03 5786866

from the drawing board

FAX Who : Mr Angus Laird Where: MDC

#: What:: Resource Consent When : 18/10/04

Dear Mr. Laird

Thank-you for your letter of 14/10/04. File Ref U041704
Healey. Kaitepeha Bay.

ref.

1. Full detail of the sewer system is attached
2. I understand the soil assesment is part of the Engineer's report which we submitted with the applicatesion.
3. Covered in attached documents
4. Excavation elevations are on Architectual drawings actual excavation volume expected to be less on site due to slope.
5. Excavated material to be placed in benched areas on site by excavation contractor and placement approved by Engineer on site.
6. Access is by barge and clear accesslane.

Russell Devlin ANZIA Architect
P O Box 30 050 Christchurch NZ ph. 03 332 9696 fax. 03 332 9697
E-mail : rad@energydesign.co.nz

Please contact me if I can be of further help.
Yr Russell Devlin.

Lets Go Environmental Ltd

** Specialists in Wastewater Treatment Solutions **

PO Box 1508, Nelson

Date: 13th October 2004

Producer Statement: Installation of a **Stemphlow BM2** Aerated Wastewater Treatment System.

Project Location: Driftwood Bay, Arapawa Island

Legal description: Lot5, DP3439 Queen Charlotte SD

Owners: M & JHealey

Installer: Wastewater Treatment Services Ltd.

I Mardy Audier being director of Lets Go Environmental Ltd can certify that the above component & accompanying Land Application System (LAS) 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

Lets Go Environmental Ltd is solely responsible for ensuring all works relating to the installation and siting of the wastewater treatment system and accompanying LAS 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.

Our Staff are fully trained in our procedures and requirements for the installation of our range of wastewater treatment plants and land application systems.

The following inspections are carried out.

Inspection 1 - Upon installation of tank.
Inspection 2 - Upon installation of land application system.
Inspection 3 - Upon commissioning of system LAS.

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

Yours faithfully

Mardy Audier

LETS GO! ENVIRONMENTAL LTD

** Specialists in Wastewater Treatment Solutions **

PO Box 1508, Nelson
Ph: (03) 547 6838
Fax: (03) 547 7274
Cell: 021 LETSGO
Email: lets.go@xtra.co.nz

14th October 2004

Wastewater Treatment and Land Application Assessment for M and J Healey

1 Introduction

The property Lot 6 DP3439 is located in Driftwood Bay, Arapawa Island.

A Wastewater Treatment System and associated Land Application System is to be installed within the lot boundary. The final location is subject to the actual placement of the tank and associated landscaping. This treatment plant will have the capacity to process the wastewater generated from a dwelling up to 2,000 litres per day in accordance with the performance criteria, AS/NZS 1547:2000.

Potable water is to be supplied from on-site water tank/s that fill from the low pressure community reticulation scheme.

2 Report Overview

This report covers the estimated wastewater volumes generated and the sizing of the land application system.

Note: This report supplements the Marriott engineering report prepared by Jim Hadley (date unknown).

3 Design

3.1 Flow Calculations

Inflow Source

- Domestic washing machine (front loading)
- Standard electric hot water cylinder
- Dual flush toilet

- Standard shower
- No bath/spa bath

Number of bedrooms: 3

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

Occupants:	5 Persons
Flow Allowance:	140 litres/person/day (lpd) *1
Flow:	**700 litres per day**
Contingency	200 lpd *2
Total Flow:	**900 litres per day**

Footnotes

*1 Adjusted by 40 lpd as an allowance for a dual flush toilet, front loading washing machine and a low pressure reticulation system.

*2 Allowance made for peak season occupancy (up to 10) and reduction in water usage due to limited facilities (single toilet and shower)

3.2 Recommended Land Application System

Area Required

The soil type falls into the category 4 soil type being a clay loam – Mariott engineering report

Recommended Design Irrigation Rate (DIR) for irrigation systems and Category 4 soils is: 25 mm/week.

Note: 1mm is equivalent to 1 litre of water covering 1 square metre per week

Area required for the Land Application Area (irrigation area)

Max Loading	6,300 litres per week
DIR	25 millimetres per week
Area required	**252 m^2**

Design

A Network of covered dripper lines, manifold line and mains will form the Land Application System (irrigation system). The System will use the "Dose Loading" method for application on the soil.

All irrigation dripper line laid on the surface should be pegged and covered with a decomposing layer of organic material, bark or soil to a minimum depth of 100mm where accessable.

The dripper line will be RAM 17D 2.3LPH 0.6M (similar to a garden hose with built in emitters) and connected to a low density alkathene supply line from the irrigation pump via an inline screen or disc filter.

Design Irrigation Rate per dose

Total estimated daily flow	900	litres / day
Number of Doses	5	doses / day
Discharge per dose	160	litres / dose - approx
Estimated Duration	11	min/dose
Design Flow	882	litres/hour
Irrigation Rate (RAM 17D)	3.5	litres/hour/metre
Total RAM Required	252	metres
Number of Zones required	1	zones
Land Application Area	252	square metres/zone
DIR per dose	0.63	mm / dose

3.3 Effluent Quality

The Wastewater Treatment Plant will be capable of exceeding the recommended minimum effluent quality standard set for subsurface dripper line irrigation in AS/NZS 1547:2000;

BOD5	< 20 milligrams per litre
Suspended Solids	< 30 milligrams per litre

3.4 Wastewater Treatment System

Recommended System:

The *Stemphlow BM2 advanced Aerated Wastewater Treatment Plant* (by Wastewater Treatment Services Ltd, Nelson, ph 547 8408). This system is capable of meeting the required standards.

4 Summation

Based on the information from AS/NZS 1547:2000, the relevant Resource Management Plan and best practices it is of my opinion that this application will provide sustainable and effective on-site domestic wastewater management.

Mardy Audier
Lets Go Environmental Ltd

File Ref: U041704

Case Officer: Angus Laird

ISO 9002
Form Ref CI 521

14 October 2004

S88 RMA 1991
More info letter

R Devlin Architect
P O Box 30050
CHRISTCHURCH

Dear Russell,

Receipt of application for resource consent - U041704 - Healey, Martin James - Kaitepeha Bay Queen Charlotte Sound

The Council acknowledges receipt of the following application(s) for resource consent:

To excavate in excess of 20m³ on Lot 5 DP 3439.

To discharge effluent within 50 metres of other disposal fields and within 30 metres of surface water runoff.

I have been appointed as your case officer. I have assessed your application for completeness and have determined that further information is required to enable the application to be further processed. The information required is outlined as follows-

1) Full detail of the proposed wastewater disposal system, including an accurate to scale plan show the location of the system and discharge field.

2) A site and soil assessment as required by AS/NZS 1547:2000 (a New Zealand Standard for On-site Wastewater disposal), please note this requires physical site assessment.

3) An AEE describing the potential effects of the discharge with specific reference to the site constraints and the location and type of the wastewater disposal.

4) Detail of the excavation proposed including side views, batters and proposed measures to ensure stability and mitigate the effects of the excavation including the control of the sediment from the site.

5) Detail of any filling proposed and how this is to be stabilised and the sediment controlled.

6) Detail of how machinery/building materials are to access the site.

Once you have provided the information I will continue to process your application and determine whether or not -

- It needs to be notified; and
- It contains sufficient information to enable it to be fully assessed and processed.

If your application is to be notified, you will be contacted as soon as possible. If notification is necessary, the Resource Management Act requires this to be done within 10 working days of an application being "accepted" for processing.

Applicants will be charged actual and reasonable costs for receiving and processing an application as described on the attached fees and charges sheet.

Fees are calculated on the basis of actual cost recovery, and vary for each application. The fee calculated is non-refundable, irrespective of the Council's decision on your application. If your application is withdrawn prior to a decision being issued, you will be liable for the costs incurred up to the time of the withdrawal.

Please do not hesitate to contact me if you have any questions or concerns regarding the above matters.

Yours faithfully

Angus Laird
RESOURCE MANAGEMENT OFFICER

\\l....O:\Resourceconsent\2004\041501-041750\U041704-Healey,MJ-discharge-s88non-ala1-le.doc Saved 14/10/2004 10:56

MJ Healey
New Bach Driftwood Bay - Arapawa Island - Marlborough Sounds.

Assessment of the Environmental Effects:

A Copy of the Engineers report for this site is on the property file and is attached.

Reference : Hadley Consultants 24/10/03 and 20/01/04

This plan locates the recommended Building platform and the wastewater treatment system.

The design of the house is based on the recommendations.

Ground Disturbance

While the limit without Resource Consent is set at 20 cubic metres for excavation is is noted that this application is still relatively minor in quantity at 70-80 cubic metres.

This amount is actually likely to be less as the ground slopes across the site also, whereas the site sections are a higher level.

The house footprint is simple and small at 12m x 6m with the basement or bunk room area being 9m x 3m approximately – for which there is the small excavation.

The net effect of this is to lower the house on the site and hence lower the environmental impact on neighbours and local area.

Excavated material will be carefully placed on site in benched areas by a qualified excavation contractor to the satisfaction of the site Engineer.

Discharge Permit

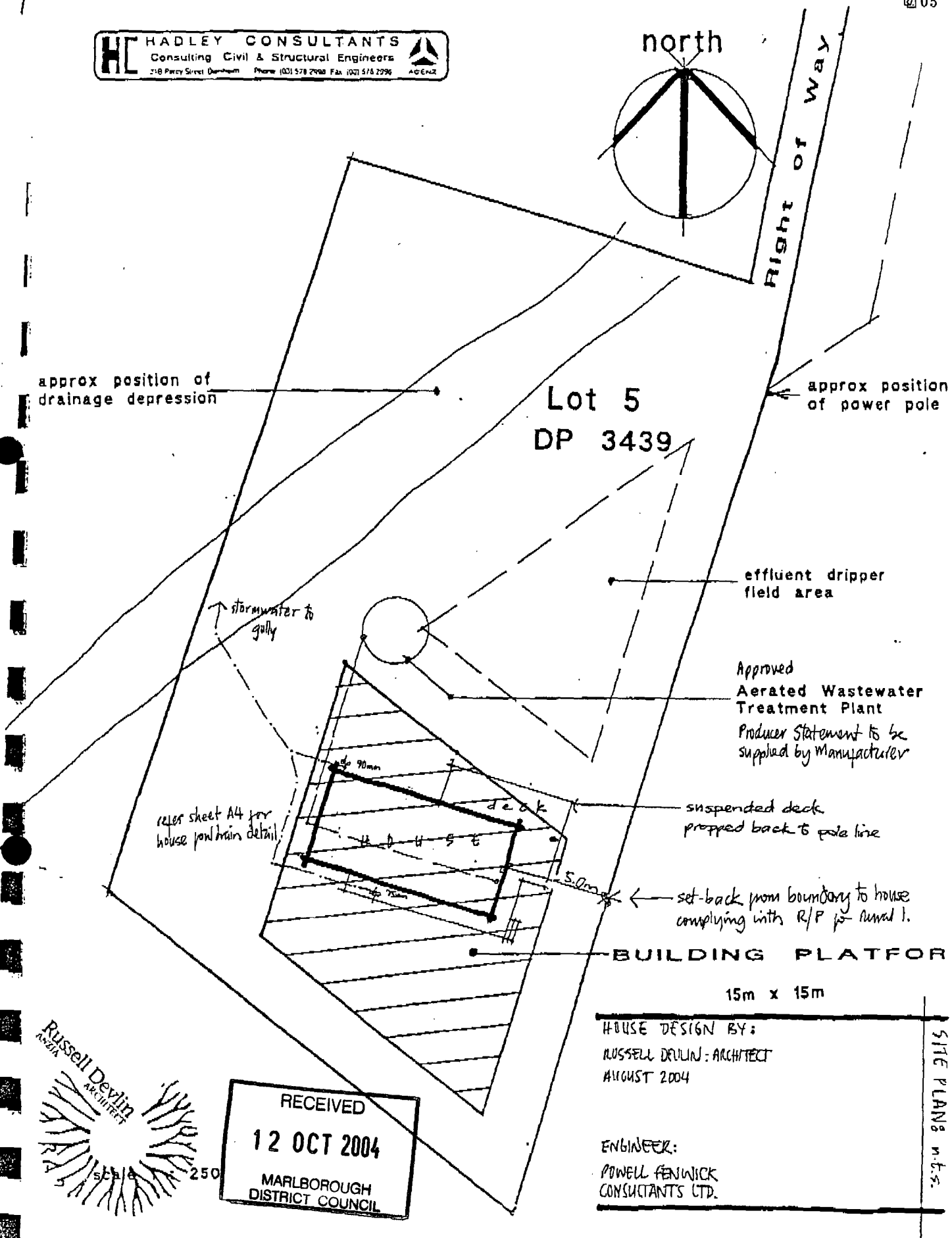
This type of Cluster settlement is typical of various areas in the Sounds. This application recognizes the requirement for the Consent for distance from other fields and from the surface water indentation on site.

As the latest design in water treatment is to be utilized (as per Building Consent Application) and designed to meet Council requirements the likely impact is planned to be negligible. Irrigation quality water is to be the out put and this will be disposed of to assist regeneration of the native bush around the properties.

A Producer statement to meet the Council requirements will be supplied prior to drainage work commencing.

Russell Devlin : Architect

HADLEY CONSULTANTS
Consulting Civil & Structural Engineers
318 Percy Street Dunedin Phone (03) 578 2988 Fax (03) 578 2996 AGENZ



Site Plan to Accompany Engineering Report for Marriott at Driftwood Bay Arapawa Island

HADLEY CONSULTANTS
Consulting Civil & Structural Engineers
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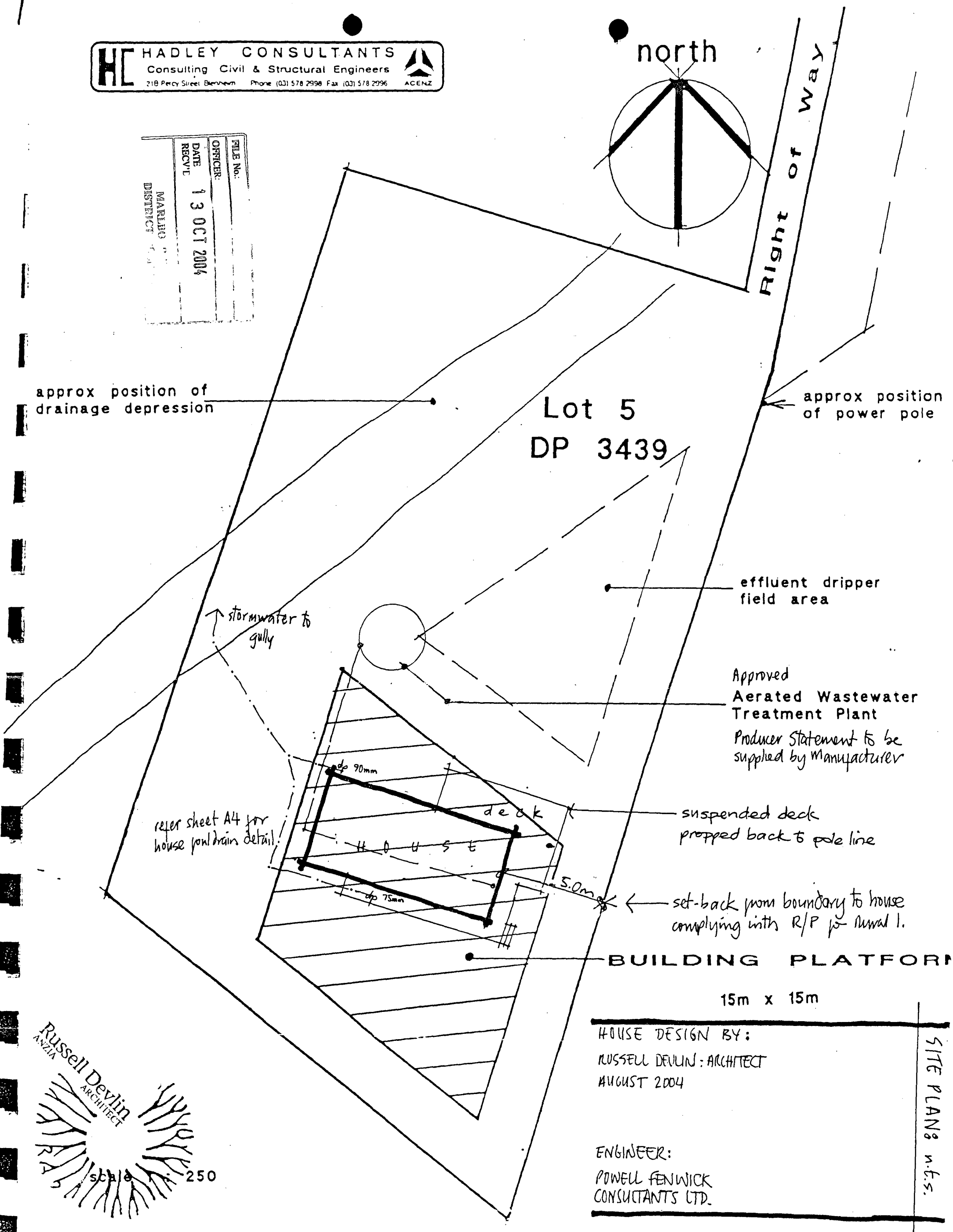


Site Plan to Accompany Engineering Report for Marriott at Driftwood Bay Arapawa Island

Engineering Report:
HADLEY CONSULTANTS 03091

HADLEY CONSULTANTS
a division of Wharehunga Enterprises Limited
Consulting Civil & Structural Engineers

21B Percy Street, Blenheim * Telephone (03) 578 2998 * Facsimile (03) 578 2996

20 January 2004

The General Manager
Marlborough District Council
P O Box 443
BLENHEIM

ATTENTION: Mr John Kennedy

Your Reference: Prop. No.198475

Dear John

**ENGINEERING REPORT ON MARRIOTT PROPERTY,
LOT 5, D.P. 3439, DRIFTWOOD BAY,
ARAPAWA ISLAND, QUEEN CHARLOTTE SOUND.**

The attached is a copy of the synopsis of our engineering report, and the engineering report itself, together with our Professional Opinion on the general stability of the land contained in and around the building platform contained on the Marriott property Lot 5, D.P. 3439, in Driftwood Bay, Arapawa Island, Queen Charlotte Sound for Council records.

Please note that our engineering reports are written not only to cover the engineering aspects of an application for necessary Resource Consent to enable the development of the property, e.g. for land disturbance and discharge to land etc., but also to cover engineering issues that pertain to Building Consent when application is made to develop the property with a residential dwelling and any Resource Consent issues that might arise at that juncture.

While we have not yet sighted firm proposals for the development of the property there is a possibility that the dwelling might be sited as close as possible to the southern rear boundary with the land zoned Rural One and also close to the eastern common side boundary with Lot 4. Thus, it is possible that an application for Consents will show the height of any dwelling proposed penetrating the recession plane specified in the Sounds Resource Management Plan for a Permitted Activity on these boundaries unless the building is designed as a split level dwelling. We have no knowledge of when an application will be lodged for Building and Resource Consent for a new dwelling but understand it is not imminent.

We trust this and the attached information is sufficient for your records at this time.

Kind regards
HADLEY CONSULTANTS

Jim Hadley
Director

cc Mr Dave Marriott
Ms Jenny Wills

HADLEY CONSULTANTS
a division of Wharehunga Enterprises Limited
Consulting Civil & Structural Engineers

21B Percy Street, Blenheim * Telephone (03) 578 2998 * Facsimile (03) 578 2996

20 January 2004

The General Manager
Marlborough District Council
P O Box 443
BLENHEIM

ATTENTION: Mr John Kennedy

Dear John

STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR RESIDENTIAL BUILDING DEVELOPMENT

I, James Alexander Hadley, Director, of Hadley Consultants, Consulting Civil and Structural Engineers, 21B Percy Street, Blenheim, with respect to possible applications for Resource Consent and Building Consents for the development of Lot 5, D.P. 3439, Driftwood Bay, Arapawa Island, Queen Charlotte Sound, owned by Mr Dave Marriott of Wellington, hereby confirm that:

1. The above named is a Registered Engineer and Chartered Professional Engineer experienced in the field of soils engineering and more particularly land and foundation stability, and our firm is covered by a current policy of Professional Indemnity insurance to a minimum value of $250,000, and that,

2. We understand that the purpose of this professional opinion is to assist the Marlborough District Council in fulfilling its statutory obligations under the Building Act 1991 and the Resource Management Act 1991, and that,

3. Based upon our inspection of the site, our knowledge of local conditions, and our observations and testing on the property on 15 September 2003 and the information contained in our engineering report of 24 October 2003, numbered 03091 on the allotment referred to above, and that,

4. This opinion is based upon the assumption that the information obtained from our inspections, observations, and testing is representative of the whole area under consideration and it is our opinion that it is reasonable for Council to accept this assumption as valid, and that,

5. No detailed architectural and engineering drawings and specifications have been prepared for the proposals to develop Lot 5, D.P. 3439, and that,

6. In our professional opinion this allotment is capable of being developed with a residential dwelling and its associated on-site waste water disposal system meeting the requirements of NZS 1547:2000, without destabilising the land in any way, provided all construction works are built in accordance with accepted trade and engineering principles and practice, and provided that the requirements contained in our aforementioned engineering report are adopted, namely that any construction works falling outside the ambit of NZS 3604:1990, are designed by a registered engineer, and that,

7. This professional opinion is furnished to the Marlborough District Council for its purposes alone. It may not be relied upon by any other person or entity. It is based on the conditions presently found on the site at the time of our inspection and is consistent with standards and/or engineering principles and practices currently being applied to engineering work of this nature, and that,

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

Yours faithfully
HADLEY CONSULTANTS

J A Hadley
Director

HADLEY CONSULTANTS
a division of Wharehunga Enterprises Limited
Consulting Civil & Structural Engineers
218 Percy Street, Blenheim * Telephone (03) 578 2998 * Facsimile (03) 578 2996

SYNOPSIS

OF

ENGINEERING REPORT ON LOT 5, D.P. 3439, DRIFTWOOD BAY, ARAPAWA ISLAND, QUEEN CHARLOTTE SOUND.

The attached engineering report records the inspection carried out during a site visit on 15 September 2003 to determine whether or not a building platform, satisfying the engineering criteria required to comply with New Zealand Building Code requirements for a residential dwelling exists on Lot 5, D. P.3439, Driftwood Bay, Arapawa Island, Queen Charlotte Sound.

The engineering report addresses the issues of land stability, both on the site and in the surrounding land, geotechnical and soils considerations, access, a suitable building platform for a dwelling, foul effluent collection and disposal, stormwater disposal, and a suitable supply of potable water.

The engineering report concludes that there is a suitable area for a building platform on the allotment that meets fully with the required engineering criteria for a residential dwelling.

This building platform has been identified and is shown in photographs and a site plan attached to the report.

The engineering report concludes that foul effluent from the proposed new dwelling can be treated with a proprietary Stemphlow BM2 aerated wastewater treatment plant built and maintained in accordance with NZS 1547:2000. The effluent from this plant is required to be dose discharged through a suitable dripper line system sized in accordance with NZS 1547:2000. Although an accurate size for the land application area for the field for the dripper system cannot be determined until the size of the residential dwelling is determined, it is to be located above the building platform in the position shown on the attached site plan in the engineering report.

The report includes information on the ultimate bearing capacities of the soils upon which any dwelling could be founded.

Inspection of the soils showed that reliable ultimate bearing values of at least 360 kPa are present over the site at depths of around 700 millimetres below the ground but that in all probability any building will be constructed partly on pole foundations that will need to be sized at the time these footings are designed after any necessary soils testing is undertaken to confirm the ultimate soil bearing values.

The engineering report draws attention to the need to undertake site works to maintain the long term stability of the land and to ensure that the building platform is adequately drained so that surface run-off from the land and the platform area itself is collected and channelled into an adequate stormwater drainage system piped to the sea.

These proprietary systems are specifically designed to fulfil the requirements for a particular dwelling design.

No permeameter testing to determine K_{sat} was carried out on the allotment since it was clear that the size and gradient of the allotment precluded any land disposal system other than a surface irrigation system. It was clear from a visual inspection of the soils that their permeability was that of a Category 4 clay loam, as defined by NZS 1547:2000, at worst.

The above requirements and recommendations may be altered by the manufacturer of a proprietary aerated wastewater treatment plant if experienced in installing plants in the Marlborough area generally and the Sounds area in particular, but only after the site has been cleared for inspection and after consultation with the design engineer.

Water Supply

The seven allotments zoned Sounds Residential in Driftwood Bay are connected to a communal water system that draws water from the natural watercourse that comes down the gully partially shown on the left hand side of Plate 1.

There is ample capacity in this watercourse to supply the potable water needs of seven residential dwellings occupied permanently except in extremely dry periods such as those that have been experienced in Marlborough over the past four years.

We are advised that the experience of the other property owners in and around this part of Arapawa Island is that storage tanks for rainwater from roofs have not yet proved necessary in dry conditions to supplement their domestic water supplies from watercourses on the rural land above their properties.

Nevertheless, it is our opinion that in this particular situation it would be prudent to allow, in the design of a new dwelling, provision that permits rainwater storage tanks to be connected into the household water supply system in the future even though there is a reticulated supply of potable water presently available.

Such a provision will guard against the possibility of this water supply becoming overloaded in the future.

A common practice with Sounds water supply systems in situations where the demand may be only partially fulfilled using water from a watercourse is to have a dual system. In this system the water from the watercourse and the rainwater from the roof are stored in interconnected tanks.

These tanks need to be of sufficient capacity to store enough water to carry the dwelling through a prolonged period of dry weather. In determining the size of the storage capacity required for storage an allowance of 150 litres per day per person represents a liberal supply of water.

In prolonged dry spells daily consumption could be reduced to 100 litres per day per person without seriously inconveniencing the occupants in the dwelling. Thus, a full 5,000 litre storage tank, with no inflow from the watercourse or from rainwater from the roof, would sustain one person for 50 days in relative comfort.

It may well prove prudent to install a reserve supply tank, generally around 750 litres capacity, to cover periods, such as Christmas holidays. During these periods the flow from the communal system might be insufficient to supply the residents of every property at periods of peak water demand during the day.

If it were to be necessary to collect rainwater from the roof of the buildings on the property, store this in supply tanks, and use this water as the only supply of potable water for the dwelling then there is sufficient precipitation in the region to provide a domestic supply from a roof catchment system. Rainfall in the region is around 1.6 metres per annum.

In determining the size of the storage capacity required, based on an allowance of 150 litres per person per day, and if the roof area of any new dwelling is assumed to be around 150 square metres (about 1,600 square feet), the gross water collected per annum from the roof will be around 240,000 litres minimum.

Allowing for an average of 4 persons continuously occupying the dwelling there is likely to be sufficient precipitation per annum to provide around 400 days supply. Even allowing for losses this should be ample for a permanently occupied residential dwelling.

However, in determining the volume of the storage tanks required it will be necessary to assess the likely maximum period the dwelling will be occupied and the average occupancy over this time. Since the maximum length of any dry spell is unlikely to exceed 30 days it would be prudent to have sufficient storage capacity to cover at least this time span even if the period of occupancy is less than this time. In this instance, if the average occupancy were 4 persons, the storage capacity of the tanks should be around 18,000 litres.

If the likely period that the dwelling is occupied were 60 days then it would be prudent to provide 45 days total storage, i.e. 30 days plus half the time above 30 days. In this case if the average occupancy were also 4 persons over these 60 days then it would be prudent to provide tanks with a storage capacity of around 25,000 to 27,000 litres.

In addition to the water storage tanks it will also be necessary to install a header tank or tanks, of capacity of around 1,000 to 2,000 litres, to provide gravity fed water to the household system. If possible, this system should operate under a head of at least 5 metres although a household hot water system will function at about half this head if the 5 metre head proves difficult to achieve.

It is important that any overflow from the storage or header tanks be connected into the stormwater system to ensure that surplus water is carried well clear of the foundations to the dwelling, retaining walls and the like.

Electricity and Telephone

There is a readily available electrical reticulation available on this proposed allotment in this region of Queen Charlotte Sound. A power pole is sited at the common corner boundary of Lots 4, 5, and 6.

An application and the payment of a connection fee to Marlborough Lines Limited will be required before mains power can be connected to Lot 5.

Telecom New Zealand Limited does have a telephone reticulation in Driftwood Bay. The existing dwellings on Lot 2 and 4 are both connected to Telecom's reticulation. Thus, it is likely that this Telecom system can be connected to Lot 5 following the making of the necessary application and the payment of any connection fees. Telecom does not have this area well covered by its cell phone system. Therefore, it may be necessary to locate a position, such as on the end of the jetty where cell phone signals may be able to be received.

There is no reliable television signal that can be obtained from the repeater stations in this region. However, a TV signal could be obtained from the Sky satellite system as a satellite dish would have an unobstructed line to the north when set at an angle of 30 degrees to the horizontal.

Conclusions

We believe, as a result of our inspection of Lot 5, D.P. 3439, that there are no sound engineering reasons to restrict or prohibit the construction of a residential dwelling, and associated out buildings as may be necessary, on this allotment on the proposed building platform identified in this report. This platform is shown in the attached photographs and on the copy of the site plan attached to this report.

These conclusions are founded on the premise that the requirements contained in this report are complied with in respect to the design of the site works, access track, and the foundations for the dwelling that are not able to be covered under NZS 3604:1999, i.e. all engineering design required in the report is carried out by a registered engineer.

We also believe that there is no sound engineering reason to prevent the foul effluent discharged from a dwelling on this site to be from a proprietary aerated wastewater treatment system such as a Stemphlow BM2 plant and pumped therefrom into a covered surface drip irrigation system laid in the bush downhill and northwest of the platform. The land application area receiving the effluent from the treatment plant is to be dose loaded. The effluent treatment system and its disposal to land are required to comply with the provisions of NZS 1547:2000

We also believe, as a result of our inspection and investigation of Lot 5, D.P.3439, that the land contained in this allotment or any land surrounding it that could be considered to affect this land is not subject to, or likely to be subject to, any of the conditions listed in Section 106(1)(a) of the Resource Management Act 1991 or Section 36(1)(a) of the Building Act 1991 nor will the use of this land, or construction of any or all of a building(s), a track(s), or an effluent disposal system to land, on it, accelerate, worsen, or result in any of the conditions listed in Section 106(1)(b) of the Resource Management Act 1991 or Section 36(1)(b) of the Building Act 1991.

HADLEY CONSULTANTS
24 October 2003

J A Hadley
Director

Plate 1: General Panoramic View of Driftwood Bay Showing the Allotment Positioning.

Plate 2: Closer View of General Location of Allotment.

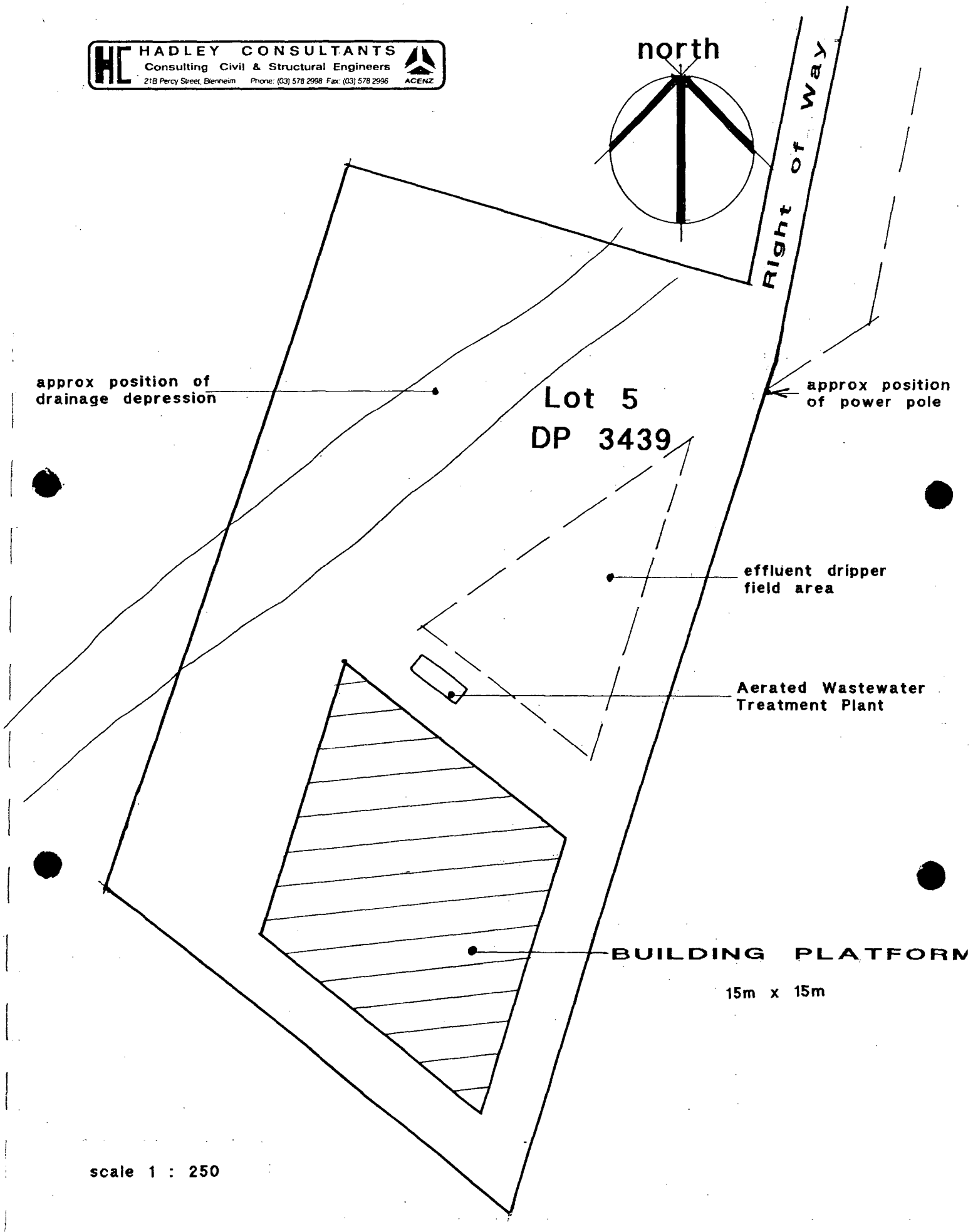
Plate 3: General View Across Building Platform at Lower Levels on Site.

Plate 4: General View Looking Down the Site Over Building Platform.

Plate 5: General View of Northwest Edge of Building Platform.

Plate 6: General View of Southwest Edge of Building Platform.

HADLEY CONSULTANTS
Consulting Civil & Structural Engineers
218 Percy Street, Blenheim Phone: (03) 578 2998 Fax: (03) 578 2996 ACENZ



Site Plan to Accompany Engineering Report for Marriott at Driftwood Bay Arapawa Island

HADLEY CONSULTANTS
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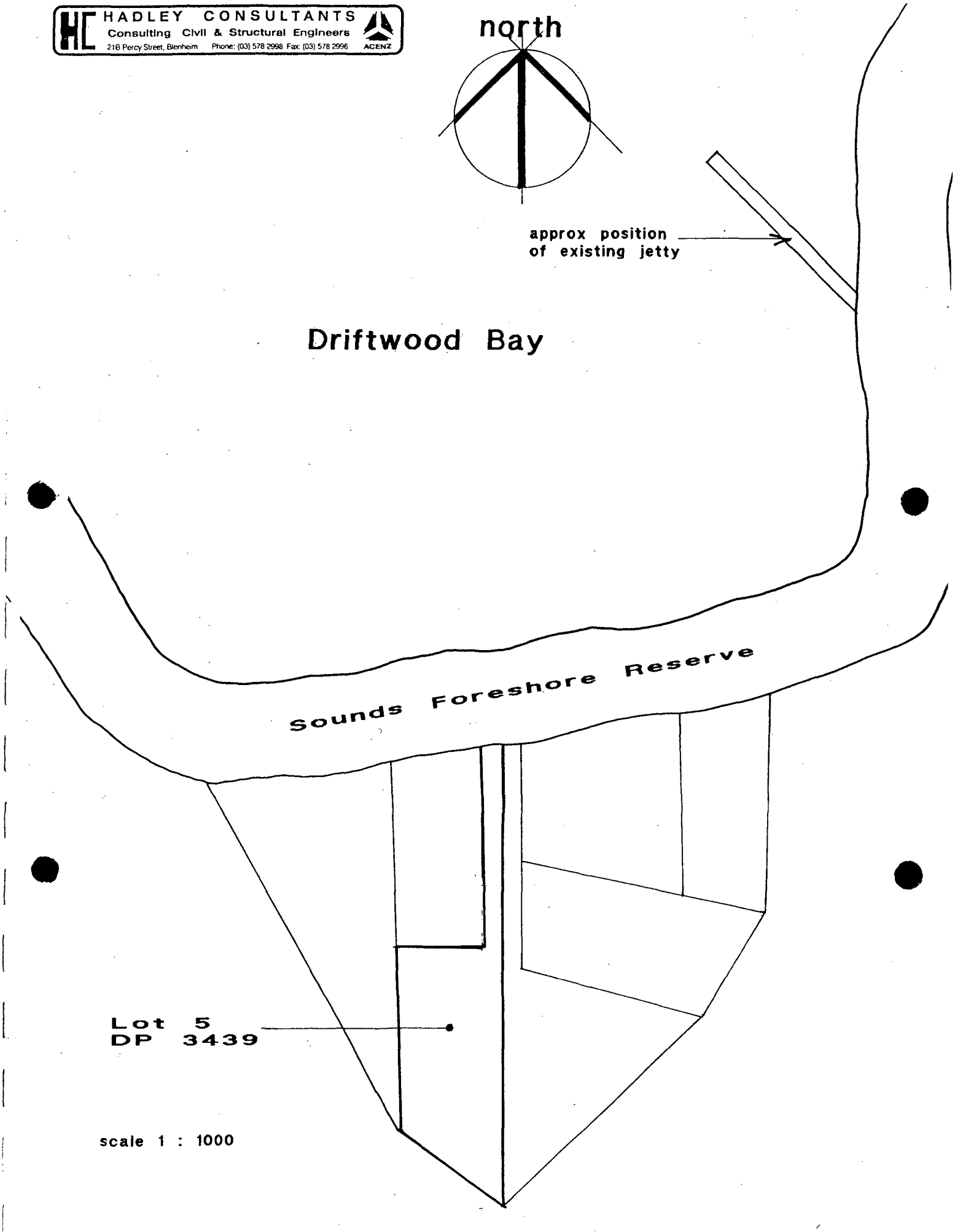

Locality Plan to Accompany Engineering Report for Marriott at Driftwood Bay Arapawa Island

HADLEY CONSULTANTS
a division of Wharehunga Enterprises Limited
Consulting Civil & Structural Engineers
21B Percy Street, Blenheim * Telephone (03) 578 2998 * Facsimile (03) 578 2996

ENGINEERING REPORT ON LOT 5, D.P. 3439, DRIFTWOOD BAY, ARAPAWA ISLAND, QUEEN CHARLOTTE SOUND.

General

This engineering report has been prepared in accordance with instructions received from Mr David Marriott of Wellington, the owner of Lot 5, D.P. 3439. We visited this property on Sunday and Monday, 14 and 15 September 2003. Our instructions were to inspect this property to determine whether or not a suitable building platform, satisfying the engineering criteria for a residential dwelling, existed on the land contained in this allotment.

We have not received precise instruction as to the particular style of any proposed new residential dwelling. Therefore we have assumed that it will be a conventional single or two storey, timber framed residential dwelling with a plan in the form of a rectangle. We have assumed that, if need be, at least one side, the south side, of any residential dwelling could be founded upon a bench formed from virgin soils and its other sides and a portion of the floor area founded on timber poles. Further, we have also assumed that the development on the site could lend itself to the construction of a split-level residential dwelling if required.

The approximate position of a proposed building platform is shown on a copy of a site plan prepared from site measurements taken during the course of our inspection, from the deposited plan, and from aerial photographs. A copy of this site plan is attached to this report for reference purposes.

General views of the land contained in this allotment, taken from the sea, are shown in the photographs, Plates 1 and 2. Plate 1, taken looking approximately southwest, shows a panorama of the proposed allotment and the land surrounding it to the east, southeast and south. Plate 2 shows a view of the adjoining land in Lots 1, 2, 3, 4, 5, 6, and 7. The building platform on Lot 5 is inside the circle shown on Plates 1 and 2.

The approximate position of this platform, on the side slope of a spur that runs from the south towards the north, has been marked on site with red dazzle blazes on the trunks of dense manuka and kanuka native bush that covers this allotment. These trees now stand about 6 to 8 metres tall.

This quite dense regeneration of native bush over this allotment makes it difficult to obtain meaningful photographs illustrating the land gradients and the general topography inside the bush and over the platform. The photographs, Plates 3, 4, 5, and 6, attached to this report serve to illustrate the density of the bush and the difficulty in demonstrating the lie of the land. Plates 3 and 4 have been taken in a relatively clear area on the building platform and indicate the across the slope and down the slope lie of the land.

Plates 5 and 6 show the density of the bush and two of the four red dazzle blazes on trunks that indicate the perimeter lines of the building platform. In these photographs light levels are generally too low and the bush cover itself tends to dominate the photograph and prevent a realistic record of the three dimensional effects of slope and undulation being recorded.

It is our opinion that there is no sound engineering reason that restricts or precludes the development of this allotment by way of the construction of a building platform for a residential dwelling, around or close to the position shown on the attached copy of the site plan and in photographs attached to this report.

In reaching this opinion we have assessed and evaluated matters of land stability, both on this site and in the surrounding land, geotechnical and soils considerations, access, a suitable building platform, foul sewage effluent collection and disposal, stormwater disposal and the supply of potable water.

The land contained in the allotment is zoned Sounds Residential in the Marlborough District Council's Marlborough Sounds Resource Management Plan as is the land in all adjoining allotments on D.P. 3439.

Our inspection extended to quite high elevations on the land into the regenerating native bush well beyond the building platform. It also extended across Lots 3, 4, 6 and 7 and onto the parts of the land beyond the western boundary of Lot 7 that could affect Lot 5.

Two survey pegs were located. These were on the eastern boundary of Lot 5 at its north and south ends. The other two survey pegs that identified the position of the western boundary of Lot 5 with Lot 7 were not located. However as the building platform is located close to the eastern boundary the position of the platform was located by measurement off the line of this boundary. Consequently, the locations described in this report are accurate to within a tolerance of plus or minus about two or so metres.

Area Geology

The land contained in Lot 5 lies on a side spur that rises off a principal spur off the main ridgeline on Arapawa Island. This ridgeline runs southwest to northeast. The land in the allotment lies to the north and looks across Queen Charlotte Sound towards the Snake Point peninsula that forms the eastern headland of the Bay of Many Coves.

Rock outcrops along the shoreline at both the north and south ends of the shingle beach in Driftwood Bay. This outcropping rock can be seen at the right hand side of Plate 1 attached to this report. Generally rock is not outcropping across Lot 5 but can be seen outcropping at depths of between 2 and 3 metres in excavations on Lots 4 and 7.

Rock also outcrops at the shoreline on a pathway to the jetty located at the northeast end of the beach. It also outcrops at various levels in the natural watercourse that traverses the rural land to the north of the land area zoned Sounds Residential.

The bedding plane of the rock exposed over the land in and around Lot 5 varies significantly but there is no situation observed where this bedding plane is parallel with the lie of the land. The outcropping rock at the shoreline at both ends of the beach and over the adjoining land indicates that the geology of the area is the familiar folded and fractured greywacke/schist overlain by yellow clay/loess of variable depth.

On and around this allotment the depths of the clays are likely to range from as little as 1.5 metres thick on the steeper parts of the allotment to probably about 2.0 to 3.0 metres thick or more over the flatter parts of the ridges above the allotment.

The rock exposed in the shoreline outcrops is about 2 to 3 metres high. It is sound rock of a good quality. Rock exposed in cuttings on the access from the jetty varies from about 1 metre high to 3 metres high in places. It is similarly of good quality.

The general area geology is well known to the Marlborough District Council having been documented in introductory passages of the reports by Horrey (1989) and McManus (1994). Bishop (1972 and 1983) and Campbell and Johnstone (1992) have also documented this geology in greater depth.

It is also covered in, as yet, unpublished reports by Sutherland and Bell (1994). Consequently the general area geology will not be revisited here.

Site Description

As mentioned above, the land contained in the allotment lies on the north facing side slope of a secondary spur off a spur that rises on the main ridgeline forming this part of Arapawa Island. The two main spurs off the ridgeline rise at Mount Kaitapeha, R.L. 387 metres, about 1 kilometre southeast of the beach in Driftwood Bay. Side ridges on the Driftwood Bay side of Arapawa Island run off this main ridgeline generally towards the north or north west and end in rocky promontories at the sea.

The area of Lot 5 is 1,186 square metres. The photographs, Plates 1 and 2, attached to this report, show the general lie of the land contained on the south side of the gully that contains Lots 1, 2, 3, 4, 5, 6, and 7. Plate 1 serves to illustrate the presence of the side spurs off the main ridgeline, the subsidiary spurs of these main spurs and their topography on this part of Arapawa Island.

The average gradient of the ground slope on the northwest side of the main ridgeline in this region of Arapawa Island is about 21 degrees, becoming steeper, as would be expected, as the Foreshore Reserve is approached at the ends of the main side spurs. On the ground in Driftwood Bay the land gradient varies. As can be seen in Plate 2 the ground slope immediately behind the centre of the beach is very flat. However, as the side spurs are approached the land gradient increases markedly. The Right of Way access to the rear allotments, Lots 3, 4, and 5 is quite steep in places, particularly at the top of the Right of Way near Lots 4 and 5. Here, ground slopes vary between about 10 to 15 degrees.

No rock is outcropping on this Right of Way, although overburden above the rock in this region is likely to be shallow, varying from about 1.5 to 2.0 metres deep. This depth of overburden relates to depths found elsewhere in cuttings on Lots 4 and 7 after regard is taken of the material excavated to form the Right of Way. Therefore it is reasonable to expect overburden depths of this order, or slightly greater say up to 3.0 metres, to be found covering rock on most similar slopes over the land within and outside the allotment that might conceivably affect the allotment. Hence, rock is likely to be encountered at relatively shallow depths over most of the allotment. Thus it is likely that any material that had the potential on steeper slopes in the region to move has already moved at some very early time in the past. Therefore, further slope movement on and around this allotment is improbable.

Generally ground slope angles are in the range of 20 to 25 degrees over the land immediately to the south of Lot 5. Rock is exposed at the shoreline below and to the west of Lot 7 and outcrops stand 3 or more metres high along the shoreline in this position. The side slope on the spur as it melds into the gully in this region is in the range of 30 to 35 degrees.

The rock outcrops at both ends of the shingle beach in Driftwood Bay stand, near vertical in places, 3 or more metres high. Vegetation is growing from these exposed vertical faces. This suggests that these rock faces, and the clay overburden on top of the rock, has not moved for many years.

The entire area of Lot 5 is covered in dense regenerating natives. These are mostly manuka and kanuka, about 6 or more metres high, although there are a large number of small ngaios and five fingers starting to grow in the undergrowth as can be seen in Plates 3, 4, 5, and 6. The native bush is not difficult to penetrate. Therefore, gaining knowledge of the precise lie of the land can be comfortably achieved.

There is a dry natural watercourse that manifests itself more as a depression in the ground that runs approximately between the southwest and northeast corners of the allotment. This watercourse was dry at the time of our inspection and had clearly been dry for some protracted period. The owner of the property, who has been visiting the bay for the past 30 years advised that he had seen water flowing in the depression on only one occasion after torrential rains. The approximate position of this watercourse is shown in the site plan attached to this report.

Land Stability

None of the land mass contained in Driftwood Bay is identified in Natural Hazard Maps in the operative Marlborough Sounds Resource Management Plan as being unstable.

However, hazard maps represent a guide only, to the occurrence of natural hazards such as land instability. They are not comprehensive and are based on areas where Council records give clear notice that there has been a history of instability in the general area. They do not, and are not intended to, supplant the results of detailed on site inspections. It is well accepted that all of the areas that are shown on these hazard maps as unstable are not, in themselves necessarily unstable. Equally, it is also widely accepted that outside these hazard zones and within areas that are shown on the maps as not being unstable there are, indeed, areas which are unstable and thus, unsuitable for the development of a building platform.

The fact that general instability in this area is not indicated on the hazard maps is a correct assumption as evidenced, according to the owner, by the general stability of the landmass in this bay over the past 35 years. The owner's lay evidence of the general stability is supported by our own casual inspection of this land when visiting it from time to time as well as when passing it enroute to our own property further north on the island over the past 30 years. We have observed this land retain its basic form over the past 30 years.

Additionally, there is no general evidence that there has been significant landslip in the proximity of Lot 5 despite the heavy precipitation experienced during the winter and spring of 1998 and the late spring of 1994. It is noteworthy that during these previous periods of heavy rains there was no apparent damage to any part of the steep slopes of the Foreshore Reserve land on the north and south ends of Driftwood Bay, nor in the general area of the allotment where it is proposed to establish the building platform.

The general ground slopes of the land both inside and outside the allotment have been recorded in the foregoing. By Sounds standards these ground slopes are moderate. The ground slopes across the Foreshore Reserve are very steep in parts. However, there is no evidence of any instability over these steeper parts of the land adjacent to Lot 7.

There is evidence of old minor soil creep on the higher elevation slopes on the allotment and above the rear and side boundaries at these elevations. This soil creep is now difficult to discern as most of the affected ground is covered in a dense layer of native bush debris. This soil creep has been evident for around 30 years and probably for a much longer time.

Soil creep movements are common on hill country that has been heavily stocked and has been subjected to prolonged dry periods followed by heavy precipitation. It is our opinion that none of this minor soil creep observed is significant in terms of the general stability of the area on, or around, this proposed allotment. This soil creep is old and probably dates to the time the area was used for pastoral farming. It appears to have largely ceased probably since the land was de-stocked in the early 1960's.

There are few regenerating manuka and kanuka trees that are showing signs of "hockey sticking" in their lower trunks on the allotment or its surrounds. The larger native trees growing over the allotment are near vertical as are those in and around adjoining allotments. The "hockey sticking" phenomenon is, in some quarters, regarded as evidence of land instability. It is assumed that the land slipped after the trees have commenced growing. This view of this phenomenon is not necessarily correct.

If the growth pattern of first generation regenerating native scrub is observed closely it will be seen that these plants tend, initially, to grow as seedlings normal to the angle of the ground slope upon which they are growing. These native seedlings then bend at the base of the trunk so that the trunk becomes vertical and the scrub takes the shortest route to the sunlight. There is a general absence of hockey sticking at, or near, the proposed building platform.

There is a possibility that minor land instability could occur at the time the building platform or the access to it is cleared of native flora. It would therefore be prudent to make every effort to minimise any potential instability on the land at this time by planting out the area in broad leaf native bushes, shrubs, and trees. This would help to avoid stormwater collecting in the decaying root systems of the felled trees, thereby encouraging the formation of underground stormwater passages through the soils, and increasing the soils' potential for instability.

It should be noted that the creation of the building platform is likely to occur after the land has been cleared. Clearing work to the platform needs to be undertaken with care to avoid unnecessary disturbance of the ground. If areas are disturbed or defoliated during construction and subsequently not required in the final development it would be prudent to undertake a planting programme which will re-establish native bush over these temporarily cleared areas on the allotment.

Such a planting programme on these areas will assist in ensuring that the possibility of any erosion and/or any minor land instability is minimised, as well as providing a desirable buffer zone against the spread of fire, both from, and to, any building platform.

If native bush is left to regenerate around any residential dwelling, without fire, then it is likely that most of the land within and outside the allotment will continue to remain stable over the years.

The soil compositions present on the land in this allotment are common throughout the Marlborough Sounds area and, even on very steep slopes, provide excellent foundations for residential buildings when these foundations, and other relevant engineering criteria, are designed by a registered engineer.

The building platform is underlain by this typical clay/loess and no foundation problems are expected with a lightweight timber framed dwelling on the flatter area on this allotment.

It is our opinion that the general stability of the land in and around the building platform on this proposed allotment, both inside and outside the allotment, is sound. There is no obvious evidence of significant instability in this region of the allotment.

Notwithstanding anything in the foregoing, it is our opinion that the land contained in Lot 5, and that surrounding it that could affect any development on this property is currently stable and will remain stable indefinitely. It is also our opinion that the building platform can be developed with a residential dwelling without the land being destabilised in any way.

We are also of the opinion, as a result of our inspection and investigation of Lot 5, that this part of the allotment, and the land surrounding it that could be considered to affect this land is not subject to, or likely to be subject to, any of the conditions listed in Section 106(1)(a) of the Resource Management Act 1991 or Section 36(1)(a) of the Building Act 1991 nor will the use of this land, or construction of a building on it, accelerate, worsen, or result in any of the conditions listed in Section 106(1)(b) of the Resource Management Act 1991 or Section 36(1)(b) of the Building Act 1991.

Building Platform

There is a sound building platform available on Lot 5. The approximate position of this platform is shown on the site plan attached to this report. The platform position is in the southeast corner of the allotment and lies on the side of a subsidiary spur off the main spur forming the southwest end of Driftwood Bay.

The orientation of this building platform, shown inside the circle drawn on Plates 1 and 2 attached to this report, is towards the north. The proposed platform is positioned at an elevation of about 25 to 30 metres above mean high water level on the allotment.

The platform lies well to the morning and afternoon sun almost year round. However, winter evening sun will be restricted because of the principal spur to the southwest off the main ridgeline on Arapawa Island.

The dimensions of the building platform are about 16 metres across the slope and about 16 metres up the slope towards the rear of the property.

The ground slopes over this platform are less than 15 degrees across the slope, while up the slope towards the rear of the allotment beyond the building platform they are about 27 degrees.

The downhill slope over the platform is about 23 degrees and this slope continues across the common boundary with Lot 6.

There would be little scope to move the building platform uphill towards the rear of the allotment as the platform has been set about 5 metres off the rear boundary.

Similarly, there is little scope to move the platform across the slope towards Lot 4 as the platform has also been set here at about 5 metres off the common boundary with Lot 4.

There is scope to move, or extend, the platform towards the west but this is restrained by the proximity of the dry watercourse unless its broad, 4 metre wide depression is confined by earthworks or piping. There is also limited scope to move the platform downhill because of the proximity of the dry watercourse unless its wide depression below the platform is confined or piped.

It would appear desirable to cut a bench into the uphill slope to enable short poles to be used as foundations at the rear of any building. Cutting a series of benches down the slope would enable any building to be built as a split level dwelling with its floors stepped down the slope.

Movements as much as 2 or 3 metres to the west and north could be achieved if desired. The approximate lines of the sides of this building platform can be seen in the native bush and are marked in red dazzle on trunks of manuka trees.

The platform position shown on the drawing is about 3 metres off the common boundary with Lot 4 and about 3 metres off the rear boundary. It may be desirable to reduce these boundary offsets but any reduction will limit the height of the dwelling as this is governed by the recession plane diagrams given in Figures 1, 2, and 3 in Volume 2 of the Resource Management Plan for the Marlborough Sounds. If, as is likely if any future dwelling is constructed close to the side and rear boundaries, it transpires that any building constructed on the platform penetrates the recession plane requirements of the Resource Management Plan, then it will be necessary to obtain Resource Consent from the Marlborough District Council to penetrate the recession plane.

In relatively sparsely populated areas Council currently has a reasonably flexible policy towards encroachments of this type. Its current policy is to generally approve the encroachment provided that it is consented to by all of the landowners of adjoining properties.

These landowners in this particular situation are the owners of Lots 3, 4, 6 and 7 and the owner of the rural land at the rear, south east and west of the Sounds Residential zoning in Driftwood Bay.

Approval to any penetration of the recession plane would be necessary to avoid the need for any application for dispensation becoming the subject of a hearing before Council's Planning Committee and the possible ramifications that may arise therefrom even if Council granted the necessary dispensation to encroach into a yard.

The foregoing comment on Council attitudes to granting and/or approving dispensations for penetrations of recession plane requirements of the Resource Management Plan are a record of our experience only. They cannot be relied upon as being continuing Council policy in regard to this particular allotment. Therefore, they should be confirmed independently directly from Council.

A new dwelling could be constructed on the building platform by cutting a small bench into the upper part of the platform. Cantilever poles over a small terrace cut in this position would provide adequate resistance to lateral loads on the dwelling. Poles towards the front of the building would therefore need to be designed to take gravity loads only. Alternatively, a dwelling could be constructed entirely on poles with only minimal excavation being required at this building platform.

If the option of benching at the rear of a dwelling is chosen this is likely to generate an amount of cut material that will need to be disposed of on site.

This can best be done behind properly designed, well drained, post and plank retaining walls around the dwelling that would assist in providing flat areas to the front and sides of the dwelling without affecting the inherent stability of the land.

The construction of post and plank retaining walls behind which surplus cut material is placed is generally the most economic method of disposing of this material in remote inaccessible areas of the Sounds.

If the alternative of founding the dwelling entirely on poles without cutting a bench at the rear is adopted then the amount of cut material will be minimal and should be able to be disposed of on site with the need for only a limited number of low retaining walls to develop flat areas and small walls to protect low batters for access to the platform.

These retaining walls, and any others built on-site, such as any that might be needed to protect cut batters at the rear of the dwelling, will need to be designed by an engineer if they exceed 1.2 metres in height because of the surcharges, resulting from the sloping ground, that will be on these walls.

The issue of the disposal of surplus cut material is further addressed under the heading Site Development that follows in this report.

Notwithstanding any qualifications contained in the foregoing it is our opinion that Lot 5 contains a sound building platform that is suitable for the construction of a residential dwelling. The position of this platform is shown on the copy of the site plan attached to this report.

Allowable Bearing Stress on Soils from Foundations

Scala Penetrometer Testing to determine ultimate bearing stress of the foundation soils over the site was not carried out over the platform. This was because there was ample evidence of the adequacy of the ultimate bearing capacity of the foundation soils from the existing dwellings on Lots 4, 6, and 7 that surround Lot 5 being at least 300 kPa.

Moreover, it is highly probable that the foundations for any new dwelling on Lot 5 will be on poles. If this is so then ultimate bearing capacities of soils are not so significant as pole foundations will need to be sized after testing to determine the actual bearing capacity at the pole foundation position.

It might prove that rock is encountered at relatively shallow depths of about 1.5 to 2.0 metres below the surface and if so foundations should be taken down to rock particularly if poles are used for foundations.

An ultimate bearing capacity of a minimum of 300 kPa for the soils is required if dwellings are to be built in accordance with NZS 3604:1999, Code of Practice for Light Timber Framed Buildings not Requiring Specific Design.

It is important that values of 300 kPa for the bearing capacity of the soils be achieved when either strip footings or short piles are used for foundations. However, if the foundation for any dwelling is to be largely on poles, then the value of the bearing stress becomes less significant. As a guide to the ultimate soil bearing pressures in the region it is anticipated that ultimate bearing capacities of soils will comfortably reach 300 kPa at depths of about 900 millimetres below the ground surface.

If it transpires that bearing capacities do not reach this value then pole foundations can be increased in diameter to accommodate any lower values.

Pole foundations for any building will need to be designed by an engineer and thus foundation sizes will be able to be adjusted to suit the allowable bearing stress measured at the poles once the design for the dwelling has been finalised and the site cleared.

It should be noted that if the external wall cladding to any proposed residential dwelling is a masonry veneer or if the dwelling is constructed with masonry walls then foundations should be sized after the positions of the foundations for the proposed dwelling are located on the site and soil bearing stresses in these locations are confirmed by soils testing. The confirmation of bearing stresses should also be carried out for any retaining walls proposed on the site.

The above information on bearing stresses will be sufficient for the design of foundations for light weight structures in timber with external walls clad in timber or similar light weight cladding and for low retaining walls around the building if the platform is cut to provide a relatively flat bench at its rear.

Access

Access to this allotment is by water only.

A suitable jetty that services all of the existing residential dwellings in Driftwood Bay exists at the northeast end of the shingle beach. This jetty provides easy walking access from the jetty to all of the existing dwellings in the bay. It is also capable of providing walking access to any new dwelling constructed on Lot 5. This jetty position is shown on the drawing attached to this report.

The access from the landward end of the jetty is along a narrow pathway across the Foreshore Reserve that cuts around the end of a steep bluff until it crosses the creek onto the Foreshore Reserve area in front of Lot 1. From this position there is easy access across flat land to the bottom of the Right of Way serving Lots 3, 4, and 5.

The Right of Way is quite steep in parts, particularly at the top onto Lots 4 and 5. The ground slope of this Right of Way is about 15 degrees and therefore has a gradient of between 1 in 3.5 and 1 in 4. These gradients will allow vehicular access with a four wheel drive motorbike and trailer to the top of the Right of Way.

Thereafter the ground slope over Lot 5 increases to about 23 degrees and there will be insufficient area on the allotment to construct vehicle access at a reasonable gradient. Consequently access from the top of the Right of Way to any dwelling on the building platform on Lot 5 will be restricted to walking access only.

In our view, it would be an unjustifiably expensive exercise to attempt to balance cuts and fills for a walkway from the top of the Right of Way to the dwelling on Lot 5.

The most economical solution for developing this access over the sloping land to the building platform would be to cut a path to its full width wherever possible and to use retaining walls only on the downhill side of the track where walls could be kept low. In this way retaining walls along a walkway access can be minimised.

Depositing cut material on-site behind post and plank retaining walls is likely to be the cheapest way of dealing with disposal of surplus cut material. Any retaining walls over 1.2 metres high required along the length of any access track to the building platform will need to be designed by an engineer as will any retaining walls built elsewhere around the allotment for site development.

It is important that any on-site access track, even one for foot traffic, be adequately drained. Tracks should have cross-falls to either watertables on the uphill sides of the track or be sloped to the downhill edge of the access. If the option to use watertables on the uphill side of the track is chosen then these should be graded to collect stormwater discharges.

The choice of using watertables or discharging run-off over the downhill edge of the access will be determined by the quality of the material into which the access is cut. Discharges from uphill watertables need to be collected, at regular intervals of about 40 metres, in settlement sumps and piped from these sumps directly to the sea.

Site Development

It is desirable to seek approval from the adjoining neighbours to site any new building on the building platform as close as is possible to the south and east boundaries. This will maximise the area available for the creation of the access and any flat areas that may be required on the site.

This will generally have the effect of raising the level of the platform and therefore increasing the length of the access track from the Right of Way to the platform if track gradients are kept constant.

It will also probably be desirable to establish some flat areas around the dwelling. It will also probably be necessary to excavate a path at the rear of the building about 1 to 1.5 metres wide and build a low post and plank retaining wall about 1 metre high along the cut face to retain this face and protect it against weathering.

If flat, grassed areas are required around a dwelling at the building platform then additional post and plank retaining walls will be required at the edges of these areas.

The height of any retaining walls supporting flat, grassed areas will depend upon the width of the grassed area required. The height of the walls may also be dictated by the position of the building in relation to the line of the access to the dwelling. Obviously, the height of any retaining walls along the track will relate directly to the cross falls over the access track.

It is also important that the parts of the land below the proposed building platform that are partially cleared for construction purposes are re-planted in deep rooting native species to ensure continued long-term stability and provide fire protection for the dwelling.

The extent, shape and style of any flatter areas will undoubtedly be determined by the style and type of any new dwelling eventually constructed on the site. A further factor that is likely to influence their eventual size is the amount of surplus cut material from excavations for benches.

Disposal of surplus cut material off-site is likely to be considerably more expensive than disposing of it on-site behind post and plank retaining walls. Generally this is the cheapest way of constructing low, two metres or less, retaining walls in outlying areas in the Sounds.

It is not anticipated that once post and plank retaining walls are constructed around the platform and along the walkway access track, there will be a surfeit of cut material that would need to be disposed of off site. It is anticipated that all surplus cut material can be disposed of behind retaining walls.

However, until the proposed platform and the access track have been cleared of regenerating native bush and the general style of any residential dwelling to be constructed has been decided, it is impossible to assess the extent of the excavations required. Once this clearing work has been completed an engineer will need to re-inspect the site and prepare the necessary development plans for the site works at the platform and along the access track.

It should be noted also that all retaining walls and other site works to the building platform, the access track, and the jetty need to be designed by a registered engineer.

Stormwater Disposal

As with all developments in the Sounds area, even those on relatively flat ground slopes, the proper treatment of stormwater is of paramount importance. It is essential that soils be prevented from becoming saturated and thus increasing their potential to settle, slip or erode.

To this end it is particularly important that the disposal of surface run-off and stormwater from any development be treated adequately. This can be achieved only by ensuring that all stormwater from the platform, the dwelling and ancillary buildings, and retaining walls is collected in impervious channels, sumps, and pipes at various points on the development and from these points piped to the sea. Care needs to be taken to ensure that stormwater discharged into the sea does not contain sediment that would discolour and pollute the seawater.

Since stormwater from the roof of any dwelling may be collected and stored in tanks, as a supply of domestic water, it will be necessary to provide water storage tanks with a suitable overflow system which discharges into the stormwater drainage system.

It should be noted that it is, in our opinion, also important to consider adequately methods of stormwater disposal to ensure that there is no possibility of stormwater drainage channels and pipes becoming blocked and causing soils in close proximity to any development to become saturated, thereby increasing the possibility of their moving.

In our opinion the proper treatment of stormwater and the design of an adequate disposal system is the most important aspect in maintaining the inherent stability of the ground supporting any development on this allotment or, for that matter, on any other allotment on which residential development is proposed in the Sounds area.

Foul Effluent Disposal

There is no public foul effluent disposal system on, or close to, the property. However, there is a mains power supply reticulated to this area of the Sounds.

The area of this proposed allotment is small at 1,186 square metres and the moderately steeply sloping area of the site outside the building platform available as a land disposal area is limited.

Since for a variety of reasons, including access and sun and the path of the dry watercourse depression, it is desirable to site the dwelling as close as possible to the east and south boundaries, there is sufficient room for a land disposal area in the northwest corner of the allotment.

The land in this region is quite steep and unsuitable for the construction of a subterranean land disposal area. Hence the most suitable method of foul effluent disposal is to use a proprietary aerated on-site treatment plant.

This method is our preference, and that of the Marlborough District Council, for the foul effluent treatment in difficult terrain. These systems do require regular, between three and nine monthly maintenance, depending upon the requirements of the particular manufacturer.

An on-site aerated treatment system involves collecting the foul effluent from the dwelling in a proprietary on-site treatment plant producing effluent to the specifications given in NZS 1547:2000. Effluent emanating from such a proprietary secondary treatment plant can then be disposed of to land in accordance with NZS 1547:2000. The effluent from the treatment plant has no smell.

Consequently, it is our recommendation that the best means of disposing of the foul effluent from the dwelling and from the secondary treatment plant would be to pass it through a dose loaded pressurised surface irrigation system, incorporating drippers, laid in the bush over that part of the property in the north west corner of the allotment.

The approximate position of these dripper lines is shown on the site plan attached to this report. This area is well in excess of the approximately 200 square metre area of sloping ground that will be required for the land disposal area. It is also sufficient to allow a reserve area of about 100 percent should this be required in the future. The dripper line used should be RAAM 17, or Council approved equal, and laid over a sufficient area to cope with the daily load from the eventual dwelling constructed on the platform. The dripper lines need to be covered with about 150 millimetres of leaf mould to avoid them being damaged by wandering wildlife or by humans.

One of the currently available aerated wastewater treatment plants is the Stemphlow BM2 manufactured by Wastewater Treatment Services Limited, P O Box 1508, Nelson. We would recommend that the plant used on this allotment be a Stemphlow BM2 or Council approved equal. We consider, as we understand does Council, that this plant and similar types have proved more reliable than some of the other proprietary plants over recent years.

Proprietary systems need to be designed to cope with the daily loading from the residential development on the site once this is known. The daily loading rate is determined from the number of occupants and/or bedrooms in the dwelling, the type of water supply, rainwater or reticulated supply, and the type of plumbing fixtures incorporated in the dwelling.

These variables cannot be known until the size and design of the residential dwelling is finalised. It should be noted though that the capacity of the proprietary treatment plant is dictated by the minimum retention time in the tank rather than from NZS 1547.1:2000.

Similarly, the minimum size of the land disposal area required for covered surface drip irrigation disposal is also dictated by the provisions of NZS 1547.1:2000. Again this size is determined from the daily loading imposed on the system by the dwelling. Hence until this daily loading is known the size of the land disposal area required cannot be determined.

These proprietary systems are specifically designed to fulfil the requirements for a particular dwelling design.

No permeameter testing to determine K_{sat} was carried out on the allotment since it was clear that the size and gradient of the allotment precluded any land disposal system other than a surface irrigation system. It was clear from a visual inspection of the soils that their permeability was that of a Category 4 clay loam, as defined by NZS 1547:2000, at worst.

The above requirements and recommendations may be altered by the manufacturer of a proprietary aerated wastewater treatment plant if experienced in installing plants in the Marlborough area generally and the Sounds area in particular, but only after the site has been cleared for inspection and after consultation with the design engineer.

Water Supply

The seven allotments zoned Sounds Residential in Driftwood Bay are connected to a communal water system that draws water from the natural watercourse that comes down the gully partially shown on the left hand side of Plate 1.

There is ample capacity in this watercourse to supply the potable water needs of seven residential dwellings occupied permanently except in extremely dry periods such as those that have been experienced in Marlborough over the past four years.

We are advised that the experience of the other property owners in and around this part of Arapawa Island is that storage tanks for rainwater from roofs have not yet proved necessary in dry conditions to supplement their domestic water supplies from watercourses on the rural land above their properties.

Nevertheless, it is our opinion that in this particular situation it would be prudent to allow, in the design of a new dwelling, provision that permits rainwater storage tanks to be connected into the household water supply system in the future even though there is a reticulated supply of potable water presently available.

Such a provision will guard against the possibility of this water supply becoming overloaded in the future.

A common practice with Sounds water supply systems in situations where the demand may be only partially fulfilled using water from a watercourse is to have a dual system. In this system the water from the watercourse and the rainwater from the roof are stored in interconnected tanks.

These tanks need to be of sufficient capacity to store enough water to carry the dwelling through a prolonged period of dry weather. In determining the size of the storage capacity required for storage an allowance of 150 litres per day per person represents a liberal supply of water.

In prolonged dry spells daily consumption could be reduced to 100 litres per day per person without seriously inconveniencing the occupants in the dwelling. Thus, a full 5,000 litre storage tank, with no inflow from the watercourse or from rainwater from the roof, would sustain one person for 50 days in relative comfort.

The report concludes by noting that the land contained in this allotment or any land surrounding it that could be considered to affect this land is not subject to, or likely to be subject to, any of the conditions listed in Section 106(1)(a) of the Resource Management Act 1991 or Section 36(1)(a) of the Building Act 1991 nor will the use of this land, or construction of any or all of a building(s), a track(s), or an effluent disposal system to land, on it, accelerate, worsen, or result in any of the conditions listed in Section 106(1)(b) of the Resource Management Act 1991 or Section 36(1)(b) of the Building Act 1991.

HADLEY CONSULTANTS
24 October 2003

J A Hadley
Director.

HADLEY CONSULTANTS
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north

Right of Way

actual drainage depression

22m

approx position of drainage depression

Lot 5
DP 3439

approx position of power pole

39m

16m

28m

primary effluent dripper field area 224 m²

Aerated Wastewater Treatment Plant

44.5m

deck

HOUSE

suspended deck propped back to pole line

set-back from boundary

BUILDING PLATFORM

15m x 15m

27m

secondary effluent dripper area approx 140 m²

(pumped)

Russell Devlin ANZIA ARCHITECT

scale 1:250

HOUSE DESIGN BY:
RUSSELL DEVLIN: ARCHITECT
AUGUST 2004

ENGINEER:
POWELL FENWICK CONSULTANTS LTD.

SITE PLAN n.t.s.

Site Plan to Accompany Engineering Report for Marriott at Driftwood Bay Arapawa Island

Engineering Report
HADLEY CONSULTANTS 03091