KERRIGAN ENGINEERS LTD

Graham Kerrigan
N.Z.C.E., B.E. Civil, MIPENZ
95b Maxwell Road
P O Box 1092
Blenheim

Ph: 03 578-4085
Fax: 03 579-3478
Mobile 027 649 4299
E.mail: kerrigan.engineers@xtra.co.nz

Our Ref: 2480

26 September 2006

U060907

Opus International Consultants Ltd
P O Box 563
Blenheim

Attention: Gus Laird

Dear Gus

JUNJI – R/C NO 060907

In response to your request of additional information for the above Resource Consent application please consider the following.

1. Soil category – the soil category is 3 – DLR 50mm/day
2. The effluent disposal is a trench system to planted terraced area.
3. The AWTS system specification – the owner plans to install an Airtech 9000 supplied by Crafar & Crouch Ltd as agent for RX Plastic Ltd. The system specification is attached.

We trust this is satisfactory.

Yours sincerely

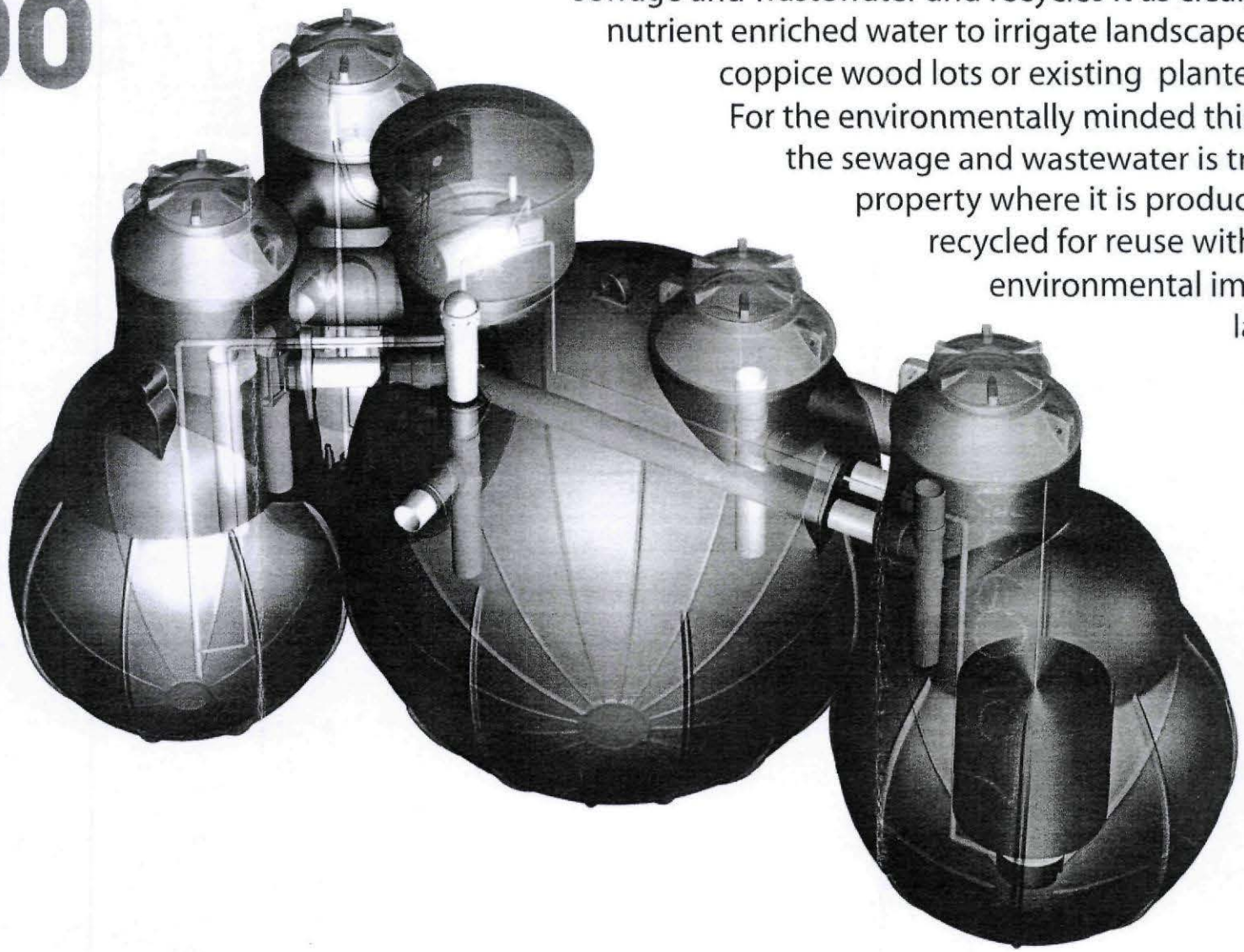
Graham Kerrigan

AERATED WASTEWATER TREATMENT SYSTEM

AIR TECH™ 9000

The **AirTech (™) 9000** system is an efficient, lightweight sewage treatment plant that safely and effectively processes all household sewage and wastewater and recycles it as clear, odourless nutrient enriched water to irrigate landscape, shelterbelt, coppice wood lots or existing planted areas.

For the environmentally minded this means that the sewage and wastewater is treated on the property where it is produced and then recycled for reuse with little or no environmental impact on the land.



TECHNICAL SPECIFICATION

AIR TECH ™ 9000 SEWAGE TREATMENT SYSTEM

The specifications of the Air Tech ™ 9000 Aerated Wastewater Treatment System are as follows:-

Tank Chambers Polethylene modular interlocking tank chambers - complying with construction standard AWS/NZS 1546.1:1998
Capacities - primary chamber 3300 litres - Aerobic chamber 1500 litres
Clarification chamber 1200 litres - pump chamber (maximum) 1000 litres

Primary Chamber Filter Biotube 100mm Effluent Filter. Flow Modulation Outlet.

Air Blower Side Channel 120 Rotary Vane. Double Inlet Filter.

Diffuser Pro Flex 250 Disc Diaphragm. Automatic Check Valve.

Air System Supplies air to the diffuser and venturi sludge return system (aerobic and anaerobic). The air system is controlled by valves enabling the air supply to be regulated and fined tuned to achieve the most effective and efficient use of air in the treatment system.

Media Bio-Tube Module - purpose made polytheylene biological treatment and filtration media.

Disinfection
1. Chlorinator (optional) - Chlorine tablet water contact dispenser /single adjustable tube.
2. Electronic Treatment - Water Sterilisation system

Effluent Pump D42A submersible pump 26m maximum head

Effluent Filter Arkal 1" Super Filter - Red Grooved Rings 120 mesh = 130 micron = .13mm

Controller Alarm & Management System The Air Tech ™ 9000 Aerated Wastewater Treatment System is managed by an electronically monitored controller. This state of the art microprocessor based unit is monitored 24 hours a day and in the unlikely event of a system fault will alert the home owner with an audio-visual alarm.

The controller will then communicate through the Public Switched Telecom Network (PSTN) transmitting a status report to a central database. These reports are logged with date and time, processed, and if necessary, transmitted to the Area Service Technician who can respond to the alarm call.

Design Certification

The design of the Air Tech ™ 9000 Sewage Treatment System has been developed in accordance with sound and widely accepted engineering principles and technology. The system has been assessed, for a typical domestic household wastewater loading, as capable of meeting the following quality of effluent treatment:

BOD_5	-	14 to 20 mg/L
TSS	-	20 to 30 mg/L
Faecal Coliforms (soil treatment)	-	less than 1000/FC (CRC GA Standard)
Faecal Coliforms (with disnfection)	-	0 to 200/100ml

Andrew Dakers ME, BE, Registered Engineer, Natural Resources Engineering

The Technical specifications are for the Air Tech ™ 9000 domestic wastewater treatment system. Because of the company's on-going research and development, B.Y. Plastics Ltd. reserves the right to alter specifications without notice.

Such alterations will maintain or improve the above effluent quality standard. C:\WPWIN60\WPDOCS\SEPTIC\TECH.WPD

SERVICING SCHEDULE

AIR TECH ™ 9000 SEWAGE TREATMENT SYSTEM

RX Plastics Ltd specify that the system shall be serviced in accordance with the following regime:

Full service by the manufacturers approved service technician : annually
Regular servicing by the service technician or "owner" * : as specified by the manufacturer

* "owner" must be the property owner who has been specifically trained by the company to service the system.

The system is designed so that it can be simply serviced. The company has developed a recording system for the monitoring of each installation. The owner will be required to submit certification that the servicing has been carried out in accordance with the service schedule, specified below.

The servicing requirements for componentry, as recommended by manufacturers, are as follows:-

1	Primary Chamber	check **annually**/desluge every **five years or as required**
2	Bio tube Effluent Filter	remove filter and wash **annually**
3	Air Blower	clean the air filter **three times per year**
4	Air System	check diffuser/sludge return/air flow **annually**
5	Chlorinator (if fitted)	top up chlorine tablets **three times per year**
6	Effluent Pump	general check of pump and flow pressure **annually**
7	Arkal Disc Filter	check and wash **three times per year**
8	Alarm System	check system **twice a year**
9	Effluent Disposal System	check disposal area **twice a year**

Servicing Chart

	Function	4 Monthly	6 Monthly	Annually
1	Primary Chamber/Check			Service Technician
2	Bio tube/Clean Filter			Service Technician
3	Air Blower/Clean Filter		Owner	Service Technician
4	Air System/Check			Service Technician
5	Chlorinator/Tablets	Owner		Service Technician
6	Effluent Pump/Check			Service Technician
7	Effluent Filter/Clean	Owner		Service Technician
8	Alarm System/Check		Owner	Service Technician
9	Effluent Disposal System		Owner	Service Technician

Note: The desludging of the anaerobic chamber is the responsibility of the owner and should be carried out at least every five years or sooner if required.

Assessment of Servicing Schedule C:\WPWIN60\WPDOCS\SEPTIC\TECH.WPD
This servicing schedule has been assessed and confirmed by:-

NRE Consultancy

Natural Resources Engineering
Andrew Dakers, Registered Engineer.

63 Bowenvale Ave
Christchurch 8002
Aotearoa/New Zealand
Ph: (64)(3) 942 7954
Mobile: 021 533386
Fax: (64)(3) 942 9954
Email: Dakers@paradise.net.nz

FACSIMILE

Date: 17 Dec 2001

To: Neville Moon, Christchurch. Fax 342 4637

Subject:

Configuration of single tank Aerated Wastewater Treatment Systems (AWTS).

Dear Neville

I have analysed the desirable capacity for proposed single tank AWTS unit. I have done the analysis based on input from population equivalents of both 8 and 10 people. The design is based on the reference *Small and Decentralised Wastewater Management Systems*, by R Cites and G Tchobanagious, McCraw Hill, 1998.

The following analyses assumes;

- An average daily values for raw wastewater of 185L/person and 85gm BOD_5/person.
- An output quality of 20 mg/L BOD_5 and 30 mg/L TSS. (assuming 75% coefficient of reliability.
- Recycling of biosolids from clarifier to aeration chamber with adequate mixing.
- The proposed contact media in the aeration chamber has not been factored into the calculations. The effect is likely to act as a safety factor and improve the quality of the output.

The results of the analyses follow.

	Notes	8 p.e	10 p.e
Primary chamber	• Peaking factor of 2.5 • 50% BOD_5 reduction • Annual desludging of primary chamber • Hyraulic detention time of 12 hrs • Filter fitted	Recommended capacity 2500L	Recommended capacity 3100L
Aeration chamber	• Food to micro-organism ratio of 0.04 • MLSS 3000 mg/L • Mean cell retention time of 30 days.	Recommended capacity 1200L	Recommended capacity 1500L
Aerator capacity	Assuming 3% oxygen transfer efficiency	80L/min[1] for 15hrs per day	80L/min[1] for 19hrs per day
Clarifier	Peaking factor = 4 Hydraulic retention time 2 hrs	Recommended capacity 800L Minimum surface area 0.3 m^2	Recommended capacity 1200 L Minimum surface area 0.34 m^2

1. If the Aerator is used to drive a venturi sludge return in the clarifier then the aerator capacity should be increased to 100 L/min.

Yours sincerely

Andrew Dakers

KERRIGAN ENGINEERS LTD

ENGINEERING REPORT

For Junji Matsuda

Site Evaluation For Waste Water
Treatment and Disposal for site at
Lot 1 DP306717 Kaiuma Bay, Havelock

July 2006 - **FINAL**

By Graham Kerrigan

Job Number: 2480

KERRIGAN ENGINEERS

ENGINEERING REPORT

Junji Matsuda
Kaiuma Bay, Havelock

CONTENTS

A SYNOPSIS

SCOPE OF INVESTIGATION

The site was inspected on 12 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 property has been developed for the construction of a new dwelling. Included in this site development is landscaping by way of small retaining walls to form terraced gardens to the north western slope of the site.

This garden area is planned for LPED of secondary treated septic wastes. The fill material to the terraces is remnant material cut from the adjoining cuttings to form a bench for the dwelling location.

The owners wish to utilize this terraced garden area for onsite waste disposal. This area is approximately 200m^2. There is ample coverage for waste disposal at this location.

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 Junji Matsuda.

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

SITE DESCRIPTION

The planned dwelling will be a 3 bedroom Fraemohs house. The possible future occupancy is 6 persons per MDC Guidelines.

The site is located at the foothill of a ridge formation. The slope of the area varies but in the area of the waste disposal bed it is generally about 15 degrees. However the proposed bed area is terraced with retaining walls making each disposal trench relatively flat.

The site is historical pastoral land. We understand the owners wish to revegetate the uphill area with native bush.

There is adequate room in the front yard below the house to accommodate a waste treatment irrigation 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 loam, category 3 per NZS/AS 1547:2000. The design-loading rate has been assessed to be 50mm/day based on AWTS secondary treatment system and LPED via trenches per the Marlborough District Councils guidelines for on site waste disposal.

Based on the 1080litres/day usage the required discharge area per NZS/AS 1547:2000 equates too approximately $22m^2$.

However upon permeating through the fill material the treated wastes will reach natural ground. We conservatively assessed the natural ground as category 4 soils and hence a conservative DLR = 10mm/day requiring a permeable area of approximately $108m^2$. The owners wish to utilize the terraced garden area for onsite waste disposal. This area is approximately $200m^2$. Hence there is ample coverage for waste disposal at this location.

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.

We note an ephemeral drain to the north of the proposed terrace bed. We recommend that the drainage system be located at least 2m away from this drain. To ensure seepage from entering this area a 0.4m minimum width of damp proof discharge membrane DPM be laid against the existing retaining as detailed in the attached plan.

This area should be sign posted indicating area is a septic waste disposal bed and indicating possible hazards. Planting should be low maintenance evapotranspiration favourable plants as per attached list.

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 consideration and design recommendations presented in this report and the attached plan 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.

We consider that there are no current 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 for Junji Matsuda with respect to our understanding of his 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.

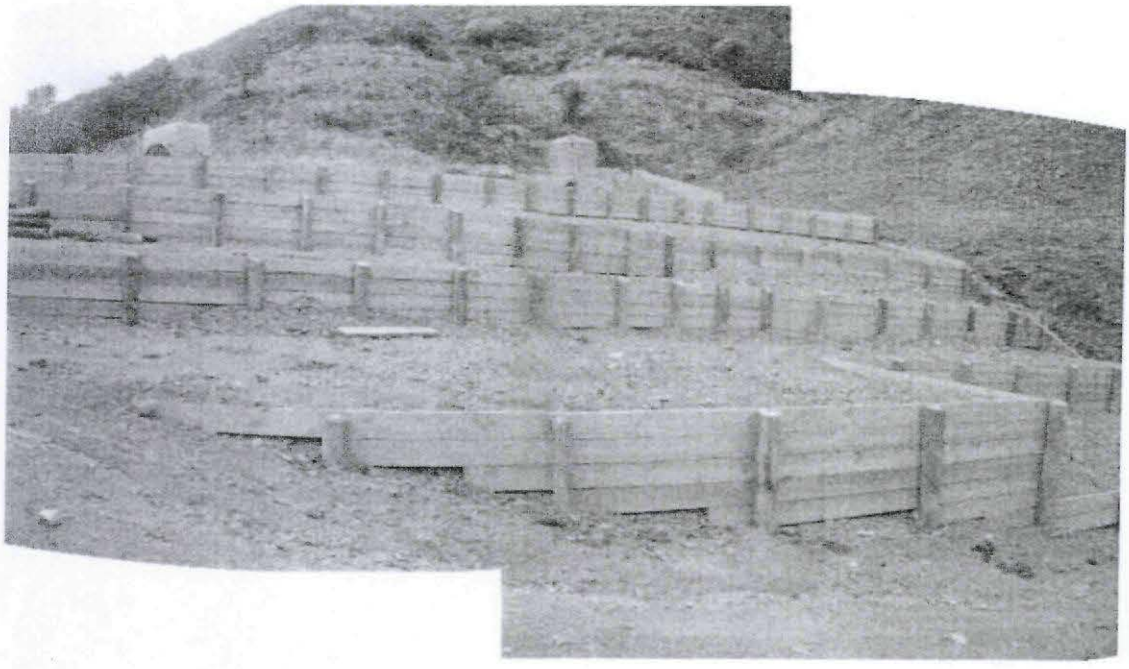
This report is based on our interpretation of our visual examination and limited soil tests only and does not preclude the possibility of differing soil properties and/or other relevant physical features being present between the test locations or hidden from view. Opinions and judgements expressed herein 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.

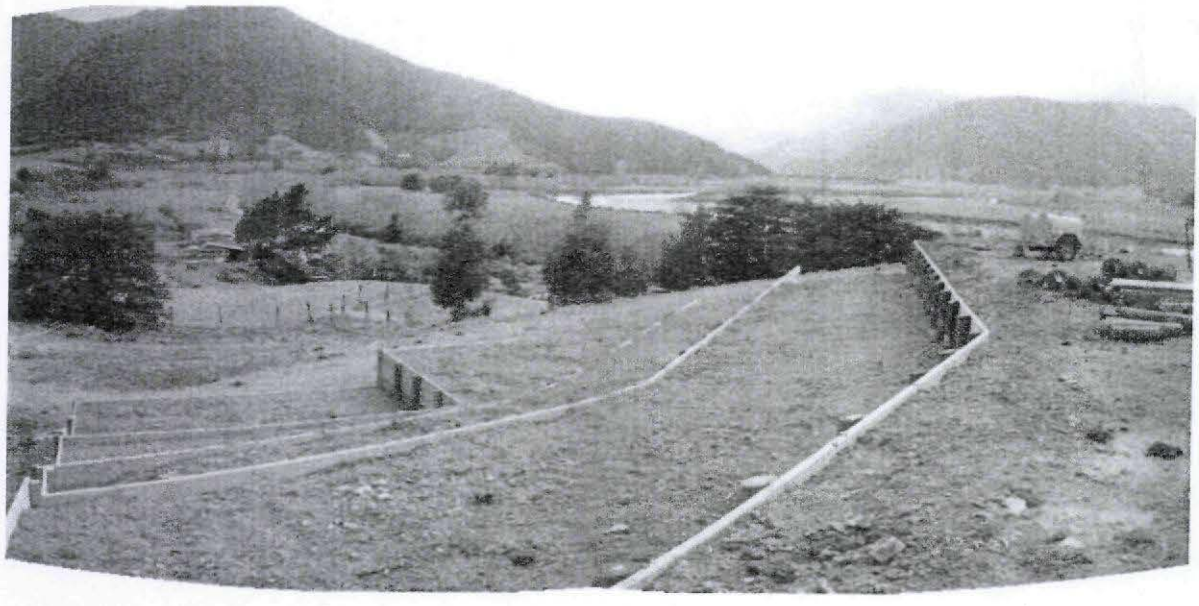
KERRIGAN ENGINEERS

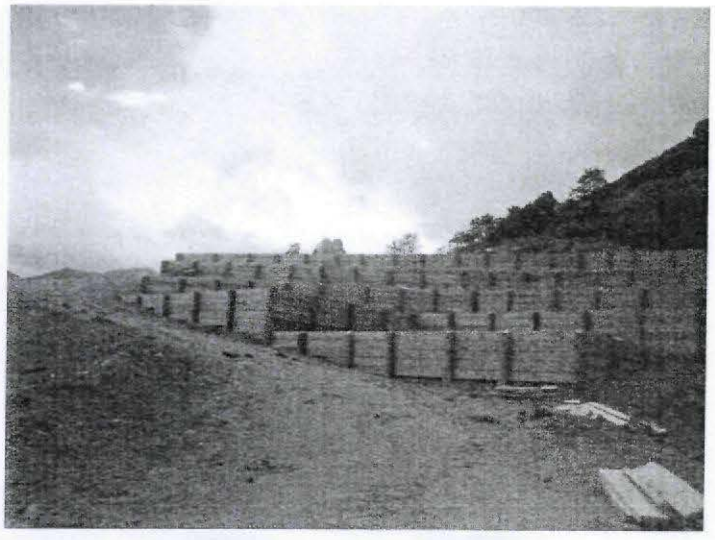
APPENDICIES

Appendix 1

Photographs

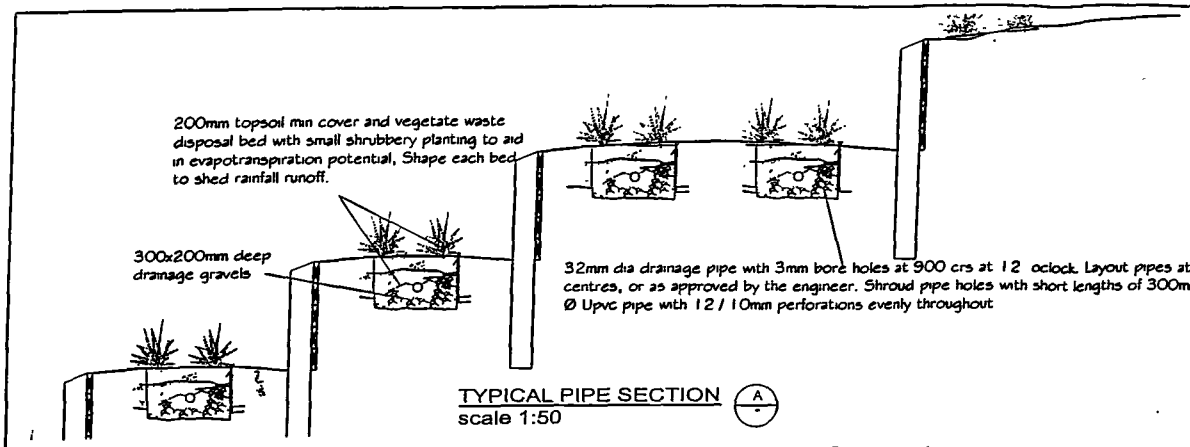




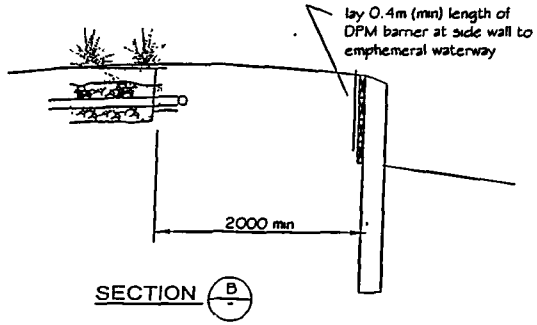


Appendix 2

Waste disposal plan



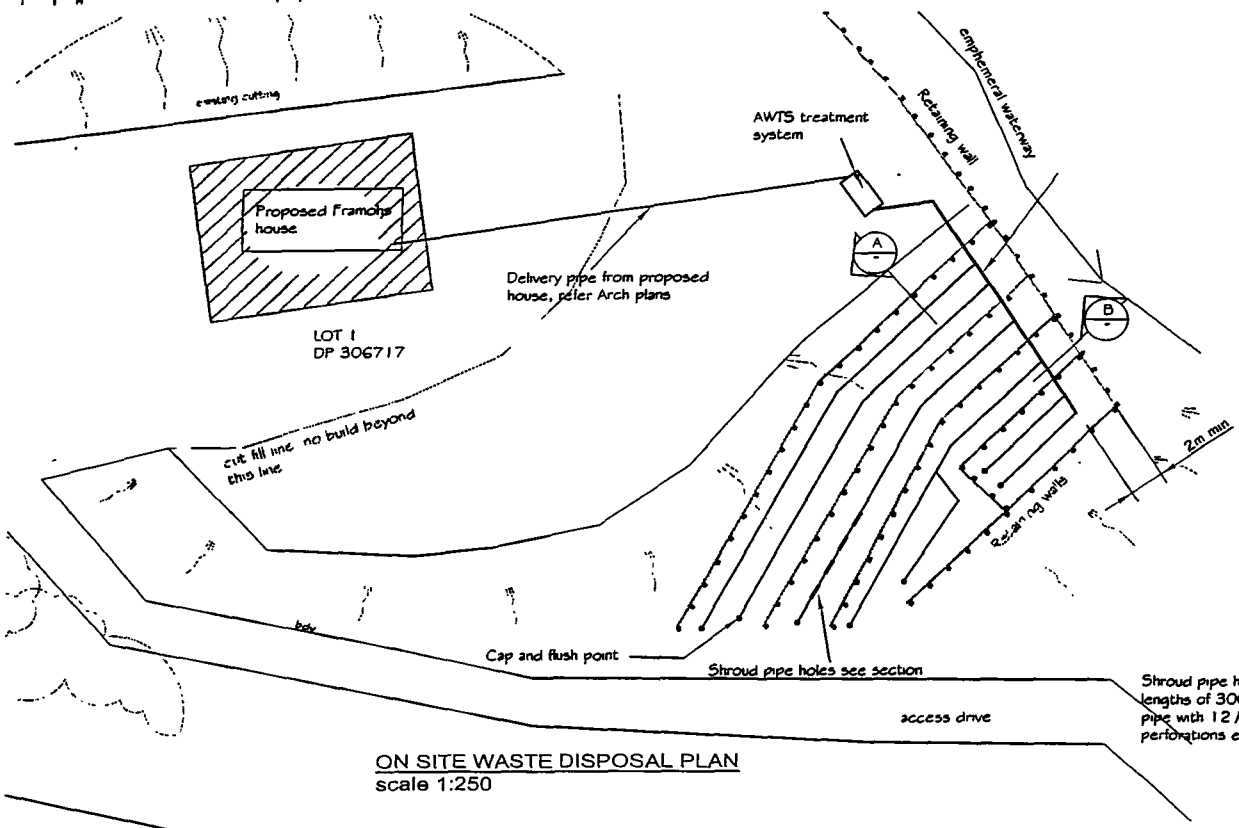
TYPICAL PIPE SECTION (A)
scale 1:50



SECTION (B)

Septic Treatment Systems Notes:

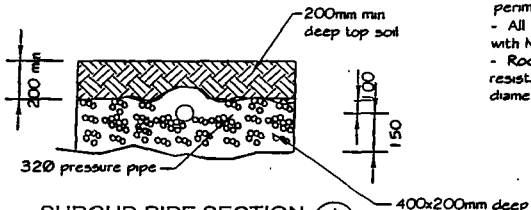
Owners should obtain Councils publications on maintenance and management of septic systems.
- Only Registered tradesmen familiar with the construction of land application systems and working to the National Plumbing and Drainage Code NZS/AS 3500 should carry out the installation.
- pump chamber volume of 1200 litres.
- Start and stop operation via floats etc to ensure dosing of 300 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 manifold of the perforated pipes. Minimum outflow at the extremeties of the discharge shall be 0.034 litres/ sec/ 3mm per perforation.
- Pump and outflow performance to be inspected and approved by the Engineer prior to back filling



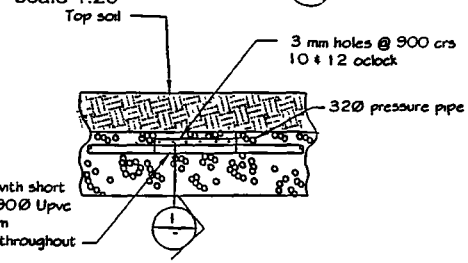
ON SITE WASTE DISPOSAL PLAN
scale 1:250

Land Application Notes:

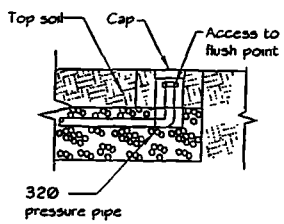
- Surface water should be diverted around the perimeter and up-slope of the land application area.
- All pipework to be sewer grade and compliant with NZS 1477.
- Rock backfill shall be clean, durable and decay resistant,and range in size from 20mm to 60mm in diameter.



SHROUD PIPE SECTION (1)
scale 1:20



SHROUD PIPE DETAIL (2)
scale 1:20



END DETAILS (3)
scale 1:20

KERRIGAN ENGINEERS
PO Box 1092
95b Maxwell Rd
Blenheim
Ph 03 578 4085
Fax 03 579 3478
email kerrigan engineers@xtra.co.nz

Project Title:
JUNJI MATSUDA PROPERTY - HAVELOCK - LOT 1 , DP 306717

Sheet Title:
ON SITE WASTE DISPOSAL - SEPTIC TANK & LOW PRESSURE EFFLUENT DISPOSAL -PLAN & SECTION

DRN: GCK
DES: GCK
SCALE: NOT TO SCALE
Dwg. No. 22480
Sht. 1 OF 1
rev.
FILE:

APPROVED: 7.7
DATE:

RECEIVED
23 AUG 2006
MARLBOROUGH DISTRICT COUNCIL

Appendix 3

Management and maintenance guidelines

Management & Maintenance requirements for AWTS

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 AWTS:

   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 AWTS 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 possible.

Advice on maintenance

a. The AWTS will need to:

   i. **Remain powered on**. Refer to supplier literature. Generally in bach locations the power supply is turned off when the bach is not occupied. However, turning off the AWTS will more than likely cause the system to go anerobic (septic) and create smell problems. The AWTS will continue to digest waste long after the last input so long as power is maintained. Check with the individual supplier's literature and directions on this issue.
   ii. Be maintained regularly; AWTS systems generally come with a standard maintenance contract. Ensure that the service requirements of the contract are carried out and the contractor's maintenance is undertaken regularly.
   iii. be protected from vehicles;
   iv. have any grease trap cleaned out regularly;
   v. keep the vent and/or access cover of the AWTS tank exposed;

vi. Have any outlet filter inspected and cleaned (as part of the regular maintenance contract).

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

i. 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. Check equipment and:
i. Ensure that no dripper is clogged or that the dripper location is not out of place and has the appropriate humus and topsoil cover.
ii. 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	:	Havelock
Owner	:	Junji Matsuda
Address	:	Kaiuma Bay, Havelock
Lot No	:	Lot 1 DP306717
Aerial photo details	:	Site photo only
Regional Authority	:	Marlborough District Council
Site plan details	:	Refer site plan in report No 2480

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:

1.7 Preliminary evaluation of solutions which could be feasible:

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	:	Inspect existing cuttings & an excavations, view ground contours and evaluate limiting soil horizons and proximity to water ways.
Date	:	12 July 2006
Weather (on day & preceding week)		fine
Photocopy of desktop study	:	NA

2.2 Topography

Slope	:	Varies- approx 15 degrees.
Ground cover	:	Grass
Geology	:	Underlying Schist rock
Soil landscape	:	Filled terraces
Drainage patterns	:	Controlled with siteworks
Site plan details attached	:	Refer site plan in report no 2480
Waterway:		Site on slope ephemeral waterway present within 30m of proposed irrigation field.
Stands of trees/shrubs	:	Owners plan to revegetate hillside in future
Well, bores	:	None on site
Embankment	:	None in proximity
Buildings	:	None in proximity
Other	:	None in proximity
Site history (land use)	:	Natural bush/pastural

2.3 Site exposure

Site aspect	:	Hill slope facing east

Pre-dominant wind direction : Northwest
Presence of shelter belts : None
Presence of topographical features or structures: None

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? No

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:		Measures to minimize waste entering the adjacent ephemeral drain

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 2480

3.0 SOIL INVESTIGATION

3.1 Soil profile determination

Method :

Other : Observation of Existing cutting

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)	Consis tency	Perme ability	Other assessment
1	200	dry	Light dirty brown	topsoil	Na	Moderately structured	Y	Firm	NA	
2	Not determined	dry	Light clayey brown	Medium clays	Claybound weathered schist rock	Moderately structured	Y	Firm	NA	

3.3 Estimated soil category (refer to table 4.1.1 and clause 4.1.4.1)

Summary:

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

Remarks:

3.4 Recommended DIR

Refer to clause 4.1.4.2: Surface material- loams – category 3 - DLR = 50mm/day

Subsurface – category 4 – DLR = 10mm/day

4.0 GENERAL COMMENTS

4.1 Soils and loading:

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 loam, category 3 per NZS/AS 1547:2000. The design-loading rate has been assessed to be 50mm/day based on AWTS secondary treatment system and LPED via trenches per the Marlborough District Councils guidelines for on site waste disposal.

Based on the 1080litres/day usage the required discharge area per NZS/AS 1547:2000 equates too approximately $22m^2$.

However upon permeating through the fill material the treated wastes will reach natural ground. We conservatively assessed the natural ground as category 4 soils and hence a conservative DLR = 10mm/day requiring a permeable area of approximately $108m^2$. The owners wish to utilize the terraced garden area for onsite waste disposal. This area is approximately $200m^2$. Hence there is ample coverage for waste disposal at this location.

Appendix 5

List of suitable plants

Suitable plant species for evapotranspiration system

Notes:

1. Compiled from information provided by Alan Fielding and Associates, Landscape Architects and Environmental Horticultural Consultants, Whangarei, August 1976.
2. Information applicable to Northland, Auckland, Bay of Plenty and Coromandel areas in particular. For other areas of NZ local horticultural advice should be sought
3. Key:

Height	Durability
1. Around 1 metre or lower	A. Very hardy
2. Around 2 metres	B. Hardy
3. Above 3 metres	C. Soft

SECTION A: TREES – GENERAL

Should preferably be evergreen although some deciduous trees offer very good transpiration, eg:

Elms, 3A
American Oaks, 3A
Birch, 3A
Shrubby Pussy Willow, Bitter Willow, 3A
Hydrangea, 2A
Catalpa, 3B

SECTION B: FRINGE TREE

KawaKawa, 3A
Geniostoma, 3A
Hibiscus (various indigenous and exotic), 1-2B
Catalpa, 3B
Karaka, 3A
Pukatea (for very wet conditions), 3A
Kohekohe, 3A
Puka (Meryta), 3B
Puriri, 3A
Makomako, 3A
Lemonwood (Pittosporus), 3A
Parapara, 3C

(Shelter at least for initial establishment may be very important).

SECTION C: PLANTS AND EVERGREENS

Canna, 1B
Taro, 1C
Aralias, 1-2B
Rhubarb, 1A
Rock Lily (Arthropodium), 1B
Rangiora, 2A
Fuchsia, 2A
Philodendrons (large range), 1C
Flax (Phormium tenax), 2A
Agapanthus, 1B
Kaka Beak (Clianthus), 1-2A
Swan Plant, 2-3A
Gunneras (larger varieties), 1-2A
Geraniums (large range), 1A

Begonias (large range of species), 1C
- are very useful as an underplant in sheltered places.

SECTION D: GRASSES

Paspaium (will tolerate extreme wet and dry)

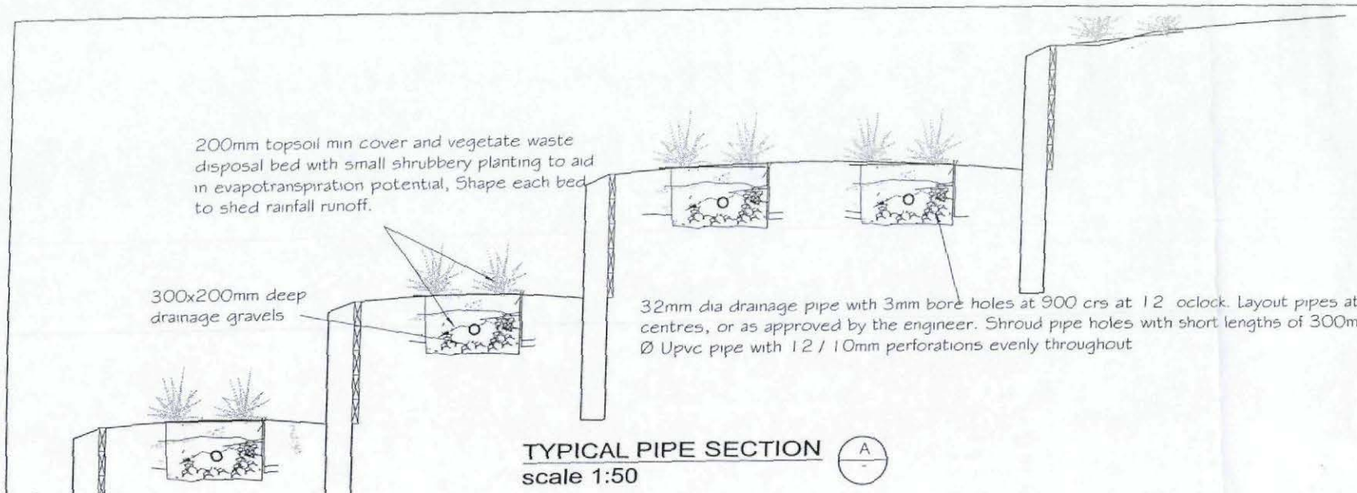
Poa species
Crested Dogs Tail (Cynosurus cristatus)
Yorkshire Fog (if fairly regularly wet)
Canary Reed Grasses (Phalarus Arundinacea)

SECTION E: GROUND COVERS

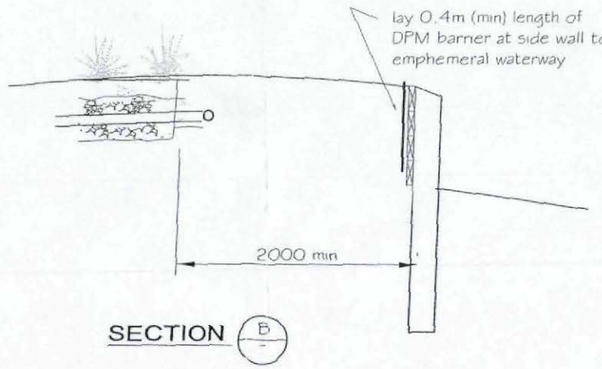
Mercury Bay Weed (Dichondra) could be useful on light soils
Yellow clovers (or pseudo clovers) – good where extra wet

Important Notes

Many of these trees and some shrubs may develop deep root systems that could block the ETS system. Local horticultural advice should be sought to ensure any proposed vegetation's root system will not be deep enough to encroach into the ETS bed and pipeworks.



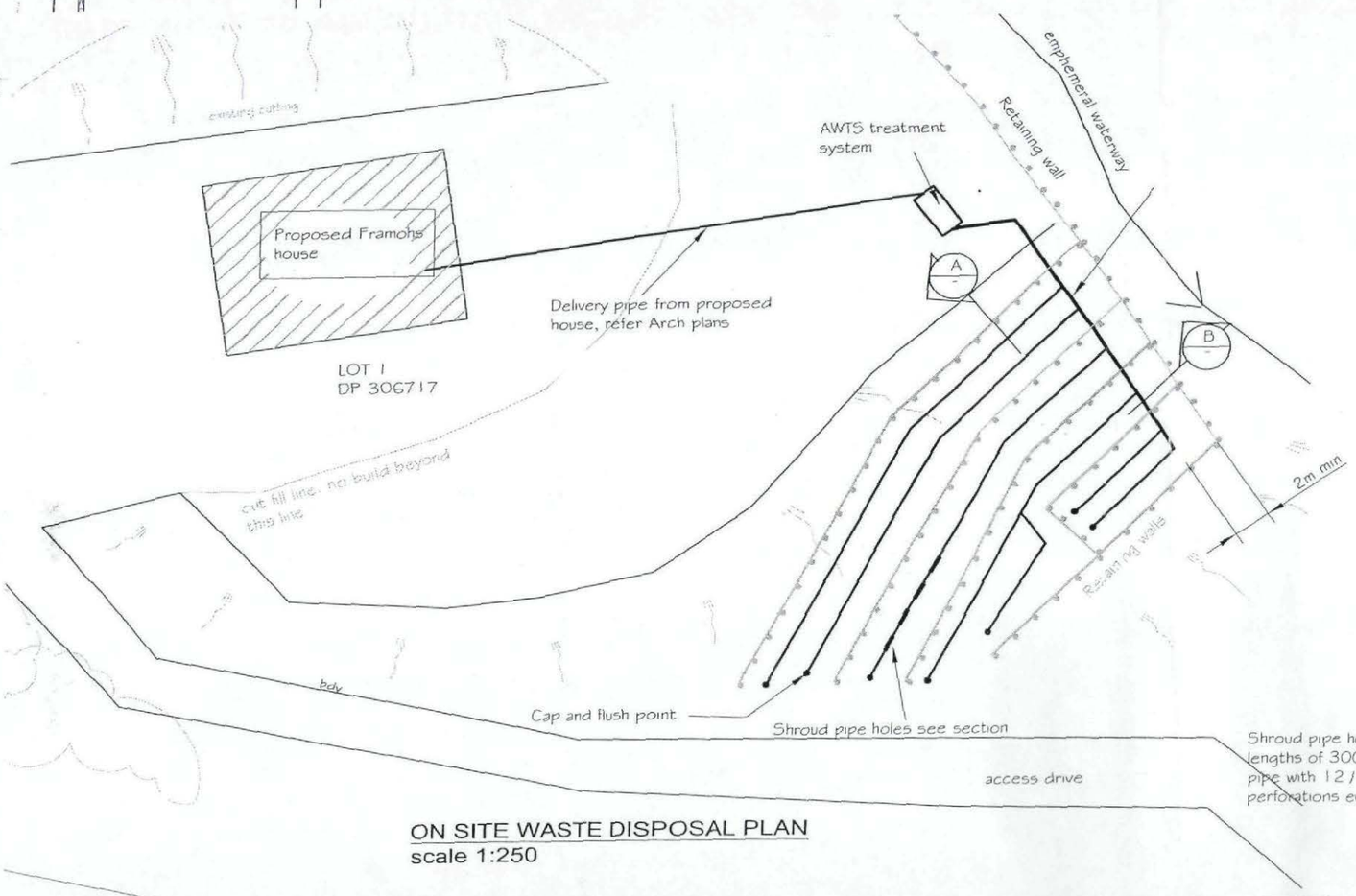
TYPICAL PIPE SECTION (A)
scale 1:50



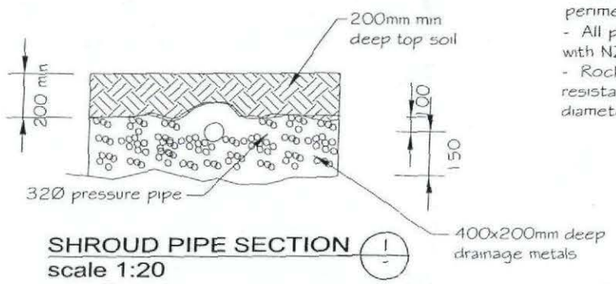
SECTION (B)

Septic Treatment Systems Notes:

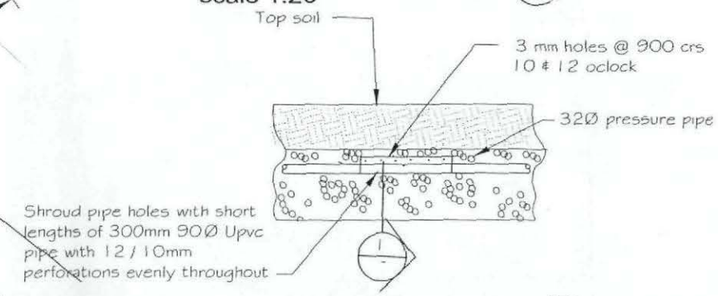
Owners should obtain Councils publications on maintenance and management of septic systems.
- Only Registered tradesmen familiar with the construction of land application systems and working to the National Plumbing and Drainage Code NZS/AS 3500 should carry out the installation.
- pump chamber volume of 1200 litres.
- Start and stop operation via floats etc to ensure dosing of 300 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 manifold of the perforated pipes. Minimum outflow at the extremeties of the discharge shall be 0.034 litres/ sec/ 3mm per perforation.
- Pump and outflow performance to be inspected and approved by the Engineer prior to back filling



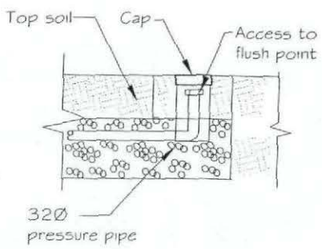
ON SITE WASTE DISPOSAL PLAN
scale 1:250



SHROUD PIPE SECTION (1)
scale 1:20



SHROUD PIPE DETAIL (2)
scale 1:20



END DETAILS (3)
scale 1:20

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.
- Rock backfill shall be clean, durable and decay resistant,and range in size from 20mm to 60mm in diameter.

060907

Revision Note.	Appr.	Date.

KERRIGAN ENGINEERS
PO Box 1092
95b Maxwell Rd
Blenheim
Ph.03 578 4085
Fax. 03 579 3478
email kerrigan.engineers@xtra.co.nz

Project Title:
JUNJI MATSUDA PROPERTY - HAVELOCK - LOT 1 , DP 306717

Sheet Title:
ON SITE WASTE DISPOSAL - SEPTIC TANK & LOW PRESSURE EFFLUENT DISPOSAL -PLAN & SECTION

DRN: GCK	APPROVE:
DES: GCK	DATE: MAY 06
SCALE: NOT TO SCALE	
Dwg. No. 2480	
Sht. 1 OF 1	
rev.	
FILE:	