ENGINEERING REPORT

For Mr & Mrs Kiddey

Site Evaluation For Waste Water Treatment and Disposal for site at Lot 9 DP5540, Grove Arm, QCS

July 2006 - **FINAL**

By Graham Kerrigan

Job Number: 2577

KERRIGAN ENGINEERS

ENGINEERING REPORT

Mr & Mrs Kiddey
Grove Arm, QCS

CONTENTS

A SYNOPSIS

SCOPE OF INVESTIGATION

The site was inspected on 21 July 2006. The site evaluation generally followed the recommendations of NZS/AS 1547:2000.

Appended to this report is the site and soil evaluation sheets based on the forms of NZS/AS1547:2000.

SUMMARY/ CONCLUSIONS

The existing house belonging to Mr & Mrs Kiddey currently operates a septic tank system.

Due to proposed alterations to the existing house the tank and disposal field no longer comply with the requirement of the Marlborough Sounds Resource Management plan. Consequently Mr & Mrs Kiddey plan to upgrade the treatment and system land application field.

The property is reasonably sized and well vegetated with native bush. There is a reasonable area east of the house to accommodate an LPED system. The soil profile consists of approximately 200mm of topsoil and an indeterminable depth of silty clay bound remnants of weathered schist rock. No water table is expected at this location given the elevation and hill slope.

The insitu material in the area of the proposed land application bed is categorized as clayey loam, category 4 per NZS/AS 1547:2000. The design irrigation rate has been assessed to be 4.0 mm/day for irrigation disposal field.

We consider that there would be no adverse affects on the environment as a result of installing an irrigation field so long as the considerations /recommendations outlined in this report are followed.

B REPORT

INTRODUCTION

The following report evaluates the options for wastewater treatment and on site disposal at a property for Mr & Mrs Kiddey

The property owners plan to make alterations to the existing dwelling on the site. These alterations include the addition of a new bedroom. The Marlborough District Council have indicated that as a result of the possible increased usage the on site waste disposal should be upgraded to suit.

The purpose of this report is to satisfy Marlborough District Councils Resource Management plan requirements to discharge domestic wastewater in the Marlborough Sounds.

SITE DESCRIPTION

Following the planned renovations the dwelling will include an additional bedroom and will be deemed a 3 bedroom house under the MDC guidelines for on site waste disposal. The possible future occupancy is 6 persons per MDC Guidelines.

The site is above the Grove Track Road of the Queen Charlotte Sound. The slope of the area varies but generally is about 15 degrees.

The site is covered in native vegetation typical of the Queen Charlotte Sound. There is an ephemeral drain to the west of the property.

There is adequate room in the yard east of the house to accommodate a LPED system as proposed in this report.

WASTE WATER TREATMENT SYSTEM

Per MDC Guidelines the average daily flow is 1080 litres per day. This is based on water usage of 180l/c/day.

The insitu material in the area of the proposed land application bed is categorized as clayey loam, category 4 per NZS/AS 1547:2000. The design irrigation rate has been assessed to be 4.0mm/day for the LPED field per the Marlborough District Councils guidelines for on site waste disposal utilizing secondary treatment system.

Based on the 1080litres/day usage and a 4mm/day DLR rate, the required discharge area per NZS/AS 1547:2000 equates too approximately 270m^2.

Only registered tradesmen familiar with the construction of an irrigation land application systems and working to the National Plumbing and Drainage code NZS/AS 3500 should

carry out all plumbing and drainage works associated with this treatment and land application system.

The owner should obtain Councils publications on maintenance and management of Septic tank and drainage system and/or refer to NZS/AS 1547:2000.

Appendix 3 provides some summarized excerpts from NZS/AS 1547:2000 that should be understood by the home owner.

ENVIRONNMENTAL EFFECTS

The recommendations presented in this report are based on the requirements of NZS/AS 1547:2000. So long as the design and construction are carried out to the recommendations and considerations of this report, and NZS/AS 1547:2000, and the MDC Guidelines for onsite waste disposal, we consider there will only be acceptable environmental effects on this site, or the adjoining properties, or the waterways of the area, and the natural or physical resources of the area.

The surface loading using the LPED proposal, per MDC guidelines implies that the waste will predominately be taken up by vegetation of the area and hence there will only be limited volume entering the ground. We consider that the sites' significant vegetation will be able to accommodate the loading recommendations defined in this report

Although there is an ephemeral drain to the east of the drainage field, we consider the vegetation coverage over the field and the proposed cut off drain above the field, will be sufficient to ensure runoff from the field is unlikely to enter the stream in any volume that would be hazardous.

We consider that there are no site conditions that would diminish the natural break down of the wastes in such a fashion as to cause concern for the environment.

LIMITATION OF REPORT

This report has been prepared solely for the benefit of Mr & Mrs Kiddey with respect to our understanding of their request. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

This report is based on our interpretation of our 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. Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgements are to be relied on they should be independently verified with appropriate legal advice.

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APPENDICIES

Appendix 1

Photographs

LPED area located in background bush

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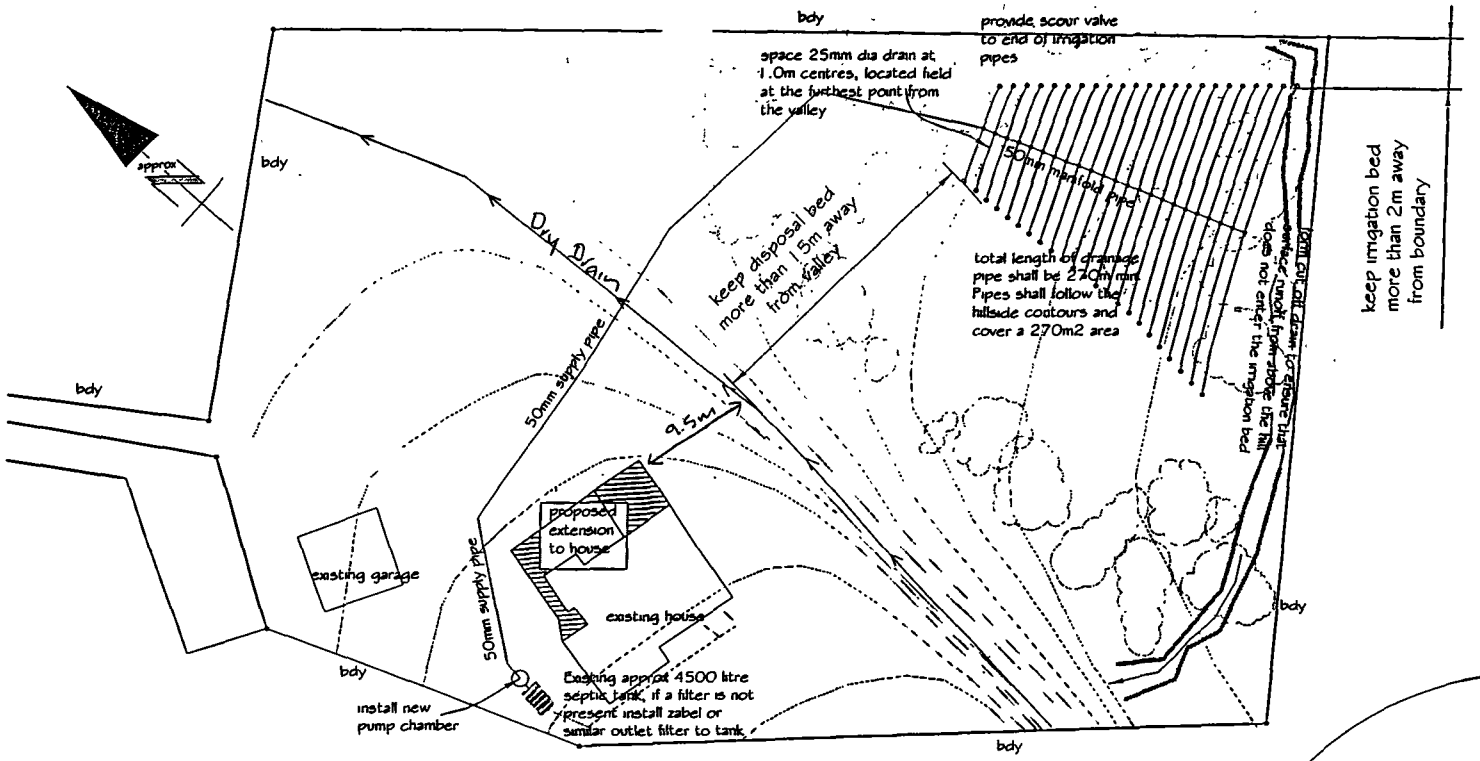
Appendix 2

Waste disposal plan



IRRIGATION BED PLAN
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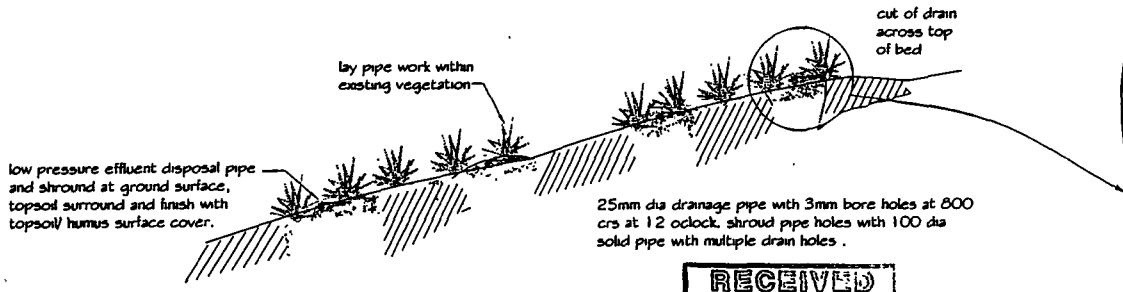
Notes:

Design Data:
- system designed to AS/NZS 1547:2000
- Loading - up to 1080 l/day
- Soil structure - 200mm topsoil
  - 800mm + clayey remnant schist
- Soil Category - 4 clayey loams
- Design loading rate for trench 4mm/day

Land Application Notes:
- Surface water should be diverted around the perimeter and up-slope of the land application area.
- All pipework to be sewer grade and compliant with NZS 1477.

Septic Tank and Pump Chamber Notes:
- Start and stop operation via floats etc to ensure dosing of 400 litres.
- High level floats and audible and visual alarm required at the house.
- pump duty to be approximately 2 litres/sec with a operation head of approximately 1.0m at the furthest extremities of the pipework
- Owners should obtain Councils publications on on site waste disposal maintenance and refer to attached installation report.
- Only Registered tradesmen familiar with the construction of land application systems and working to the National Plumbing and Drainage Code NZS/AS 3500 should carry out the installation.



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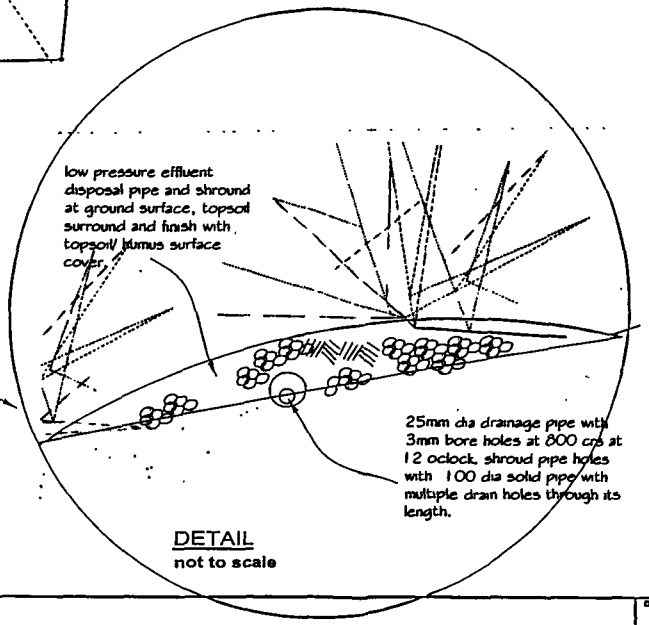

DETAIL
not to scale

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Project Title: MR & MRS KIDDEY - THE GROVE - QUEEN CHARLOTTE SOUNDS

Sheet Title: ON SITE WASTE DISPOSAL - LOW PRESSURE EFFLUENT DISPOSAL (LPED) SYSTEM

DRN:	ect
DES:	gck
DATE:	July 06
SCALE:	AS SHOWN
Dwg. No.	2577
Sht.	1
rev.	

Revision Note | Appr. | Date

060931

Appendix 3

Management and maintenance guidelines

Appendix 3

Operations & Maintenance requirements

This appendix suggests what might be useful in O & M Guidelines and provides basic technical information covering operation, maintenance and monitoring of on-site domestic-wastewater systems.

The septic tank

The septic tank pre-treats the wastewater before it goes to the land-application system. Three main things happen in the septic tank (Figure 1).

a. Solids settle to the bottom of the tank and form a layer of sludge.
b. Lighter wastes such as fat and grease float to the surface and form a scum layer.
c. Bacteria, which live in the septic tank, help break down the solid wastes and reduce the volume of sludge collecting in the bottom of the tank.

Where a two-stage septic tank is provided, the bulk of the sludge and scum will be retained in the first stage.

If the tank is not operated and maintained properly, excessive solids will pass to the land-application system. This will quickly clog up, causing health hazards, and need expensive reinstatement of the absorption area.

The land application system

Effluent from the wastewater-treatment unit receives further treatment by natural processes in the land-application system.

The mound system permits the absorption area to be sited in a location where the natural water-table can approach the ground surface. The mounds are filled with medium-grade sand to provide suitable filtering for treatment of the effluent, before it soaks down into the groundwater table. A pump or siphon-dosing system distributes effluent uniformly through a bed of aggregate placed over the top of the fill. The surfaces of the mound are grassed or planted with shrubs.

Gravity-loaded systems can have a 'distribution box' located between the primary or secondary wastewater-treatment unit and the land-application system. This is designed to direct the flow of effluent to different parts of the absorption area in order to rest the balance of the area. This prevents trenches and beds becoming clogged by saturated conditions when air needed to assist in-soil treatment is excluded from the pores of the soil. Alternatively, dosed systems can have a siphon or pump unit discharging effluent to the land-application system two or three times a day. This allows air to return to the soil pores as effluent soaks away between doses.

Advice to a home owner/occupier on use of the system

For the on-site wastewater system to work well, there are some good habits to encourage and some bad habits to avoid:

a. In order to reduce sludge building up in the tank:

   i. scrape all dishes to remove fats, grease etc, before washing;
   ii. keep all possible solids out of the system;
   iii. don't use a garbage grinder unless the system has been specifically designed to carry the extra load;
   iv. don't put sanitary napkins and other hygiene products into the system.

b. In order to keep the bacteria working in the tank and in the land-application area:

   i. use biodegradable soaps;
   ii. use a low-phosphorus detergent;
   iii. use a low-sodium detergent in dispersive soil areas;
   iv. use detergents in the recommended quantities;
   v. don't use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants;
   vi. don't put chemicals or paint down the drain.

c. Conservation of water will reduce the volume of effluent requiring disposal to the land-application area, make it last longer and improve its performance. Conservation measures include:

   i. installation of water-conservation fittings;
   ii. taking showers instead of baths;
   iii. only washing clothes when there is a full load;
   iv. only using the dishwasher when there is a full load.

d. Avoid overloading the system by spacing out water use as evenly as possibl.

Advice on maintenance

a. The primary wastewater-treatment unit (septic tank) will need to:

   i. be desludged regularly ie: every three to five years or when scum and sludge occupy 2/3 of the volume of the tank (or first stage of a two-stage system);
   ii. be protected from vehicles;
   iii. have any grease trap cleaned out regularly;
   iv. keep the vent and/or access cover of the septic tank exposed;
   v. have any outlet filter inspected and cleaned.

b. The land-application area needs protection as follows:

   i. spray or irrigation areas are not play areas for children and access should be restricted
   ii. any evapo-transpiration areas should be designed to deter pedestrian traffic;
   iii. no vehicles or stock should be allowed on trenches or beds;
   iv. deep rooting trees or shrubs should not be grown over absorption trenches or pipes;
   v. keep the surface water diversion drains upslope of and around the land-application area clean to avoid absorption of rainwater into trenches or beds;

vi. the baffles or valves in the distribution system should be periodically (monthly or seasonally) changed to direct effluent into alternative trenches or beds, as required by the design.

c. Evapo-transpiration and irrigation areas should have their grass mowed and plants maintained to ensure that these areas take up nutrients with maximum efficiency.
d. Check equipment and:

i. follow the manufacturers instructions for maintaining and cleaning pumps, siphons and septic tank filters;

Advice on operating problems

Problems can occur with systems which have not been maintained and where absorption areas have become blocked or clogged. The warning signs are obvious:
a. Absorption field is wet or soggy with wastewater ponding on the surface of the ground.
b. There is a smell of "sewage" near the septic tank or absorption area.
c. The drains and toilets run slowly.
d. The grease trap is full or blocked.

Advice of the consequences of failure

A failed septic tank and land-application system is a serious health and environmental hazard and can lead to:

a. Spread of infectious diseases.
b. Breeding of mosquitoes and attraction of flies and rodents.
c. Nuisance and unpleasantness.
d. Pollution and infection of waterways, beaches, streams and shellfish beds.
e. Contamination of bores, wells and groundwater.
f. Alteration of the local ecology.

Advice of homeowner/occupier responsibilities

Homeowners and occupiers are legally responsible to keep their on-site wastewater system in good working order. If any of the warning signs outlined above are evident, the homeowner or occupier must contact the nearest local authority without delay.

Appendix 4

Site and soil evaluation sheets

SITE AND SOIL EVALUATION REPORT

1.0 SITE INFORMATION (deck-top evaluation)

1.1 Location details

Locality	:	Queen Charlotte Sounds
Owner	:	Mr & Mrs Kiddey
Address	:	Grove Arm, QCS
Lot No	:	Lot 9, DP5540
Aerial photo details	:	Site photo only
Regional Authority	:	Marlborough District Council
Site plan details	:	Refer site plan in report no 2577

1.2 Soil type and major soil considerations from soil maps etc

Data source used : Geological Maps of New Zealand ref Sht 14

1.3 Geology of site from geological map: Schist rock

1.4 Climate

Annual rainfall :
Annual evaporation :
General comment (rainfall intensities, seasonal variation etc)

Data sourced used: not applicable ETS option not used

1.5 Intended water supply source

Public supply : Local system

1.6 Local experience with existing onsite systems

Number of systems in locality: Approx. 10 in the Marlborough Sounds

1.7 Preliminary evaluation of solutions which could be feasible:

The existing septic tank and disposal system is considered inadequate by the Marlborough District Council due to the owners propose to add 1 bedroom to the existing house.

SITE EVALUATOR(S)

1.1	**Name** (principal evaluator)	:	Graham Kerrigan
	Designation	:	Engineer- C.Peng
	Company	:	Kerrigan Engineers
	Address	:	95b Maxwell Road, Blenheim
	Phone	:	03 5784085
	Fax	:	03 5793478

2.0 ONSITE EVALUATION

2.1 Work undertaken

Details	:	
Date	:	21 July 2006
Weather (on day & preceding week)		fine
Photocopy of desktop study	:	NA

2.2 Topography

Slope	:	Varies- upto approx. 15 degrees.
Ground cover	:	regenerating native
Geology	:	Underlying Schist rock
Soil landscape	:	Topsoil on clay bound weathered schist
Drainage patterns	:	Sloping to northwest
Site plan details attached	:	Refer site plan in report no 2577
Waterway:		Site on slope ephemeral waterway is present within 30m of proposed LPED field.
Stands of trees/shrubs	:	Disposal bed site is planned to be located in regenerating bush
Well, bores	:	None on site
Embankment	:	None in proximity
Buildings	:	none in proximity
Other	:	None in proximity
Site history (land use)	:	Natural bush

2.3 Site exposure

Site aspect	:	Hill slope facing northwest
Pre-dominant wind direction	:	Northwest

Presence of shelter belts : Located in established bush
Presence of topographical features or structures:

2.4 **Environmental concerns** (eg: native plants intolerant of phosphorus load, high water table, swamp, waters etc).

2.5 **Site stability**
Is expert assessment necessary?

2.6 **Drainage controls**

Depth of seasonal water-table	:	None found
Need for cut-off drains/diversion banks	:	Anticipate there will be no ground water effects.
Need for surface water collector/cut-off drains:		Cutoff drain proposed

2.7 **Availability of reserve/setbank areas** (show details on sketch plan)

Reserve area available for extensions:		Ample room available on site
% of design area	:	
Setback distance	:	Compliant with MDC Code of Practice

2.8 **Photographs attached** : Refer to report No 2577

3.0 SOIL INVESTIGATION

3.1 Soil profile determination

Method : Topsoil surface excavation of proposed bed area.

Other : Observation of existing cutting adjacent bed area.

3.2 Reporting (attach detailed soil/report as appropriate, see soil profile information and data sheet, figure 4.1A1)

Layer	Lower depth mm	Moisture Condition	Colour (moist)	Field Texture	Coarse Fragments %volume	Structure	Sample Taken (Y/N)	Consistency	Permeability	Other assessment
1	200	dry	Dark brown	topsoil	Na	strong	N	loose	NA	
2	Not determined	dry	Light brown/ yellow	Silty clays	Claybound weathered schist rock	Weak – moderate	Y	Firm to very Firm	NA	Moderately plastic

3.3 Estimated soil category (refer to table 4.1.1 and clause 4.1.4.1)
Summary: Category 4 soils. The soils are consistent throughout area from which assessment has been made.

Site test	1	2	3	4	5	6	7
Soil category (upper zone)	2	NA	NA	NA	NA	NA	NA
Soil category (layer 2)	4	NA	NA	NA	NA	NA	NA

Remarks:

3.4 Recommended DLR
refer to clause 4.1.4.2: Layer 2 – category 4 – DLR = 4mm/day

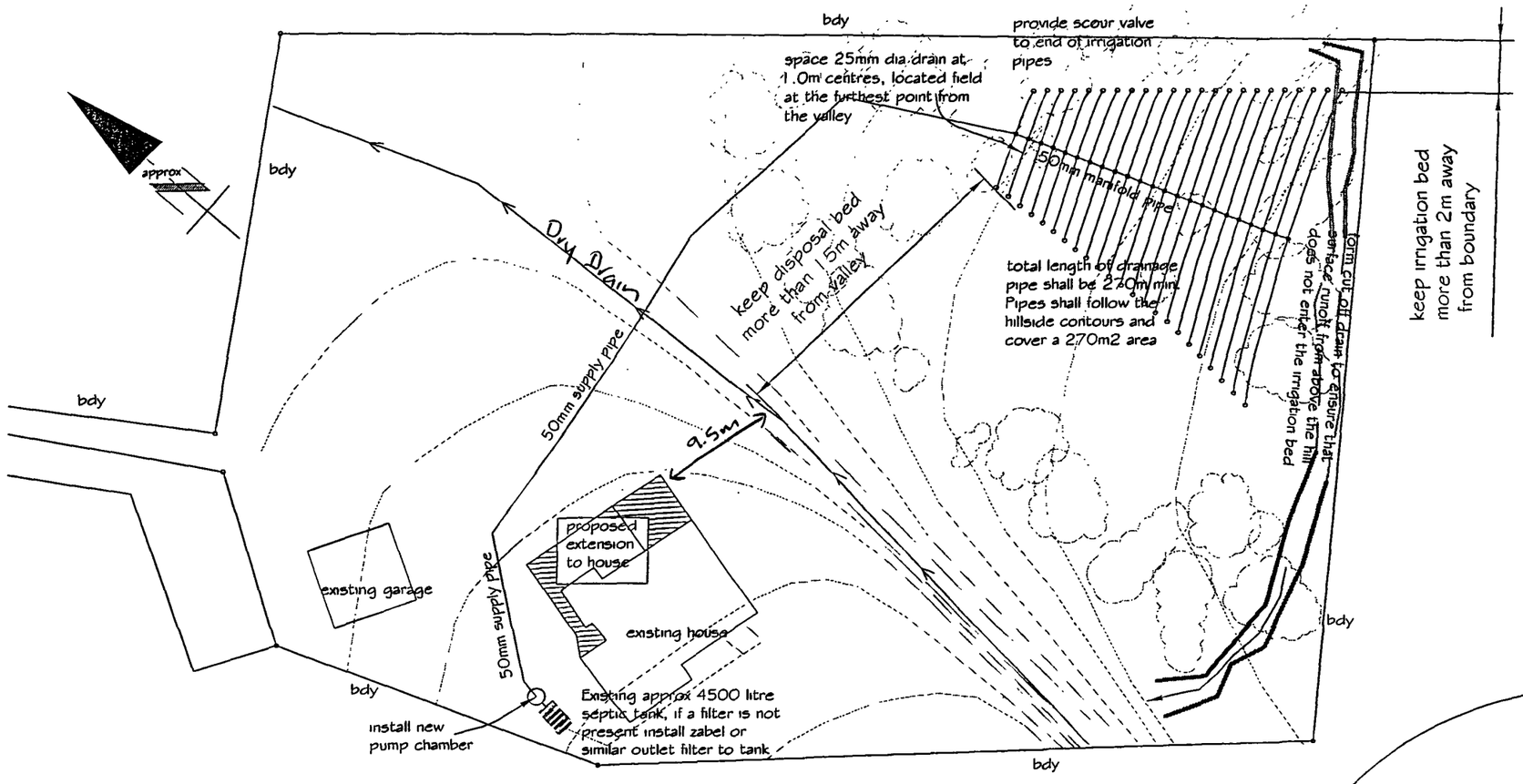
4.0 GENERAL COMMENTS

4.1 Soils and loading:

The existing 2 bedroom house will be extended to a 3 bedroom house, and the new loading equates 1080litres/day. The loading is based on the MDC recommended guide requirements of 2 people per bedroom multiplied by 180l/c/d.

For subsurface soils – category 4 (weakly structured to massive clays), we assume 4mm/day loading rate using LPED. We have been cautious in the selection of the loading rate given the proximity to an emphemeral drain in the valley floor. The drain will should be more than 15m from the proposed LPED bed.

The required bed area is assessed at approx 270m^2.



IRRIGATION BED PLAN

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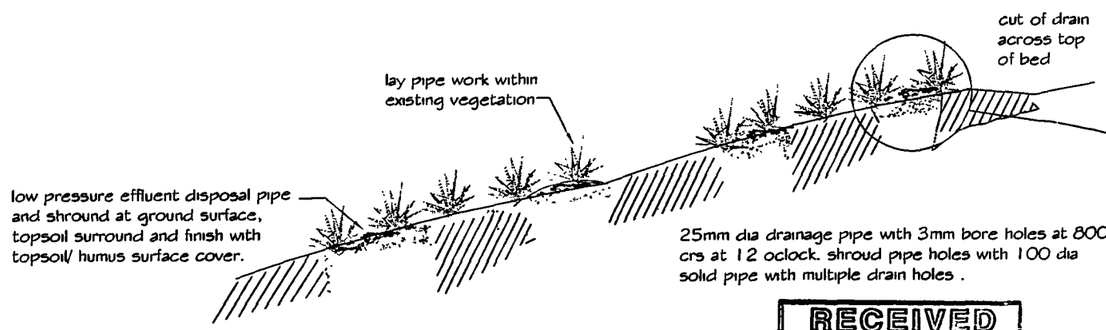

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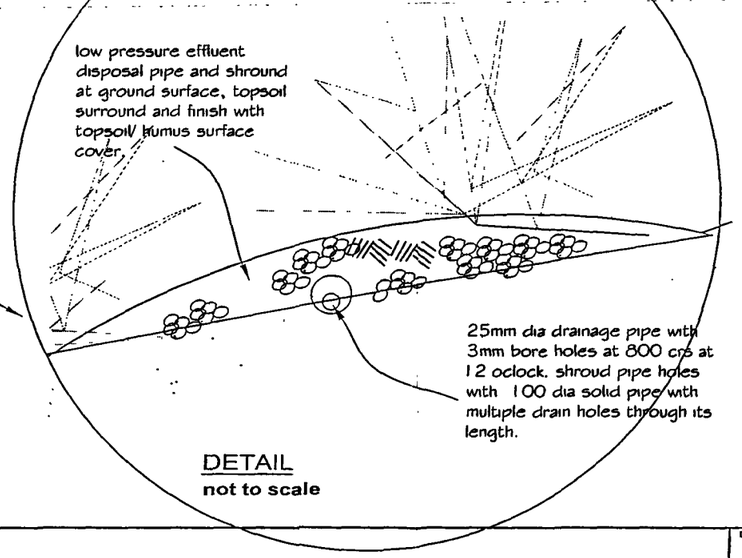

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Revision Note	Appr.	Date.

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Project Title:
MR & MRS KIDDEY - THE GROVE - QUEEN CHARLOTTE SOUNDS

Sheet Title:
ON SITE WASTE DISPOSAL - LOW PRESSURE EFFLUENT DISPOSAL (LPED) SYSTEM

DRN: ect | APPROVED:
DES: gck | DATE: July 06
SCALE: AS SHOWN
Dwg. No. 2577
Sht. 1
rev.
FILE:..lon site waste disposal

060931

File Ref: U060931

Ask For: Glen Parker

6 September 2006

Graham Kerrigan
Kerrigan Engineers Ltd
P.O Box 1092
Blenheim

Dear Mr Kerrigan

Kiddey Discharge and Land Use Consent Application U060931

The Marlborough District Council received your clients' application to discharge domestic wastewater to land and to build within a hazard zone on 29 August 2006 and has accepted the application under Section 88 of the Resource Management Act 1991.

Before I can continue with processing the application I would like you to provide a professional opinion stating that the discharge will not cause any increased instability on the hillside and that it is possible for the extension to be built safely. This opinion is part of the geotechnical investigation, which is required given these activities will be within a hazard zone of the Marlborough Sounds Resource Management Plan. Once I have obtained this information I will undertake a site visit.

In accordance with Section 92A of the Resource Management Act 1991, you are required to contact Council within 15 working days of receiving this letter, and state which of the following you are prepared to do:

1. provide the information; or
2. tell the Council in written notice that your client agrees to provide the information; or
3. tell the Council in written notice that your client refuses to provide the information.

This application will be placed on hold under Section 92 of the Resource Management Act 1991 until this information can be provided to Council.

Yours faithfully

GLEN PARKER
RESOURCE MANAGEMENT OFFICER

KERRIGAN ENGINEERS LTD

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Mobile 027 649 4299
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Our Ref: 2577

8 September 2006

RECEIVED
13 SEP 2006
MARLBOROUGH DISTRICT COUNCIL

Marlborough District Council
P O Box 443
Blenheim

Attention: Glen Parker

Dear Glen

KIDDEY – R/C U60931

Please find attached professional opinion for the above resource consent application.

We trust this is satisfactory.

Yours sincerely

Graham Kerrigan

OPINION AS TO LAND STABILITY

I **GRAHAM CHRISTOPHER KERRIGAN** hereby confirm that:

I am experienced in the field of soils engineering and more particularly land and foundation stability and am formally recognized 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 regarding slope stability of the property for Mr H Kiddey at Lot 9 DP 5540 with respect to the proposal to discharge septic waste on site.

The following professional opinion is based on the assumption that the data obtained from the reported investigation (engineering report titled "Site Evaluation for Waste Water Treatment and Disposal for site at Lot 9 DP5540, Grove Arm, QCS dated July 2006) is representative of the disposal 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 area under consideration.

In my professional opinion, and having regard to the specifics of the site which I have investigated to the extent that acceptable engineering practices require, and with the plans and specifications being made in accordance with acceptable engineering principles and practices and following the recommendations set out in the referenced report, a construction, in accordance with such plans and specifications, will meet proper engineering standards.

G C Kerrigan
MIPENZ(Civil & Structural)CPEng IntPE(NZ)

6 September 2006