



**Our Ref: 6817**

25 March 2002

**ENGINEERING REPORT  
FOR  
J & B EASTERBROOK**

<b><u>LOCATION DETAILS:</u></b>	Lawrence Road, Kenepuru Sound
<b><u>LEGAL DESCRIPTIONS:</u></b>	Lots 4 and 5, D.P. 3046
<b><u>DATE OF SITE VISIT:</u></b>	10 November 2000
<b><u>ZONING:</u></b>	Sounds Residential

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<b>FILE No.</b>
<b>OFFICER:</b>
<b>DATE RECV'D</b> 16 OCT 2002
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A. **SYNOPSIS:**

A1. **Scope of the Investigation**

The area straddling the boundary between Lots 4 and 5 has been identified by the owners some years ago as a possible building site. The purpose of this investigation is to confirm that the site is stable and also that wastewater can be disposed of safely on-site.

A2. **Summary and Conclusions**

A2.1 A large building site has been identified and staked on-site approximately encompassing the area previously identified by the owners. The site is stable and moderately sloping with a good sunny aspect.

A2.2 There is also a large area available for on-site disposal of wastewater.

A2.3 Vehicle access can either be obtained from Lawrence Road directly or from an existing access to Lot 6 (it was noted that the vehicle access into Lot 6 encroaches beyond the eastern boundary to Lot 5).

A3. **Recommendations**

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

- (a) If a pole type foundation is constructed, it is founded at least 1.5 metres below cleared ground level. The pole foundation shall be designed by a Registered Engineer who shall also certify founding depths before placing the poles.
- (b) Water from the roof and storage overflow be collected and piped to the watercourse to the west.

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**B. REPORT:**

**B1. Site Description**

The property is covered in kanuka and young natives, including pungas, and consists of a moderate slope of 16-20°. The property has a northerly aspect taking full advantage of the sun.

The property dips to the western boundary where there is a watercourse running approximately along the boundary towards the sea. This watercourse is partly incised into outwash material. The slope to the eastern boundary is more gentle and more easily developed.

We have carried out a thorough visual examination on and around the proposed building site, carried out soil test, picked up relevant features by manual survey, inspected stereoscopic aerial photographs and other existing information on neighbouring properties. The locations of tests and other features are shown on plan numbers 6817 sheets C1 to C4 appended to this report.

**B2. Geotechnical Investigation**

The underlying rock in this area is described as Marlborough Schist. Significant out-cropping was noted at the foreshore where the grey, hard, slightly weathered and moderately fractured schist appears to dip at approximately 12° to the southeast.

Scala penetrometer tests (P1 to P6) carried out around the building site confirm soft to firm yellow brown clayey silts which progressively get stiffer to the rock layer which is at approximately 2.0 to 3.0 metres below the surface.

The gentle spur feature on which the building site is located shows no signs of instability. The erosion in the creek bed along the western boundary is causing localised slumping but this is not progressing to the building site.

The aerial photographs give no indication of major active movement in this area.

Shear vane tests carried out at the building site give values of undrained shear strengths in the order of 130 kpa which converts to an allowable bearing strength at 300 mm below ground level of approximately 90 kpa.

**B3. Geotechnical Assessment**

The proposed building site is considered stable, confirmed by strong direction of dip (that is into the slope) of the rock at the foreshore, the moderate sloping spur feature, the proximity of the rock at the building site and the lack of stormwater catchment to the area.

We note that this area is classified as unstable in the Proposed Marlborough Sounds Resource Management Plan. While we acknowledge that much of the area along this side of Kenepuru Sound is unstable, there are many isolated safe building sites, such as the one identified in this report, that are considered to be at very low risk from instability.

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**B4. Building Site**

The building site has been identified on-site by four stakes at each corner, marked A to D, also shown on the plan. The site straddles the boundary between Lots 4 and 5 on a moderate slope which can be easily developed.

Construction in accordance with NZS 3604 will be suitable for this site. If pole type foundations are constructed, these should be founded at least 1.5 metres below clear ground level.

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**

Wastewater disposal was assessed in accordance with AS/NZS 1547:2000 "On Site Domestic Wastewater Management". Refer to the site notes in the Appendix.

The proposed disposal area, just north of the building site, has a high exposure to the sun and prevailing winds. A good topsoil depth of 200 mm lies over yellow brown firm clayey silts. The soil category was assessed at 3.

The disposal field is located more than 30 metres from the sea but probably within 20 metres of the creek along the western boundary. The creek was not flowing at the time of our site inspection and appears to flow only during wet weather.

**B6. Wastewater Assessment**

We have assessed the Long Term Acceptance Rate at 21 mm per day and consider that all wastewater can be disposed of safely on-site. Refer to our design notes in the Appendix.

Although the watercourse along the western boundary flows only intermittently, the Proposed Marlborough Sounds Resource Management Plan requires steps to be taken to mitigate the potential for contamination if within 30 metres of a wastewater disposal field. Such measures shall include:-

- The use of shallow disposal trenches using the 200 mm topsoil depth to maximum advantage.
- Making use of the silty nature of the soils underlying the topsoil where research has shown that within a very short distance (less than 900 mm) bacterial reduction in the discharge is considerable.
- Use of a larger septic tank to take account of expected peak (holiday) loads and intermittent loading by increasing settling capacity thereby reducing solid overflow and trench deterioration.
- Use of an effluent filter at the septic tank outlet as a safety valve for solid overflow.

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- *Returning the end of the distribution drains to the surface to maximise aeration of the trenches and breakdown of the bacteria.*

We therefore recommend that following as a minimum wastewater and treatment disposal system:

- (a) A 4,500 litre septic tank.
- (b) An effluent filter to the outlet.
- (c) A distribution box.
- (d) Five 15 metre long shallow disposal trenches.

The above is based on a typical three bedroom house with a five person normal loading and peaks up to eight people using a roof water supply (140 litres per person). Specific design should be carried out for higher loadings or use of alternative systems.

Refer to plans C3 and C4 for further details.

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)

This requirement is onerous and in fact the recently released New Zealand Standard for Septic Tanks (AS/NZS 1546.1:1998) specifically allows single chamber tanks (Clause 3.4.2). We consider that the performance of a single chamber tank is equal to, or better than, a multi chamber tank of the same capacity.

- (b) Quality

The quality limits in the Plan are set very high and we consider that septic tanks in good operation are unlikely to better the BOD and SS limits (less than 100 and 60 g/m<sup>3</sup> respectively) and will certainly not achieve the faecal coliform limit (less than 10<sup>3</sup> per 100 ml).

However, with an effluent filter to the outlet of the tank, as we have specified, the treated effluent will satisfy the BOD/SS limits, but not the faecal coliform limit (probably 10<sup>3</sup>-10<sup>4</sup>).

To reduce the faecal coliform content to less than 10<sup>3</sup> per 100 ml will likely require a sand filter or 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, is very difficult to achieve and for this site, not necessary.

#### **B7. Stormwater Disposal**

Stormwater from the roof should be collected and piped directly to the watercourse to the west.

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**B8. Water Supply**

Annual rainfall in this area is approximately 1,600 mm. This is considered sufficient for a roof water supply if adequate storage is available. For permanent occupation, we recommend at least one months storage (approximately 25,000 litres).

**B9. Vegetation Clearance**

The vegetation is not required to assist with stability and therefore its clearance on and around the building site is acceptable.

**B10. Access**

It is considered that vehicle access is most easily obtained by coming off the part of the access to Lot 6 which is on Road Reserve. A grade of approximately 1 in 12 should be possible.

Access directly off Lawrence Road will also be possible but the grade will be steeper and involve more work.

We note that a slump has activated approximately where shown on sheet C1 and that care will have to be taken when forming this access to excavating below its zone of influence and build back up.

**B11. Disclaimer**

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

While the risk of 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 our client and the relevant Local Authority. 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.

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**B12. References**

- B12.1 R Crites and G Tchobanoglous 'Small and Decentralised Wastewater Management Systems'.
- B12.2 Fietie, L (1991). 'General Authorisation for Sewage Tank Effluent Disposal - Technical Support Document'. Pollution Control Section, Canterbury Regional Council.
- B12.3 Gunn, I (1997). 'On-Site Wastewater Systems and Bacterial Reduction in Sub-Soil Disposal Areas, A Review'. On-Site New Zealand Special Report 97/2.
- B12.4 ARC Environment, Technical Paper No. 58, Second Edition 'On Site Wastewater Disposal From Households and Institutions'.
- B12.5 AS/NZS 1547:2000 'On-Site Wastewater Management'.
- B12.6 Marlborough Sounds Resource Management Plan (Proposed).
- B12.7 Rainfall Contours (Isohyets) for Marlborough Sounds - Source Unknown.
- B12.8 Stereoscopic aerial photographs, flown by NZ Aerial Mapping Ltd in 1975, numbers SN 3781, C31 and C32.

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C. APPENDIX:

C1. Professional Opinion

C2. Test Results

Scala penetrometer tests.

C3. On Site Wastewater Management

C3.1 Field Assesment Report

C3.2 Land Application System Design

C4. Plans

Plans 6817 sheets;

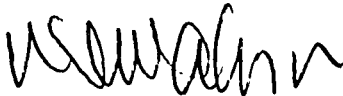
C1 Plan

C2 Sections

C3 Effluent disposal field - typical septic tank details

C4 Effluent disposal field - typical details

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W.L. McGlynn

LM:RLF

Encls

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Davidson Partners Ltd

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Building Design  
Project Management



EASTERBROOK  
LOT 5&6 DP 3046  
LAWRENCE ROAD  
KENEPURU SOUND

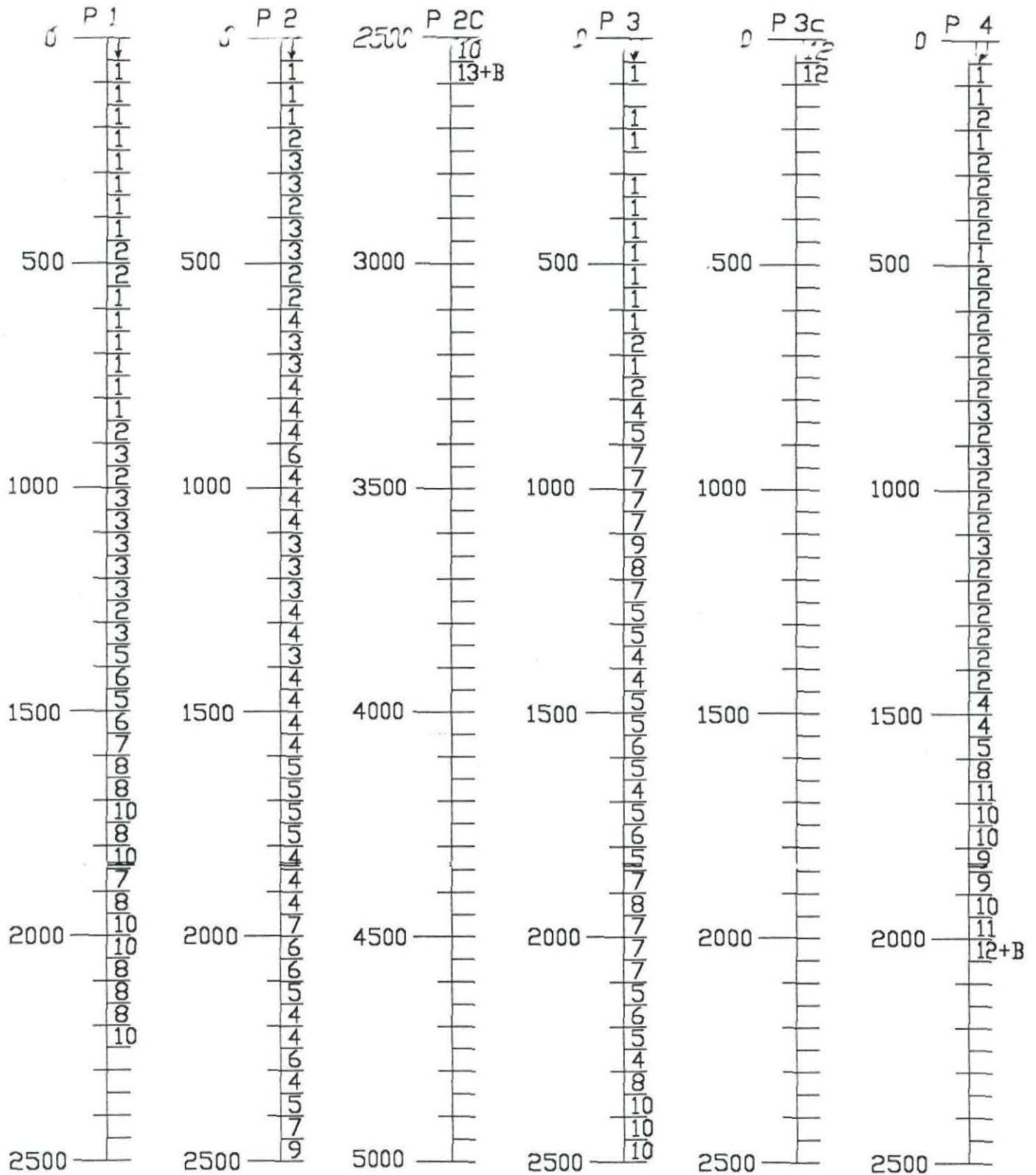
scala penetrometer results

Job No. 6817

Sheet No. 1

Name A.W. & A.C

Date 10/11/00



PENETRATION IN BLOWS PER 50mm

E.O.P

FILE No. of penetrometer
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# Davidson Partners Ltd

Structural Engineering  
Civil Engineering  
Building Design  
Project Management

Practising in association with Ayson and Partners, Registered Surveyors

**Our Ref: 6817**

25 March 2002

## OPINION AS TO LAND STABILITY

**DESCRIPTION:** Lots 4 and 5, D.P. 3046, Lawrence Road, Kenepuru Sound

**FOR:** J and B Easterbrook

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 25 March 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.
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 and land application area for treated wastewater shown on the plans are suitable for house construction and the controlled discharge of domestic wastewater respectively, providing that the following recommendations described in our accompanying report (Engineering Report for J and B Easterbrook) are adhered to:-*
  - (a) If a pole type foundation is constructed, it is founded at least 1.5 metres below cleared ground level. The pole foundation shall be designed by a Registered Engineer who shall also certify founding depths before placing the poles.

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 R. A. Nelson, BE, M. IPENZ, REGD  
 Stephen Sheat, BE, M. IPENZ, REGD  
 Leigh McGlynn, BE, M. IPENZ, REGD  
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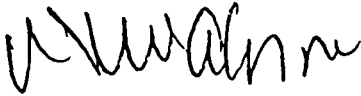


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(b) Water from the roof and storage overflow be collected and piped to the watercourse to the west.

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

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**W L McGlynn**

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ON SITE WASTEWATER MANAGEMENT  
FIELD ASSESSMENT REPORT

JOB NAME: Easterbrook

JOB NO. 6817

LOCATION: Lots 4 and 5 D.P. 3046, Kenepuru Sound

DATE: 5 December 2000

REFERENCE: 1. ARC TP#58  
2. AS/NZS 1547:2000 'On Site Domestic Wastewater Management'

- |     |  |                               |
|-----|--|-------------------------------|
| 1.  | Percolation Rate (if available).                     | -                             |
| 2.  | Site Exposure  | High                          |
|     | - to sun   | High                          |
|     | - to wind  | High                          |
| 3.  | Topsoil Depth.                                       | 200 mm                        |
| 4.  | Soil Description (colour, moisture, firmness, type). | Yellow/brown firm clayey silt |
| 5.  | Soil Category (1 - 6)                                | 3                             |
| 6.  | Coarse Fragments - size/abundance                    | -                             |
| 7.  | Ribbon Length  | -                             |
| 8.  | Soil Structure (Pedal Content)                       | High                          |
| 9.  | Performance of existing systems nearby.              | Good                          |
|     | - Type, septic and trench                            |                               |
|     | - Proximity  |                               |
| 10. | Nearby water bodies.                                 | Yes                           |
|     | - Separation Distance                                | Less than 30 metres           |
| 11. | Nearby wells.  | No                            |
|     | - Separation Distance                                |                               |
| 12. | Intended water supply.                               | Roof                          |
| 13. | Runoff to be controlled.                             | No                            |
| 14. | Ground water to be controlled.                       | No                            |
| 15. | Any stability considerations, If yes, comment.       | No                            |
| 16. | Depth to water table.                                | N/A                           |
| 17. | Vegetation cover                                     | Yes                           |
|     | - Existing   | Natives                       |
|     | - Type   | Natives                       |
|     | - Proposed   | Natives                       |
| 18. | Gravity head to proposed disposal field location.    | Negative                      |
| 19. | Reserve areas available?                             | Yes                           |
| 20. | Other Comments                                       |                               |

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ON SITE WASTEWATER MANAGEMENT  
LAND APPLICATION SYSTEM DESIGN

JOB NAME: Easterbrook

JOB NO. 6817

LOCATION: Lots 4 and 5 D.P. 3046, Kenepuru Sound

DATE 21 March 2002 (update)

REFERENCE: 1. ARC TP#58  
2. AS/NZS 1547:2000 'On Site Domestic Wastewater Management'

1. Parameters

1.1 Annual rainfall 1,600 mm  
1.2 Annual evaporation -  
1.3 Number of bedrooms (2, 3, 4) 3  
1.4 Occupancy (No. of people), N (4, 5, 6) 5  
1.5 Waste water allowance, A (roof 140, creek/well 180) 140 l/p/d  
1.6 Soil category (from field assessment) 3

2. Septic Tank Design

2.1 Number of people 8  
2.2 Daily flow (wastewater allowance x number of people) 1,120 l/day  
2.3 Minimum residence time required 24 hours  
2.4 Pump out interval required 5 years  
2.5 Sludge/scum accumulation (black-50, grey-40, both 80) 80 l/p/yr  
2.6 Allowance for scum/sludge (sludge accumulation x pump out interval  
x design occupancy) 2,000 litres  
2.7 Minimum tank size  
(scum/sludge volume + flow during min. residence time) 3,120 litres  
2.8 Choose tank size 4,500 litres  
2.9 Settling volume available (tank size - scum/sludge) 2,500 litres  
2.10 Settling time available (settling volume + daily flow) 2.2 days

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**3. Trench Design**

**3.1 (a) DLR (Design Loading Rate) Indicators**

INDICATOR	SCORE	WEIGHTING	RANKING
<u>Slope</u> >20°(0), 10-20° (1), 0-10° (2)	1	x3	3
<u>Topsoil Depth</u> <100mm (0), 100-200 (1), >200mm(2)	1	x2	2
<u>Exposure to Sun</u> Low (0), Mod (1), High (2)	2	x2	4
<u>Exposure to Wind</u> Low (0), Mod (1), High (2)	2	x2	4
<u>Vegetation</u> Not suitable(0), Suitable(1), Very Suitable(2)	2	x2	4
<u>Proximity to Water Bodies or Wells</u> <10m (0), 10-30m (1), >30m (2)	1	x2	2
<u>Proximity to Water Table</u> <1m (0), 1-2m (1), >2m (2)	2	x3	6
<u>Known Problems in Area</u> Yes (0), Unsure (1), No (2)	2	x2	4
<u>Trench Width</u> >400mm (0), 300-400(1), <300mm (2)	0	x1	0
<u>Trench Sizing</u> Bottom & sides(0), sides only(1), bottom only(2)	2	x3	6
<u>Trench Loading</u> Gravity (0), Dose (1), LPED/drip (2)	0	x3	0
<u>Use</u> Permanent (0), Frequent (1), Infrequent (2)	2	x3	6
<b>RANKING SCORE</b>			<b>41</b>

(b)

DLR (ex Table 4.2.A.1)	RANKING
Most Conservative = 15 mm/day	< 25
Least Conservative = 25 mm/day	> 50

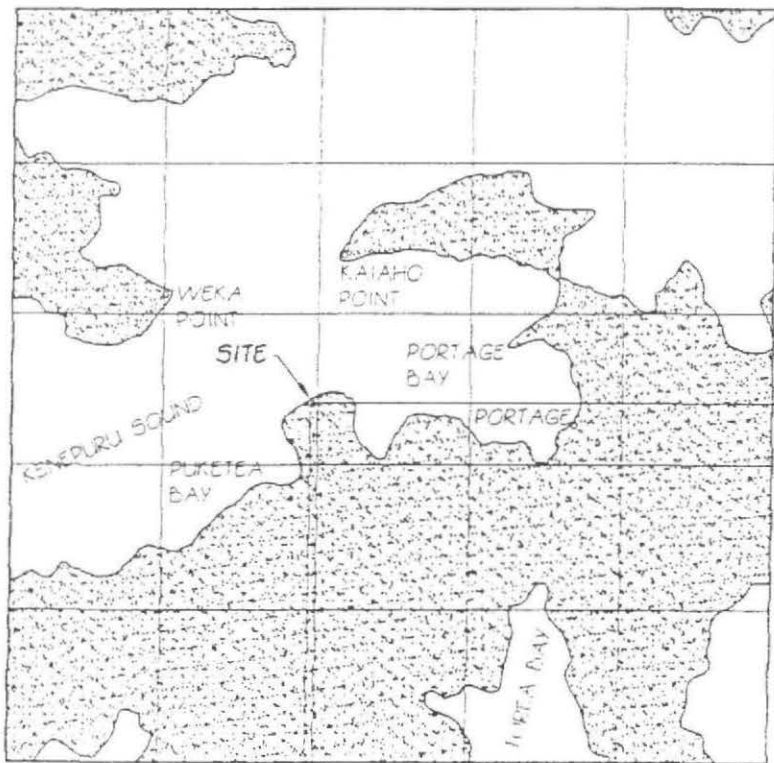
(c) DLR considered appropriate for the site 21 mm / day

**3.2 Trench Width, W (for design)**

**3.3 Trench Length, L =  $\frac{N \times A}{DLR \times W}$  =  $\frac{5 \times 140}{21 \times 0.45}$  = 74 m**

**= 5 x 15 m**

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locality plan NZMS 270/527  
1:50,000

KENEPUKU SOUND

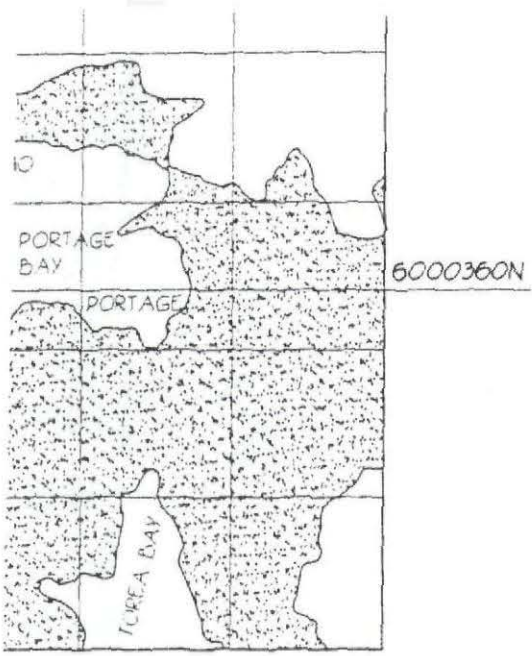
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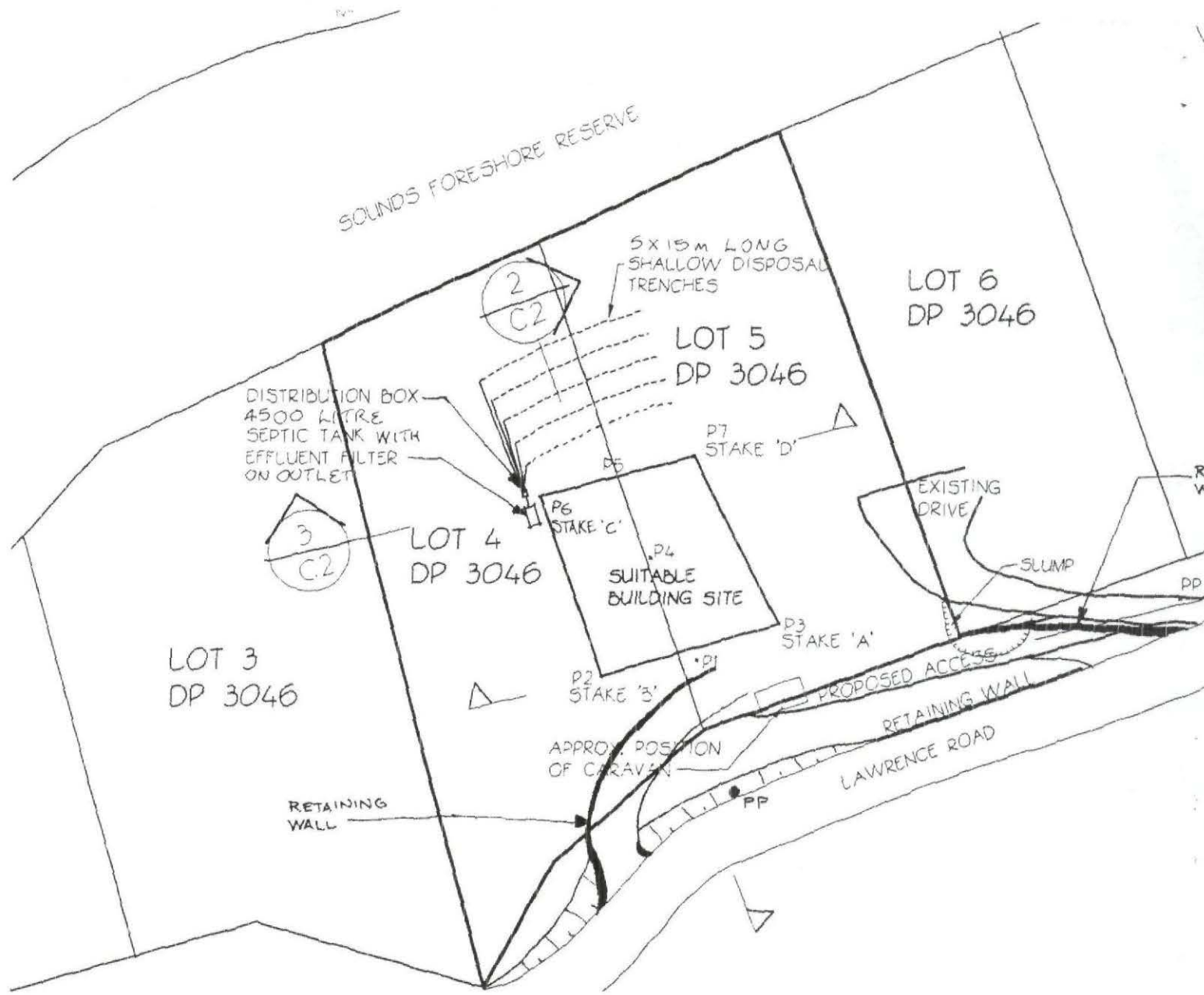
LOT 3  
DP 3046

RET.  
WAL

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C - DISPOSAL TRENCH ADDED	- T.W. - 01
B - WEST SIDE ACCESS	-
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NZMS 2701P27



PLAN  
1:500

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