terminated - struck boulder		

Notes: 1. Groundwater at 1.5 m depth (inferred from scala test)

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31 George Street
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design@smartassociates.co.nz
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Auger Borehole AG2

Project:	D & R White		
Date:	09.08.06	**Project No:**	W06-1761
Bore Ø:	50mm	**Drilled by:**	M. Maxwell

Graphic Log	Description	Depth (m)	Comments
	Sandy loam, dark brown, loose, soft	0.25	Topsoil
	Silty loam, pale brown, 5% fine gravel, loose, firm	0.7	Colluvium
	Increase to 20% schist fragments	0.9	
	Borehole Terminated - struck boulder		

Notes:

SMART ASSOCIATES Ltd.
ENGINEERS & ARCHITECTS
31 George Street
P.O.Box 57
Blenheim, N.Z.
Tel: (03) 577 7487
Fax: (03) 577 7485
design@smartassociates.co.nz
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Auger Borehole AG3

Project:	**D & R White**		
Date:	**09.08.06**	**Project No:**	**W06-1761**
Bore Ø:	**50mm**	**Drilled by:**	**M. Maxwell**

Graphic Log	Description	Depth (m)	Comments
	Sandy loam, dark brown, loose, soft	0.25	Topsoil
	Silty loam, pale brown, 2% fine gravel, loose, firm	0.7	Colluvium
	Increase to 20% schist fragments	0.8	
	Borehole Terminated - struck boulder		

Notes:

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ENGINEERS & ARCHITECTS
31 George Street
P.O.Box 57
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Tel: (03) 577 7487
Fax: (03) 577 7485
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PENETROMETER TEST RESULTS

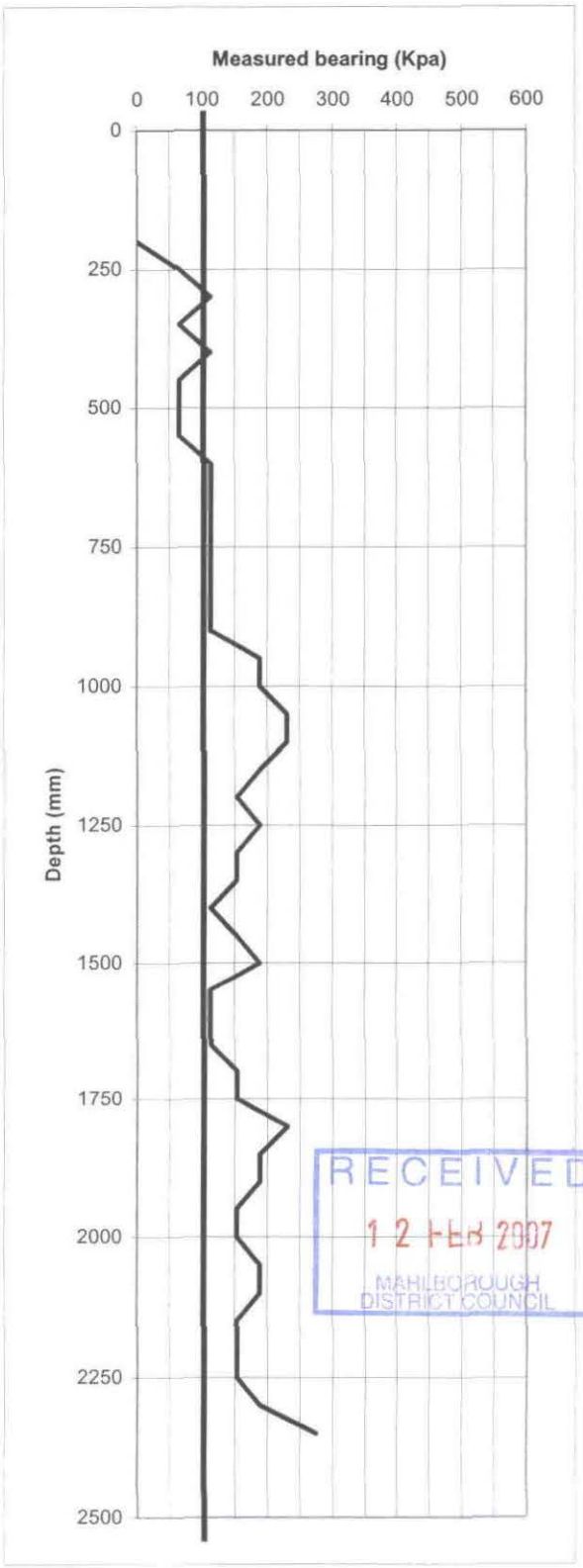
Client: D & R White
Project: Proposed dwelling
Site: Lot 10 DP2219
Ruakaka Bay

Date: 09.08.06
Investigator: D. Dravitzki
Project No: W06-1761

Notes: Test locations refer to drawing.

Test No P1

No. of Blows	e (mm/blow)	Soil bearing resistance (Kpa)	Depth (mm)
	0	**0**	200
1	50	**66**	250
2	25	**113**	300
1	50	**66**	350
2	25	**113**	400
1	50	**66**	450
1	50	**66**	500
1	50	**66**	550
2	25	**113**	600
2	25	**113**	650
2	25	**113**	700
2	25	**113**	750
2	25	**113**	800
2	25	**113**	850
2	25	**113**	900
4	13	**188**	950
4	13	**188**	1000
5	10	**231**	1050
5	10	**231**	1100
4	13	**188**	1150
3	17	**153**	1200
4	13	**188**	1250
3	17	**153**	1300
3	17	**153**	1350
2	25	**113**	1400
3	17	**153**	1450
4	13	**188**	1500
2	25	**113**	1550
2	25	**113**	1600
2	25	**113**	1650
3	17	**153**	1700
3	17	**153**	1750
5	10	**231**	1800
4	13	**188**	1850
4	13	**188**	1900
3	17	**153**	1950
3	17	**153**	2000
4	13	**188**	2050
4	13	**188**	2100
3	17	**153**	2150
3	17	**153**	2200
3	17	**153**	2250
4	13	**188**	2300
6	8	**275**	2350



Field Auger Log

Smart Associates Ltd

Property / Project No .....D & R White ..... Date .....09.08.06... Logged By .....Malcolm Maxwell / Dave Dravitzki.

Location .....W1..... Slope .....5^0..... Bearing .....240.....

Surface Conditions Half cleared bush / bracken, half bush

Exposure to sun and wind ...Good to partial.... Vegetation .....Edge of bush – sparse ground cover

Relation to any existing drainage .....Downslope of neighbouring system to be removed.....

Depth (m)	Horizon or Layer and Boundary	Genesis	Description						Moisture Condition	Drainage Category
			Colour	Field Texture	% + 2mm fragments	Compactness	Consistency	Structure		
0.25	A	Topsoil	Dark brown	Sandy loam	Nil	Loose	Soft	Moderate	Moist	2
0.6	B	Colluvium	Pale brown	Loam	10%	Medium dense	Firm	Moderate	Moist	3

Summary notes:

Landform element .....Linear planar slope..... Catchment area .....Moderate.....

Site constraints .....Foreshore reserve, creek..... EAA assessed .....

Intended water supply .....Water tanks..... Depth to water table .....>0.6m.....

Overall soil category assigned .....3.....

Desludging access .....Good.....

Field Auger Log

Smart Associates Ltd

Property / Project No .....D & R White ..... Date .....09.08.06... Logged By .....Malcolm Maxwell / Dave Dravitzki.

Location .....W2..... Slope .....5^0..... Bearing .....240.....

Surface Conditions Half cleared bush / bracken, half bush

Exposure to sun and wind ...Good to partial.... Vegetation .....Edge of bush – sparse ground cover

Relation to any existing drainage .....Downslope of neighbouring system to be removed.....

Depth (m)	Horizon or Layer and Boundary	Genesis	Description						Moisture Condition	Drainage Category
			Colour	Field Texture	% + 2mm fragments	Compactness	Consistency	Structure		
0.25	A	Topsoil	Dark brown	Sandy loam	Nil	Loose	Soft	Moderate	Moist	2
0.6	B	Colluvium	Pale brown	Loam	10%	Medium dense	Firm	Moderate	Moist	3

Summary notes:

Landform element .....Linear planar slope..... Catchment area .....Moderate.....

Site constraints .....Foreshore reserve, creek..... EAA assessed .....

Intended water supply .....Water tanks..... Depth to water table .....>0.6m.....

Overall soil category assigned .....3.....

Desludging access .....Good.....

Field Auger Log

Smart Associates Ltd

Property / Project No .....D & R White ..... Date .....09.08.06... Logged By .....Malcolm Maxwell / Dave Dravitzki.

Location .....W3..... Slope .....18^0..... Bearing .....270.....

Surface Conditions Sparse bush

Exposure to sun and wind ...Filtered and sheltered.... Vegetation .....Within bush – sparse ground cover

Relation to any existing drainage .....Downslope of neighbouring system to be removed.....

Depth (m)	Horizon or Layer and Boundary	Genesis	Description						Moisture Condition	Drainage Category
			Colour	Field Texture	% + 2mm fragments	Compactness	Consistency	Structure		
0.35	A	Topsoil	Dark brown	Sandy loam	Nil	Loose	Soft	Moderate	Moist	2
0.6	B	Colluvium	Pale brown	Loam	10%	Medium dense	Firm	Moderate	Moist	3

Summary notes:

Landform element .....Linear planar slope..... Catchment area .....Moderate.....

Site constraints .....Foreshore reserve, creek..... EAA assessed .....

Intended water supply .....Water tanks..... Depth to water table .....>0.6m.....

Overall soil category assigned .....3.....

Desludging access .....Good.....

21 August 2006

Opinion As To Land Stability

Description: Lot 10 DP 2219

For: D. & R. White

I, David Neil Robert Dravitzki of Smart Associates Ltd, PO Box 57, Blenheim,

hereby confirm that:

1. I am experienced in the field of soils engineering and more particularly land and foundation stability and am formally recognised by the Marlborough District Council. I am familiar with and understand the purpose of the Marlborough District Council's geotechnical reporting standards. This professional opinion is furnished to the Marlborough District Council alone, on the express condition that it will not be communicated to or be relied upon by any other person. It is based on conditions presently found on site and is consistent with standards currently being applied.

2. Site investigations have been reviewed under my direction and are described in the site investigation report dated August 2006 attached. The following professional opinion is based on the assumption that the data obtained from these investigations is representative of the whole area under consideration. In my professional opinion, having examined the site, it is reasonable for Council to assume that the data referred to above is representative of the whole area under consideration.

3. Building location, plans and cross sections have been prepared and the report describes the soil conditions at the building site.

4. In my professional opinion, not to be construed as a guarantee, and having regard to the specifics of the site which I have investigated to the extent that acceptable engineering practices require, giving due regard to acceptable engineering principles and practices for land and foundation stability, then the building site shown on the plans is suitable for building construction, providing that the following recommendations described in our accompanying Geotechnical Report are adhered to:

    a) Foundation footings should be seated at a minimum depth of approximately 0.6 m and be founded in materials with a soil bearing resistance of greater than 100 kPa.

5. This professional opinion shall remain current for a maximum of two years.

Dave Dravitzki, Smart Associates
BSc, MSc, Engineering Geologist

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NOTE: HEIGHTS ARE ASSUMED
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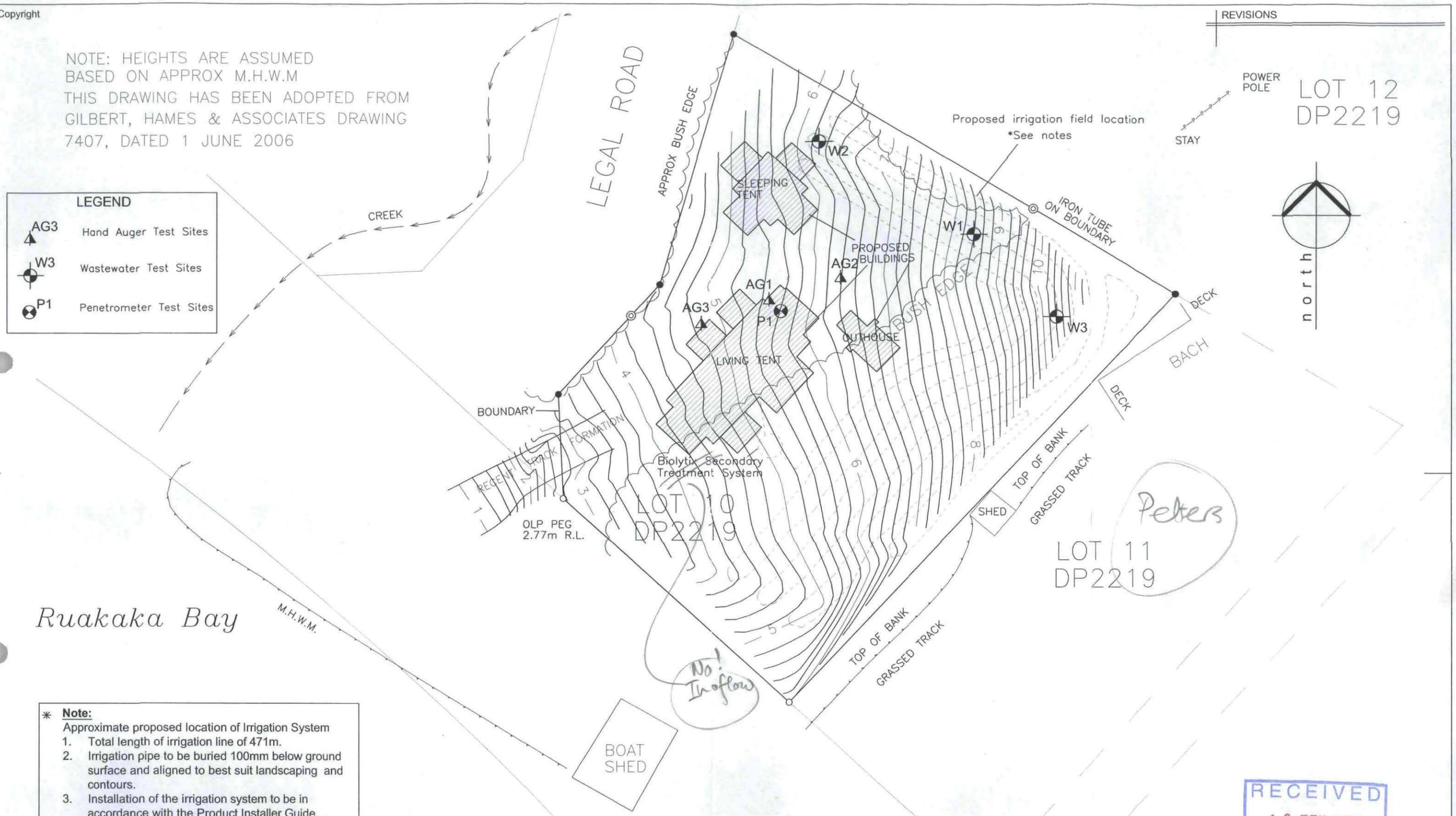
7407, DATED 1 JUNE 2006

LEGEND

- AG3 — Hand Auger Test Sites
- W3 — Wastewater Test Sites
- P1 — Penetrometer Test Sites



*** Note:**
Approximate proposed location of Irrigation System

1. Total length of irrigation line of 471m.
2. Irrigation pipe to be buried 100mm below ground surface and aligned to best suit landscaping and contours.
3. Installation of the irrigation system to be in accordance with the Product Installer Guide.
4. Detailed design of the irrigation system is to be the responsibility of the installer.

070132

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PROJECT No. **W06-1761**

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SITE PLAN			DRAWING No. 1761/1
DRAWN DD	CHECKED JIS	SCALE (A3) 1:300	DATE 20.12.06
COMPUTER FILE: drawings\			REVISION B

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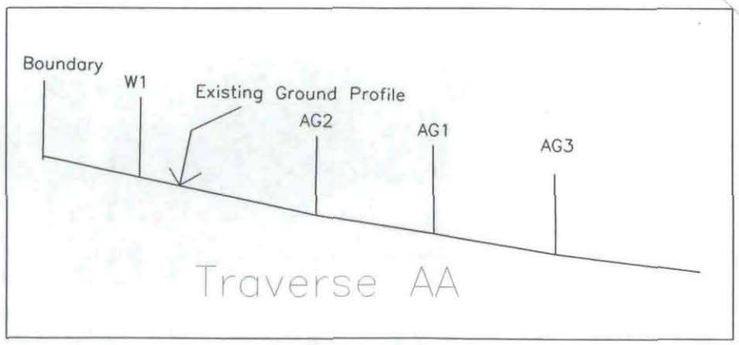
LEGEND

- AG3 — Hand Auger Test Sites
- W3 — Wastewater Test Sites
- P1 — Penetrometer Test Sites

LEGAL ROAD
APPROX BUSH EDGE
CREEK
W2
W1
AG2
AG1
AG3
P1
W3
PROPOSED BUILDINGS
IRON TUBE ON BOUNDARY
POWER POLE
STAY
LOT 12 DP2219
DECK
BACH
DECK
BOUNDARY
RECENT LANDSLIP
FORMATION
BUSH EDGE
LOT 10 DP2219
BUSH
SHED
TOP OF BANK
GRASSED TRACK
OLP PEG
2.77m R.L.
LOT 11 DP2219
TOP OF BANK
GRASSED TRACK
Ruakaka Bay
M.H.W.M.
BOAT SHED



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COMPUTER FILE: drawings\			REVISION /