DavidsonPartners Ltd

Structural Engineering
Civil Engineering
Building Design
Project Management

Practising in association with Ayson and Partners, Registered Surveyors

Our Ref: 22509

21 July 2003

Marlborough District Council
P O Box 443
BLENHEIM

ATTENTION: Toby May

re: McCARTHY, OKIWI BAY (RC: U030687)

We have been instructed to advise as follows.

1. Proposed Wastewater Treatment & Disposal

Our report dated 18 December 2002 proposed a wastewater treatment system consisting of a septic tank, dose chamber and flood loaded trenches.

Development proposals since have reduced the area available for trench disposal and our clients are proposing to use a Stemphlow aerated wastewater treatment system and drip disposal.

We consider that aeration type treatment would be suitable in this instance given the permanent occupancy proposed. We enclose a plan 22509 sheet C1 issue B showing what we consider a suitable area for disposal of the treated effluent by drip irrigation.

We also enclose details of the treatment system under the name of Sewage Solutions Ltd and the consent of the neighbour from Lot 42 to the northeast which was obtained originally when the proposal was to construct trenches close to their common boundary and when the disposal field was likely to be within 50 m of theirs.

The proposed disposal area will now be further away than originally intended.

2. Excavation

We understand that you have been previously supplied details of the proposed excavation and filling to the east of the house.

Davidson Ayson House, 4 Nelson Street,
P.O. Box 256, Blenheim, New Zealand
Telephone 03 578 7029 Fax 03 578 7028
Email: service@DavidsonPartners.co.nz

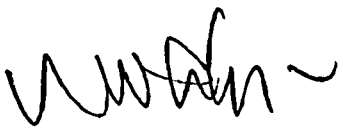
Principals Stephen Sheat, BE, M.IPENZ
Leigh McGlynn, BE, M.IPENZ
Ross Davis, BE, M.IPENZ

We confirm that it is proposed to cut the building platform and lower driveway. At this stage, it is proposed to batter the northern and eastern edges. However, some retaining may be required close to where it abuts to the existing road, the extent of which will be more clearly defined during the work. If a retaining wall is necessary and a Building Consent is required, an application will be made at the time.

It is proposed to form a pilot cut to the ground floor initially and stockpile material on site for later use to expand the parking and manoeuvring area if required. Any material not required for later use will be carted off site to an approved dumping area arranged by the Contractor.

We confirm that if filling is required under the building, the fill material will be approved granular or rocky material, some of which may come from the site but most of which will be imported.

DAVIDSON PARTNERS LTD



W L McGlynn

LM:RLF

COPY TO A & J McCarthy
8 Orchard Lane
Okiwi Bay
R D 3
RAI VALLEY

SEWAGE SOLUTIONS LTD

P.O. BOX 20124 BISHOPDALE CHRISTCHURCH

Date: 17th July 2003

Producer Statement: Installation of a **Stemphlow** Aerated Wastewater Treatment System.

Project Location: Old Mill Road

Legal description: Lot 41 DP 311754

Owners: A & J McCarthy

Installer: Lets Go Enterprises.

I Phillip James Musson being General Manager of Sewage Solutions Ltd & Biocycle South Ltd can certify that the above component & accompanying LPSSIR disposal field has been designed to comply with the relevant requirements of the following Standards

- The New Zealand Building Code
- AS/NZS 1547:2000 On-site domestic wastewater management
- AS/NZS 1546.1:1998 On-site domestic wastewater treatment units Part 1 Septic Tanks
- AS/NZS 1546.3:2001 On-site domestic wastewater treatment units Part 3 Aerated wastewater Treatment Systems.
- NZS 3101:1995 Concrete Structures Standard (Parts 1&2)
- NZS 3109:1997 Specification for Concrete Construction
- NZS 4203:1992 The Loadings Code

Sewage Solutions Ltd is solely responsible for ensuring all works relating to the installation and siting of the wastewater treatment system and accompanying disposal field are carried out in compliance with the above documents and the Company's installation documents. And that all other separate territorial restrictions and protection zones are adhered to at all times.

Lets Go Enterprises are fully trained in our procedures and requirements for the installation of our range of wastewater treatment systems and disposal fields. We have authorised Lets Go Enterprises to carry out inspections on our behalf. Inspections and reporting will be made at the following time.

Inspection 1	-	Upon installation of tank.	Report made to Sewage Solutions Ltd
Inspection 2	-	Upon installation of disposal field.	Report made to Sewage Solutions Ltd
Inspection 3	-	Upon commissioning of system & disposal field.	Report made to Sewage Solutions Ltd

After a successful pass mark in all three reports, Sewage Solutions Ltd will authorise Lets Go Enterprises to generate an installation certificate for the system and accompanying disposal field. This certificate is to be retained by the territorial authority.

Yours faithfully

PHIL MUSSON

Inside

Stemphlow Aerated Wastewater Treatment Systems

WHY CHOOSE A STEMPHLOW SYSTEM?

- The Stemphlow system is the largest standard multi-tank concrete domestic aerated wastewater treatment system available for flows up to 2,200 litres per day.
- The Stemphlow system is one of the only the only domestic system designed to exceed the new joint standards – AS/NZS 1546.3:2001 as well as AS/NZS 1546.1:1998.
- The Stemphlow system is the only domestic system with a tamper-proof, microprocessor controlled, safe low voltage, fully programmable, expandable control unit allowing the system to be easily adjusted to suit the household environment.
- The Stemphlow system is the only domestic system that offers additional power outlets to run separate outdoor equipment and can be interface with other technology such as home security systems or "Smart Housing" offering the ultimate protection for the environment.
- The Stemphlow 8000 has the lowest profile of any single tank domestic aerated wastewater treatment system making it perfect for areas where high water tables can affect the installation.
- Unlike most other aerated systems, the Stemphlow domestic systems do not require an air blower running 24hrs/day, instead oxygen is delivered via a simple very reliable submersible pump that can function effectively operating as low as 10% of the time. This makes the Stemphlow system one of the most energy efficient systems available.
- The Stemphlow systems can be designed to treat effluent to a quality that will exceed "ANY" regional or territorial requirements - where else is that guarantee available.
- Overall, the Stemphlow system is less expensive than other aerated wastewater treatment systems.

DESIGNED WITH THE FUTURE IN MIND.

Why are the Stemphlow systems Better?

The domestic system comprises two pre-treatment chambers – 1st primary & 2nd primary. A proprietary filter device is correctly installed at the end of the primary process. From here the semi-treated effluent flows into the aeration chamber, where with our advanced technology, oxygen is forced into the liquid with the use of venturi. This provides an extremely high level of oxygen to facilitate the aerobic digestion of any remaining solids. The treated wastewater gently gravity feeds into the large clarifying chamber where any solid particles settle to the bottom and are picked up via another venturi and distributed back into the aeration, and 1st primary chambers to undergo further treatment as necessary. The remaining treated effluent then passes through to the pump chamber ready for automatic discharge to the disposal field. The system comes complete with the most advanced alarm monitoring system available within the industry. This electrical control unit is a state of the art, tamper-proof, microprocessor controlled, multi-functional, low voltage, safe, fully programmable, expandable system with additional outputs to run separate electrical items such as out-door lighting for example. This system can be set for "Stay" or "Away" mode to suit periods of dormancy and intermittent use that occur in holiday homes. The control unit is able to fully interface with other equipment such as modern home security systems, or "smart housing" control systems. If a malfunction occurs, a small alarm will sound inside the dwelling. Once this is switched to "Mute" the alarm will sound one hour later as a reminder for you to contact your Stemphlow service provider. If the malfunction has not been fixed within 24hrs, the alarm will sound once again. This technology makes the system almost impervious to flooding and offers very real protection for the environment.

Developed in New Zealand, by New Zealanders, for the protection of New Zealand's unique and sensitive environments.

LETS GO! ENTERPRISES – ABOUT US

Lets Go! Enterprises is a New Zealand owned company whose employees and network of qualified sub contractors have a combined total of more than 100 years experience in the wastewater treatment industry. Any wastewater treatment system will only perform as well as the service it receives. With the network of trained and qualified competent engineers, installers and authorised service people, we are able to apply a wealth of knowledge and experience to any situation.
Lets Go! Enterprises manufactures a range of domestic and commercial sewage treatment and disposal systems, which contribute to this age of environmental awareness.
Handling on-site domestic and commercial sewage disposal is our speciality. We spent many years developing our systems in New Zealand.
The requirements of aerated water treatment systems vary throughout the world. We have developed different options to suit many different requirements, including lightweight glass fibre tanks for inaccessible areas, smaller systems for holiday homes, large kit-set commercial systems, septic tank conversion kits, surface-and subsurface irrigation systems.

Stemphlow has proved itself in many locations both domestically and commercially, and is accepted by all regional and territorial authorities as a completely reliable sewage disposal system.
Today, Stemphlow makes it possible to:

- Provide a permanent solution to localised septic waste disposal.
- Protect the environment.
- Reuse nutrient enriched water for irrigation.
- Make better use of our resources.

Back

ADVANTAGES OF THE STEMPHLOW SYSTEMS

Home owners:
Provides re-use of valuable water
Odourless, user-friendly system that enhances quality of life.
Saves water and money.
Protects our natural resources and our environment.
Lower operating and maintenance costs.
Tamper-proof electronic control system.
Covered by extensive warrantees.

Councils & Developers:
Proven reliabilityProven test results both commercially and domestcally.
Very low operating & maintenance costs.
User friendly, virtually flood-proof system.
Guaranteed effluent quality.
Complete public health protection.

Engineers:
Thoroughly tested and proven design & engineering.
Reliability and performance with reduced costs.
Systems are well proven for both domestic and commercial applications throughout New Zealand.
Up grades of failed existing systems.

Contractors & Installers:
One tank – one hole – one connection.
Simple commissioning instructions.
Low maintenance.
Spare parts universally available.
On going company support & training.

TECHNICAL SPECIFICATIONS

	BM2
1st Tank	
1st Primary Treatment Chamber	2800L
2nd Primary Treatment Chamber	1200L
2nd Tank	
Aeration Chamber	2800L
Clarification Chamber	1200L
Irrigation Chamber	1000L
TOTAL OPERATING CAPACITY	**8000L**
Total Holding Capacity	11000L

Electrical Control Unit – Microprocessor controlled.
Tank Construction – All Concrete.

Tank Dimensions:

Height	1450mm
Diameter	2500mm
Weight	4.0 tonnes

Hydraulic Loading - 10 persons @ 220 Litres/person/day = 2200 Litres/day

Lets Go! Enterprises

** Specialists in Wastewater Treatment Solutions **

PO Box 1508, Nelson
Ph: (03) 548 8108
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Cell: 021 LETSGO
Email: lets.go@xtra.co.nz

17th July 2003

Proposed Wastewater Treatment System for Alan and Jo McCarthy

1 Introduction

The proposed Onsite Wastewater Management System is to be situated on Lot 41 of DP 311754, Okiwi Bay.

The property is located on Old Mill Rd, Okiwi Bay and the lot size is approx ??? m^2.

This report reviews the effluent loadings, proposed effluent treatment and land application systems.

Recommended Wastewater Treatment System

STEMPHLOW – BM2 concrete Aerated Wastewater Management System (processing up to 2,200 litres per day)

2 Effluent Loading and Disposal System

2.1 *Design Parameters*

The property is supplied by water from the community water supply. The proposed dwelling with three bedrooms, bathroom, kitchen and laundry will be fitted with some standard water reducing fixtures including a dual flush 11/5.5 litre water closet.

Based on AS/NZS 1547:2000 the calculated flow rate is as follows

Occupants:	4 Persons
Flow Allowance:	165 litres/person/day (lpd) *1
	660 litres per day
Contingency:	165 litres per day *2
Total Flow Allowance:	**825 litres per day**

Footnote

*1 Adjusted by 15 lpd as an allowance for the dual flush toilet

*2 Balance for population equivalent for # of bedrooms: 1 @ 165 lpd – AS/NZS 1547:2000

2.2 *Land Application System*

2.2.1 *Area*

The proposed area for irrigating is not within ??m of any known watercourses and located on the Northern and Western slopes around of the proposed dwelling and no less than 1.5m from the adjoining properties (area indicated on attached site plan).

The field is located directly below the proposed dwelling and will run across the moderate sloping land.

The ground conditions for the proposed field appear stable with no signs of erosion. The layer of topsoil has relatively good drainage, with exposure to the sun and wind currents all day and has good potential for evapotranspiration.

Assessment of the soil indicates that the soil under the layer of topsoil falls into the soil category 5 as defined in the AS/NZS 1547:2000 standard and is consistent with other properties assessed in the area.

2.2.2 *System Guidelines*

The covered land application system will be dose loaded at approximately at 200L per dose. Effluent distribution will be via a "covered surface" network of RAAM 17D pressure compensated laterals.

All dripper lines are to be covered with mulch, bark or soil under the tree canopy in landscaped gardens.

2.2.3 *Loadings*

Designed Irrigation Rate (DIR) for clay loams (AS/NZS 1547:2000 table 4.2A4) is 25mm/week.

Land Application Area required to achieve a 3.0mm areal loading:
825 lts/3.57mm = 231 square metres

Average Discharge rate:	approx 4.1 doses of 200 litres per dose (11.67 litres/min).
Average DIR per dose:	200lts/231 m2 = 0.87 mm

2.2.4 *Design*

- Supply Line: 25mm LDPE
- Main: 25mm LDPE/16mm Lateral
- Submain: 16mm Lateral
- Laterals: RAAM 17, 2.3 lph emitters @ 0.6m spacings
- Lateral Spacing: 0.6m
- Lateral Depth Surface
- Coverage Bark, mulch and/or soil

3 Environmental Effects

This system does not require the use of chlorine to achieve the high quality output. Having said that, it can take up to 100 days for the natural processes to reach their desired level from commissioning.

With an average DIR of 3.57mm it is highly unlikely that treated effluent (in the from of runoff) would come anywhere near the neighbouring properties or waterways. During times when the areal loading is higher (increase in occupancy) typically the summer months, the climatic conditions would under normal circumstances balance the effects of additional loading.

In 'intermittent use' situations a well-maintained and cared for system will continue to operate with no offensive odour.

4 Conclusion

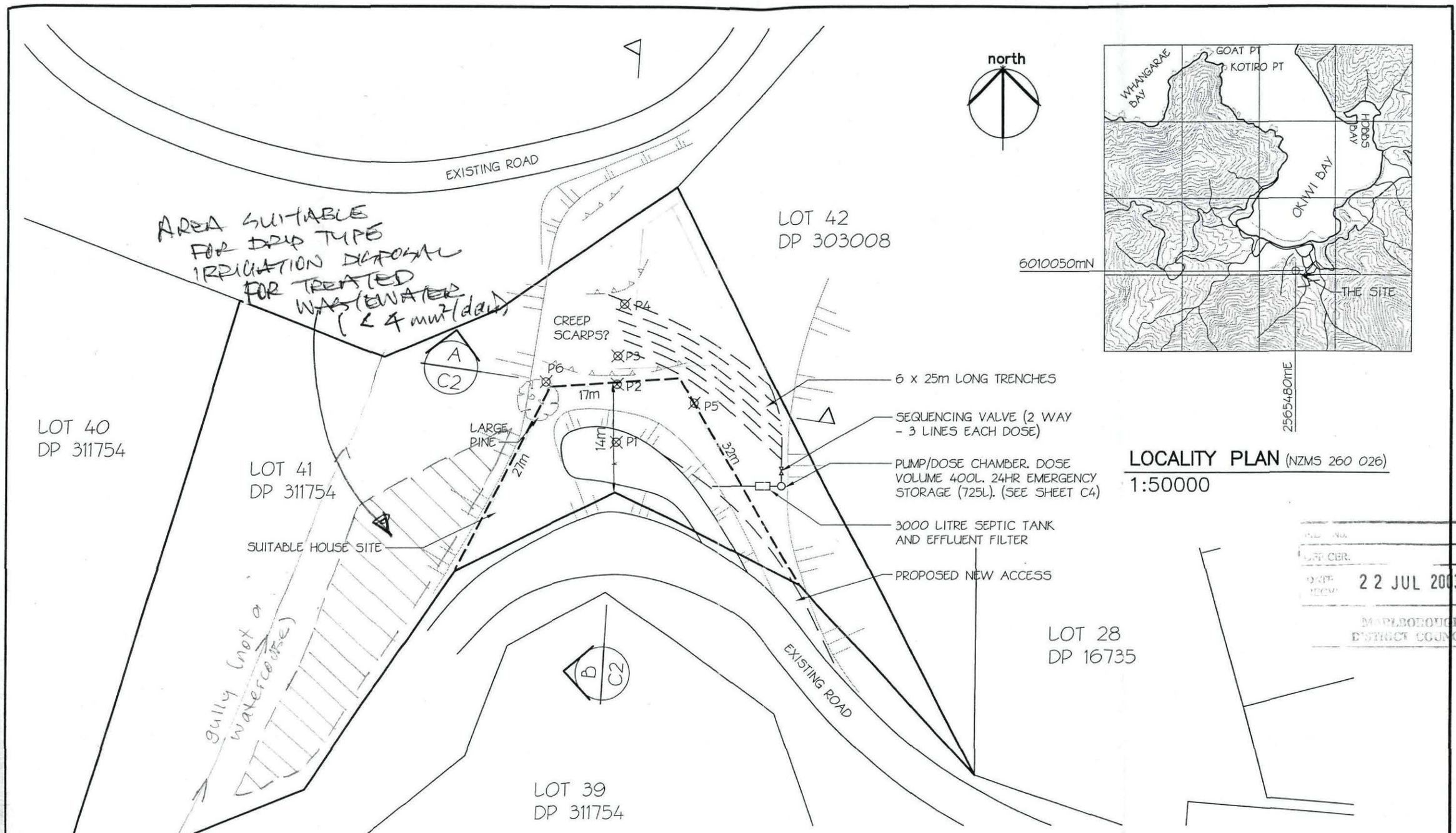
A great deal of attention has been given to the continued reliability of this treatment plant during intermittent and continuous operations and delivering a high quality effluent to the irrigation field.

The installation of the proposed treatment plant at the density proposed in this development will have little or no adverse or accumulative effects on the delicately balanced ecosystems surrounding the dwelling.

Any adverse effects of the proposed activity on the environment will be of a negligible level and will not be contrary to the objectives and policies of the Sounds Resource Management Plan.

Please contact me if you have any queries or wish to discuss further.

Mardy Audier
Wastewater Treatment Specialist



PLAN
1:500

LOCALITY PLAN (NZMS 260 026)
1:50000

'B' wastewater alternative.

0mm 100mm

22 JUL 2003
MARLBOROUGH DISTRICT COUNCIL

DavidsonPartnersLtd
Structural Engineering
Civil Engineering
Building Design
Project Management

ACENZ

Davidson Ayson House
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Blenheim, New Zealand
Telephone 03 578 7029 Fax 03 578 7028

A. & J. McCARTHY
LOT 41, DP 311754
OLD MILL RD, OKIWI BAY

site and location plan

DATE	ORIGINAL SIZE	DRAWING No.	SHEET	ISSUE
12/02	A3	22509	C1	B

DES LM DRN JC CKD CAD \\22509\22509.dwg

DavidsonPartners Ltd

Structural Engineering
Civil Engineering
Building Design
Project Management

Practising in association with Ayson and Partners, Registered Surveyors

Our Ref: 22509

18 December 2002

ENGINEERING REPORT FOR A & J McCARTHY

LOCATION DETAILS:	Okiwi Bay, Croiselles Harbour
LEGAL DESCRIPTION:	Lot 41 D.P. 311754
DATE OF SITE VISIT:	26 November 2002
ZONING:	Sounds Residential

CONTENTS

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Principals Stephen Sheat, BE, M.IPENZ, REGD
Leigh McGlynn, BE, M.IPENZ, REGD
Ross Davis, BE, M.IPENZ, REGD
Ron Melton, BE, M.IPENZ, REGD

Our Ref: 22509

A. SYNOPSIS

A1. Scope of the Investigation

The investigation included a thorough visual inspection on and around the proposed building site, the carrying out of scala penetrometer tests, the assessment of the soils and area for wastewater disposal and the picking up of relevant features by survey.

A2. Summary and Conclusions

A2.1 The proposed building site is located on a main spur running approximately south to north.

A2.2 Good rock and founding depth are available at the proposed building site.

A2.3 Further down slope, the surface profile and soil testing indicate that there has been and may continue to be some movement in this area.

A2.4 The silty clay would appear to have only moderate permeability characteristics, which has required long trench lengths and some water saving fixtures.

A2.5 Excavation should be retained around the building site and all foundations should extend into the rock, which is at least 1 m below the existing surface.

A3. Recommendations

The building site shown on the plans is suitable for house construction provided that;

(a) Foundations are founded into rock at least 1.0 m below cleared ground level. The foundations shall be designed and certified by a Registered Engineer.

(b) Water from the roof and storage overflow be collected and piped to the bottom of the adjacent gully.

(c) Excavations around the house site are assessed by a Geotechnical Engineer and retained if required by a wall designed by a Registered Engineer who shall also monitor construction and certify completion.

(d) Drinking water is tested periodically to ensure it complies with current Council drinking water standards.

B. REPORT

B1. Site Description

The property lies to the west of Old Mill Road in Okiwi Bay, Croiselles Harbour, and encompasses both a gully feature to the west of the property and a spur feature to the east.

It is predominantly covered in manuka with some whiteywoods in the gully. Slopes are moderate to steep (20 – 35°).

A vehicle access has been formed to the building site. It is proposed however to have the entrance from the road further east, approximately where shown on the plan.

B2. Geotechnical Investigation

The underlying rock in this area is the Ward Formation from the Pelorus Group consisting of grey sandstone / siltstone with lenses of conglomerate (Ref. B12.7).

The road cutting above the proposed building site exposed highly fractured and moderately weathered rock. The scala penetrometer tests through the building site itself also confirm hard rock at about 1 m below the surface. Above this the material was soft/firm colluvium. The interface between this material and the original rock was very distinct at about the 1 m level.

Below the proposed house site, there appeared to be some weathered and some more distinct scarps indicating possible creep movement in this area. The penetrometer test at P4 confirmed that the rock level suddenly increases to 2.5 m. The bank at the road cutting below the site exposes a firm, coarse rock and clay conglomerate, reasonably cemented. This cutting is relatively fresh and shows only minor signs of very small and shallow slumping and surface weathering.

It appears that the spine of the main spur through this area runs slightly to the north east into Lot 42 adjacent. This is confirmed by the rock exposure in the cutting for a building platform on that lot.

The ground profile to the south of the site, above the road, flattens and shows no signs of surface instability.

B3. Geotechnical Assessment

We consider that the slope below the weathered creep scarp between tests P2 and P3 show sufficient signs of surface movement to be extremely wary about constructing dwellings in this area.

However, the high underlying rock levels upslope and south of P2 will provide very good founding for building development and will not be effected by movements in the lower slopes, if this were to occur.

B4. Building Site

A suitable building site has been shown on the plans and extends approximately 14 m out from the boundary peg on the corner of the road above (refer to drawing 22509/C1).

The available building area is large, approximately 500 m^2, and comes to the upper part of the spur north of the road.

Foundations should extend into the rock, which is at least 1 m below the existing surface. Development could include excavation into this material with the retaining of the cuts. The foundations should be designed by a Registered Engineer and the cuts should be further assessed after excavation, and a suitable retaining wall also designed by a Registered Engineer.

The above is based on the interpretation of visual examination and limited soil tests only and does not preclude the possibility of differing soil properties and/or other relevant physical features being present between the test locations or hidden from view. Allowance should be made for further assessment during development of the site with additional work being carried out as necessary.

B5. Wastewater Investigation

An investigation was carried out in accordance with AS/NZS 1547:2000 "On Site Domestic Wastewater Management".

The site has high exposure to the sun and wind. The topsoil depth was about 300 mm in the proposed disposal field location. This lies over light brown, firm, moist, silty clay which ribboned to between 40 mm and 50 mm. No percolation tests were carried out. The soil category was assessed at 4.

There are no water bodies within 50 m, although there is likely to be another wastewater disposal within 50 m once Lot 42 has been developed. A Resource Consent will therefore be required to establish this wastewater system. Refer to Section B6.5.

No runoff needs to be controlled nor are there issues with the groundwater.

It is intended to use the area to the east of the slope showing creep movement. There are no stability considerations in the designated area.

Refer to our field notes in the Appendix.

B6. Wastewater Assessment

B6.1 Loading

The house proposed for this site has three bedrooms and the water supply is reticulated to the subdivision from a creek catchment. A preliminary assessment was carried out using a full, unrestricted, wastewater allowance of 180/person/day but for a category 4 soil, the trench length was onerous (approximately 180 m).

We consider that the use of standard water reduction fixtures throughout the house (dual flush systems, shower flow restrictors, aerator taps, and front loading washing machines) will be required.

The design can therefore be 5 x 145 = 725 l/day.

B6.2 Septic Tank

For five permanent occupants and a five year pump out, the tank size should be a minimum of 3,000 litres. A larger tank however, would provide useful additional benefits by reducing the suspended solid content (refer calculations in Appendix).

We also recommend incorporating a filter on the outlet of the tank to guard against solid carryover and to extend the life of the trenches.

The septic tank treatment system proposed will not meet the standards in the Proposed Marlborough Sounds Resource Management Plan in the following areas;

(a) Septic Tank Compartments (2 minimum)

The New Zealand Standard for Septic Tanks (AS/NZS 1546.1:1998) specifically allows single chamber tanks (Clause 3.4.2).

(b) Quality

We consider that the quality limits in the Plan are too stringent and that septic tanks in good operation are unlikely to better the BOD and SS limits (100 and 60 g/m^3 respectively) and will certainly not achieve the faecal coliform limit (less than 10^3) per 100 ml.

However, with an effluent filter to the outlet of the tank, as we have specified, the effluent quality will be below the BOD/SS limits, but not the faecal coliform limit (probably $10^3 - 10^4$).

To reduce the faecal coliform content to less than 10^3 per 100 ml will likely require tertiary treatment such as ultra violet, ozone or chlorination treatment.

We therefore consider that the Plan has set a faecal coliform limit which in practical terms, for development in the Sounds, cannot be met.

B6.3 Trench Disposal

AS/NZS 1547 allows for a design loading rate for a category 4 soil of 10 mm/day.

For a 500 mm wide trench, a total trench length of 145 m is required for five permanent occupants.

This trench is a reasonable length, and to ensure that it is fully utilized, we recommend that it be flood loaded in doses by a pump or gravity siphon. Our plans show 6 x 25 m long trenches split into two zones, with each zone dose loaded with a volume of about 400 l. A sequencing valve can be used to automatically switch between the two zones. This will need around 3 m of head to activate. The sequencing valve could be replaced by one or a series of solinoid valves which activate once 400 l has been obtained in the pump chamber.

B6.4 Additional Work

Davidson Partners Ltd has carried out a site investigation and design in accordance with current codes and modern practice. However, the treatment and disposal system is a biological (living) process and modifications may have to be undertaken to the treatment or disposal system in some circumstances, such as when there is/are;

(a) Unusual soil characteristics not normally tested for

(b) An increase in design load

(c) Disposal of inappropriate substances to the septic system

(d) Poor maintenance

(e) Poor workmanship or departure from construction drawings

(f) Severe site constraints (e.g. limited room)

We strongly recommend that the homeowner and installer read and note the information included in the Appendix and shown on the drawings to ensure ongoing good practice and maintenance.

B6.5 Assessment of Environmental Effects

The Marlborough Sounds Resource Management Plan requires that no subsoil disposal field be closer than 50 m from another subsoil disposal field. Depending on the development proposed for Lot 43 to the north east, it may be that this disposal field will be within 50 m of another. A Limited Discretionary Activity may be granted for a field within 40 m of each other, otherwise it will be a Discretionary Activity.

We consider that any potential adverse effects to the environment will be mitigated by

(a) low water usage (145 l/person/day vs 180 l/person/day)

(b) low application rate (10 mm / day)

(c) the ability of silty clays to further treat and reduce the bacterial content in treated wastewater to practically zero within 1 m of the trench

(d) the good topsoil available (300 mm)

(e) the pumped, flood loaded distribution which significantly reduces the risk of concentrated discharges.

B7. Stormwater Disposal

The water from the roof or water storage overflow should be collected and piped directly to the gully to the west. In no circumstances should a concentrated discharge be allowed over the side slopes. This could initiate a shallow slide.

B8. Water Supply

The site has a reticulated water supply from a creek catchment. However, the annual rainfall in this area is approximately 2,000 mm, which is considered suitable for a roof water supply.

The water should be tested periodically to ensure that it complies with current New Zealand drinking water standards which presently would require filtration for Giardia and cryptosporidium and UV exposure for faecal coliforms, proceeded by pre-filtration and tank storage settling.

B9. Vegetation Clearance

The maintenance of vegetation in this area is not considered essential for long term stability. However, we consider it prudent in the Sounds to limit vegetation clearance to that required for house construction and access formation in order to benefit from the assistance that vegetation provides to the stability of surface soils and control of soil moisture.

Furthermore, the uptake by plants of treated wastewater discharged to the ground assists the reliable functioning of land application systems. Vegetation should be maintained and encouraged around the building site and effluent field.

B10. Access

Good vehicle access onto the site is presently available although some modifications to this are proposed in order to gain access to the basement of the new house. Provision for turning on site to avoid backing onto the existing road would also be useful.

B11. Disclaimer

B11.1 The Marlborough Sounds area is a high rainfall area and prone to high intensity and localized rainfall events.

While the instability on building sites in the Sounds is higher than for building sites on flat ground not close to hills (where the risk is practically nil), we consider that the building sites identified should remain stable for the life of the buildings. However, given the variable nature of the ground and weather patterns, no guarantee can be provided.

If instability of the land surrounding the building sites were to occur during the lifetime of the buildings; some remedial work may be required if this threatens to undermine the foundations.

B11.2 This report has been prepared solely for the benefit of the relevant Local Authority and our client, according to their instructions. No liability is accepted by this firm or by any principal, or director, or any servant or agent of this firm, in respect of its use by any other person, and any other person who relies upon any matter contained in this report does so entirely at its own risk.

The assessments made shall not be made available to or relied upon by any other party without the specific approval of Davidson Partners Ltd.

B11.3 This disclaimer shall apply notwithstanding that the report may be made available to any other person in connection with any application for permission or approval, or pursuant to any requirement of law.

This report is based on conditions presently found on site and is consistent with standards currently being applied.

B12. References

B12.1 ARC Environment, Technical Paper No. 58, Second Edition 'On-Site Wastewater Disposal from Households and Institutions'.

B12.2 AS/NZS 1546.1:1998 'On-Site Domestic Wastewater Treatment Units, Part 1 : Septic Tanks.

B12.3 AS/NZS 1547:2000 'On-Site Domestic Wastewater Management'.

B12.4 Marlborough Sounds Resource Management Plan (Proposed).

B12.5 Rainfall Contours (Isohyets) for Marlborough Sounds – Source Unkown.

B12.6 NZ Geological Map, Sheet 14, Marlborough Sounds.

B12.7 Institute of Geological and Nuclear Sciences "Geology of the Rai Valley Area" by M R Johnston, 1993.

DAVIDSON PARTNERS LTD

W L McGlynn

WLM:AR

Encl

Our Ref: 22509

APPENDIX

1. Professional Opinion

2. Test Results

   Scala penetrometer tests

3. On Site Wastewater Management Details

   - Field Assessment Report
   - Land Application System Design
   - Owner and Installer Guides

4. Plan 22509 sheets;

   C1 Site Plan
   C2 Sections
   C3 Effluent Disposal, Typical Septic Tank Details
   C4 Effluent Disposal Field, Typical Details

DavidsonPartnersLtd

Structural Engineering
Civil Engineering
Building Design
Project Management

Practising in association with Ayson and Partners, Registered Surveyors

Our Ref: 22509

18 December 2002

STATEMENT OF PROFESSIONAL OPINION AS TO LAND STABILITY

DESCRIPTION: Lot 41 D.P. 311754, Okiwi Bay, Croiselles Harbour

FOR: A & J McCarthy

I, **William Leigh McGlynn,** of Davidson Partners Ltd, P O Box 256, 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 geo-technical 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 carried out under my direction and are described in our site investigation report dated 18 December 2002, 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. Detailed residential building and engineering drawings and specifications have yet to be prepared for this site.

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Principals Stephen Sheat, BE. M.IPENZ, REGD
Leigh McGlynn, BE, M.IPENZ, REGD
Ross Davis, BE, M.IPENZ, REGD
Ron Melton, BE, M.IPENZ, REGD

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 house construction, providing that the following recommendations described in our accompanying report (Engineering Report for A & J McCarthy) are adhered to:-

   (a) Foundations are founded into rock at least 1.0 metres below cleared ground level. The foundations shall be designed and certified by a Registered Engineer.

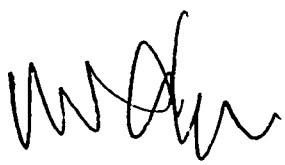
   (b) Water from the roof and storage overflow be collected and piped to the bottom of the adjacent gully.

   (c) Excavations around the house site are assessed by a Geotechnical Engineer and retained if required by a wall designed by a Registered Engineer who shall also monitor construction and certify completion.

   (d) Drinking water is tested periodically to ensure it complies with current Council drinking water standards.

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

DAVIDSON PARTNERS LTD



W L McGlynn

WLM:AR

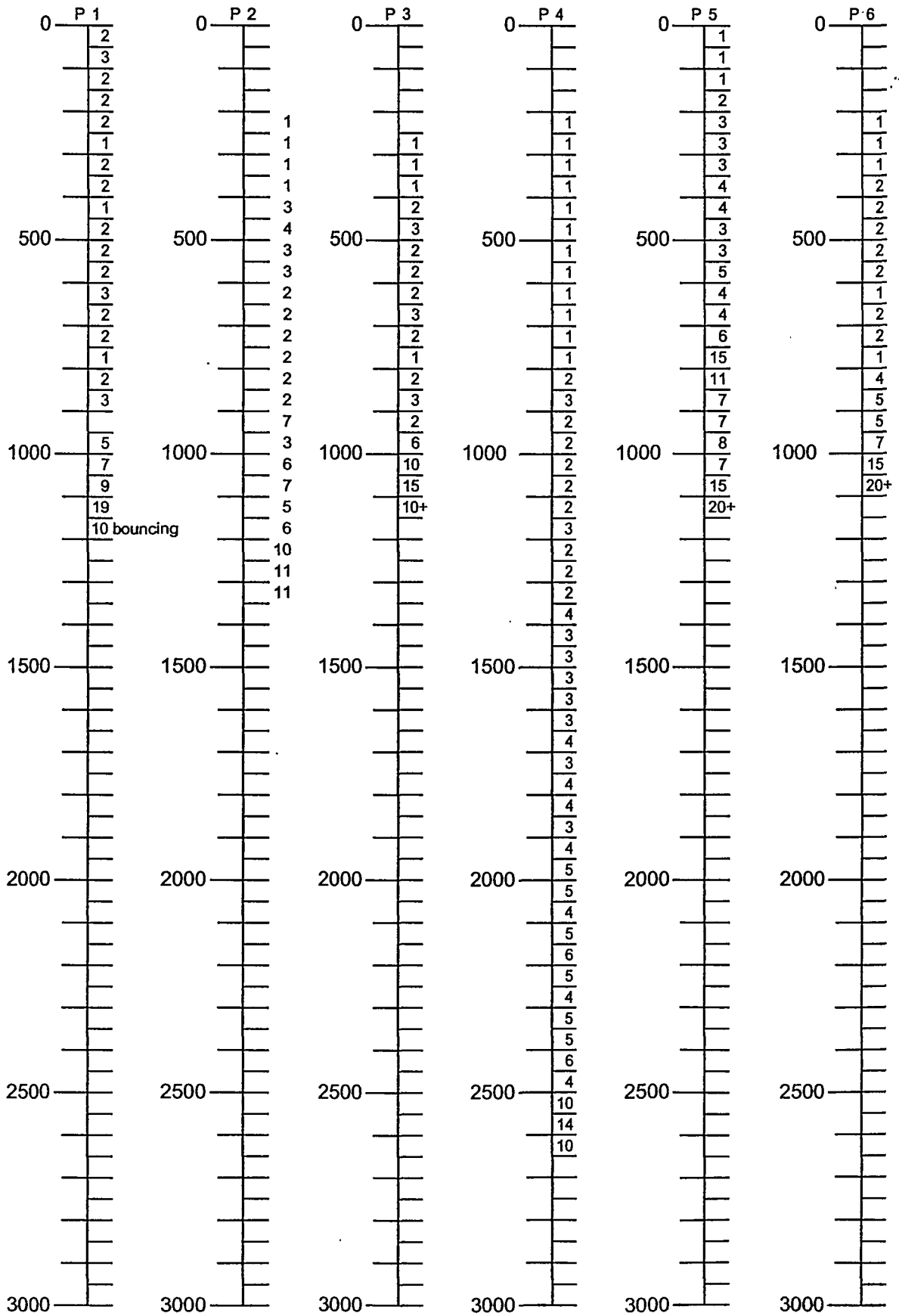
DavidsonPartners Ltd

Structural Engineering
Civil Engineering
Building Design
Project Management

A & J McCARTHY
LOT 41 DP 311754
OKIWI BAY

scala penetrometer results

Job No 22509
Sheet No 1
Name CM/JC
Date 22.11.02



PENETRATION IN BLOWS PER 50mm

EOP = end of penetrometer

APPROXIMATELY 160 CU.M. TO BE REMOVED.

THE PROPOSED BUILDING CONSTRUCTION IS FOR A TILT SLAB BACKWALL AND ONE SIDEWALL WITH A CONCRETE BASEMENT FLOOR. DURING CONSTRUCTION OF THE TILTWALLS AND CONCRETE BASEMENT FLOOR - WATER AND SILT CONTAINMENT WILL BE CONTROLLED BY BUNDING USING I.E STRAW BALES AND THE PIPING OF EXCESS WATER AWAY FROM THE SITE TO A WATER CATCHMENT GULLY RUNNING THROUGH THE PROPERTY. REFER ENGINEERS REPORT.

THE LOWER DRIVEWAY AND TURNAROUND WILL BE DEVELOPED AS THE FILL FROM THE BUILDING PLATFORM CUT ALLOWS. AS PER ENGINEER CONSULTATION THE FILL WILL BE USED IN THE CUT FILL AND BATTER PROCEDURE. THE OUTSIDE FACE OF THE FILL WILL BE PLANTED WITH PITASPORUMS AND NATIVE PLANTS TO HELP WITH STABILISING OF THE BENCHING AND TO BLEND IN WITH THE ARESENT TREES. DURING CONSTRUCTION OF THE ABOVE WATER AND SILT CONTAINMENT WILL BE CONTROLLED BY BUNDING AS PER THE BUILDING SITE EXCAVATIONS.