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Engineering Report

For Craig and Lynne Mackersey

On-Site Wastewater Management

at

Lot 1 DP 9962
St Omer
Kenepuru Sound

Jan Dimmendaal
Chartered Engineer
Smart Associates Ltd
30 January 2007

Job No M06-1745

Table of Contents

1. Introduction

1.1 Craig and Lynne Mackersey have purchased a 4004m² property in St Omer, Kenepuru Sound. The legal description of the property is Lot 1 DP 9962, MB5D/562.

1.2 A discharge consent (U061126) has been issued for an onsite wastewater system to service a two bedroom dwelling to be constructed on the property. It is now proposed that the number of bedrooms provided in this dwelling be increased to three.

1.3 The purpose of this report is to recommend a suitable wastewater treatment and disposal system that will service the three bedrooms now proposed and meets Marlborough District Council requirements.

1.4 This report utilises site information contained in the Engineering Report (dated 6 July 2006) submitted in support of the earlier discharge consent application.

2. Description

2.1 The property is located on the east side of St Omer Road on northwest aspect slopes above St Omer Bay.

2.2 Apart from the benched area that forms the building site, the property is covered in regenerating native bush with sparse undergrowth.

2.3 The nearest stream is approximately 80m north of the site and the closest neighbouring land application area is estimated to be 50m to the southwest.

3. Site Evaluation and Proposed Wastewater Treatment and Disposal System

3.1 The site investigation identified a suitable land application area for effluent disposal on stable proximal backslopes having a northwest aspect, and a cover of regenerating native bush. Soils are dominantly residual loam and clay loam, with an average drainage category of 3.5.

3.2 Three test pits were dug at the site in the proposed effluent disposal area and their locations are shown on the site plan. The representative soil properties are:

W 1

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.15	A Sharp	Topsoil	Dark brown	Sandy Loam	None	Very Loose	V.Soft	Strong	Moist	2
0.35	B gradual	Residual	Pale brown	Loam	None	Loose	Firm	Moderate	Moist	3
0.60	C	Residual	Pale yellow brown	Clay loam	None	Med. Dense	Firm	Weak	Moist	4

W 2

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.15	A Sharp	Topsoil	Dark brown	Sandy Loam	None	Very Loose	V.Soft	Strong	Moist	2
0.30	B gradual	Residual	Pale brown	Loam	None	Loose	Firm	Moderate	Moist	3
0.60	C	Residual	Pale yellow brown	Clay loam	None	Med. Dense	Firm	Weak	Moist	4

W 3

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.20	A Sharp	Topsoil	Dark brown	Sandy Loam	None	Very Loose	V.Soft	Strong	Moist	2
0.35	B gradual	Residual	Pale brown	Loam	None	Loose	Firm	Moderate	Moist	3
0.60	C	Residual	Pale yellow brown	Clay loam	None	Med. Dense	Firm	Weak	Moist	4

3.3 The proposed land application area is on slopes of approximately 20° to 30°. The landform element is linear, weakly divergent.

3.4 In accordance with Plan Change 7 Rule 27.2.4.5.5 an assessment of the best practical option has determined that secondary treatment and drip irrigation wastewater disposal is the most practical option for this property, when the average slope and soil drainage characteristics are taken into account. The option of primary/secondary treatment and conventional trench effluent disposal was rejected as the level of land disturbance required on the bush covered slopes was considered excessive.

3.5 A secondary treatment system involves aerobic biological processing and settling or filtering of effluent received from a primary unit. The following system is considered suitable:

KiwiTreat treatment system coupled with a drip irrigation system. System performance details are:

BOD after 5 days (average) $< 20\ g/m^3$
Suspended solids (average) $< 30\ g/m^3$

A KiwiTreat system specification is attached (Appendix C).

The design irrigation rate for Category 3.5 soil is 26mm/week (i.e. 3.7mm/day).

3.6 The recommended location of the proposed irrigation disposal field is indicated on the site plan (Appendix A).

3.7 The length of dripline required is 242m (refer wastewater design sheets Appendix B). The irrigation system design requires 1.6 litre/hr emitters with lines laid at 1.0m spacing and following contours (when possible), at 100mm below ground level. The irrigation lines may also be covered with 100mm of inert material such as leaf mould and must be secured against soil creep. The installation of the irrigation system is to be in accordance with the product installer guide supplied by the manufacturer.

3.8 The wastewater flow design allowance of 140 litres/person/day has been used in the design of the system. This allowance is in accordance with Appendix 4.2D of AS/NZS 1547:2000 and is based on a rainwater supply water source for the dwelling. The design is based on the proposed total of three bedrooms having a permanent occupancy of 6 people (as per MDC Guidelines for New On-Site Wastewater Management Systems). A minimum wastewater storage capacity of 4500 litres is required.

3.9 Prior to the proposed system becoming operational the system designer must inspect and certify that the system has been installed according to the design. This certification must then be forwarded to Council.

3.10 The Marlborough District Council requires that the owner of any advanced wastewater treatment system enters into and retains a maintenance contract with the supplier of the system, or with a recognised maintenance contractor, for maintenance to be carried out on a yearly basis. Records of the maintenance should be forwarded to the Council as soon as practicable following the completion of the inspection or, in the case of remedial works being required, on completion of those remedial works.

3.11 Access from the foreshore to the system for maintenance will be available via the house access.

4. Recommendation

A KiwiTreat Secondary Treatment System combined with drip irrigation effluent disposal is recommended for this site. Installation is to be in accordance with requirements and recommendations of NZS1547:2000.

5. Limitations

This report has been prepared for the benefit of Craig and Lynne Mackersey to apply for resource/building consent from the Marlborough District Council. The report should not be relied upon for any other purpose, and is valid for two years.

6. References

1. NZS 1547:2000 On-site Domestic Wastewater Management

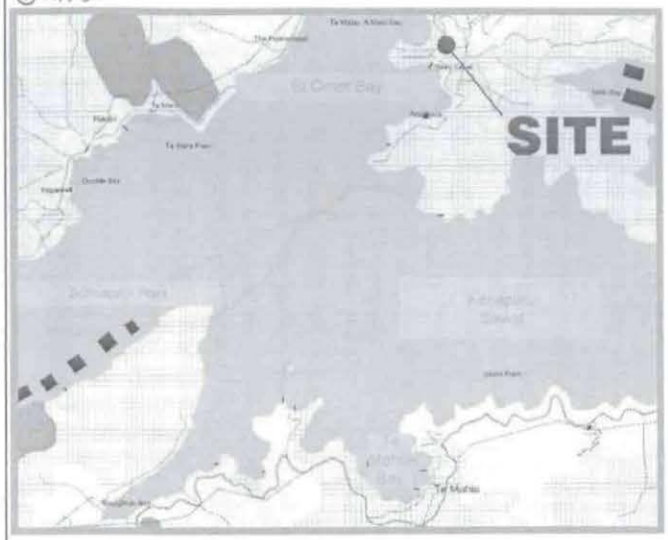
2. Marlborough Sounds Resource Management Plan including Rule Change 7

Jan Dimmendaal
Chartered Engineer
30 January 2007

Appendix A

Site Plan

REVISIONS



1 LOCALITY MAP
nts

ST OMER ROAD RESERVE

Existing Driveway

Deck Area

Proposed Dwelling

Garage

KiwiTreat System

W1

W2

W3

✳ LAA See Notes

Neighbouring Dwelling

north

Lot 1
DP 9962

2 SITE PLAN
Scale 1:250

✳ Note:

Approximate proposed location of Irrigation System

1. Total length of irrigation line of 242m.
2. Irrigation pipe to be buried 100mm below ground surface and aligned to best suit landscaping and contours.
3. Installation of the irrigation system to be in accordance with the Product Installer Guide.
4. Detailed design of the irrigation system is to be the responsibility of the installer.

RECEIVED
- 1 FEB 2007
MARLBOROUGH DISTRICT COUNCIL

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PROPOSED ON-SITE WASTEWATER MANAGEMENT
LOT 1, DP 9962 - ST OMER, KENEPURU SOUND
for Mackersey

PROJECT No. **M06-1745**

SITE PLAN			DRAWING No. 001
DRAWN jd	CHECKED mp	SCALE (A4) As Shown	DATE 16/01/07
COMPUTER FILE: drawings\			REVISION /07

Appendix B

Wastewater Design Sheets

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SOIL PERMEABILITY ASSESSMENT / EFFLUENT DESIGN SHEET

To AS/NZS 1547:2000

Mackersey, St Omer, Kenepuru Sound Project No: *M06-1745*

Intended water Supply:

~~*Public Supply*~~ *Rain water (roof collection)* ~~*Bore/Well/Dam*~~

Local experience with existing on-site systems:

Septic Tank or similar (Primary treatment):	Secondary treatment:
OK when installed properly with a correctly sized drainage area and maintained.	*Produce high quality effluent suitable for irrigation. Increased loading rate can be used if trench disposal is used - less disposal area required*

Recommendation for this site: *KiwiTreat Secondary treatment system utilising irigation system effluent disposal*

DRAINAGE CONTROLS:

Need for surface water collector / cut-off drains?

AVAILABILITY OR RESERVE / SETBACK AREAS

Reserve area available for extensions, % of design area: *100%*

Setback distance? (between development and disposal system): *Min. as required by Resource Management Act*

Ksat, (m/day): ESTIMATED SOIL CATEGORY: *Category 3.5 - Imperfectly drained clay loam*

RECOMMENDED D.I.R. *26* mm/week

(NOTE: Where DIR is 10mm/week or less, ETA/ETS trenches to Fig 4.5A7 NZS1547:2000 should be specified to enable the utilisation of such soils)

6 Permanent People At 140L/person/day: *840* L/day from Appendix 4.2D AS/NZS 1547:2000

DESIGN WEEKLY FLOW: *5880* L/week

Septic tank size (min): *4500* (Table 4.3A1)

AREA REQUIRED: *226.2* m²

LENGTH REQUIRED: *242.1* m . **(Refer Irrigation System Calculation sheet)**

RESERVE AREA REQUIRED: *100%* of specified drainage area

RECOMMENDATION :

A KiwiTreat Secondary treatment system with dripper line irrigation. Min 4500 litre capacity treatment and irrigation lines to be a minimum total length of 242m using 1.6 l/hr emitters Lines to be laid at 1.0m spacing to follow contours (when possible), at 100mm below ground level . Installation of the irrigation system to be in accordance with the product Installer Guide. Detailed design of the irrigation system is to be responsibility of the installer.

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ACENZ

File Ref: M06-1745

Irrigation System Calculation

Project Title: Mackersey
Location: St Omer, Kenepuru

Date: Tuesday, 16 January 2007
Operator:

Acceptable daily loading rate (mm/day)	3.7
Daily influent (l/day)	840
Emitter type	Raam 17
Emitter flow rate (l/h)	1.6
Emitter Spacing (m)	1
Dripline Spacing (m)	1
Distance from Treatment system to Irrigation Field (m)	5
Field Size (m^2)	227
Field length assuming square area	15
Number of lines	16
Total Dripline Length (m)	242
Total flow Rate Required (l/h)	387

Pump Duty

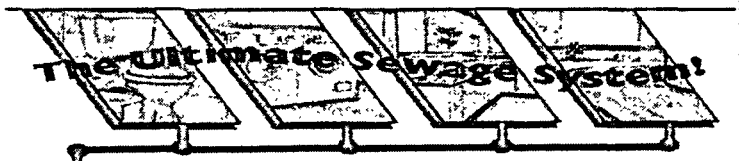
Flow (l/h)	387
Head (m)	18

Head-Loss Table		
Item	**Head loss (m)**	**Comments**
Emitter	5	Minimum pressure required
Lateral	0	Head loss insignificant
Submain	1	Using Netafim Raam 17 as a submain
Main	0.06	Using 25mm LDPE x main length
Water meter	0	For a 15mm Multijet Turbine Water Meter
Filter	3	For a Semi blocked filter
Tank Depth	2	
Elevation	5	up hill
Sub Total	16.06	
Total	18	including 10%

NOTE:
This design is indicative only and detailed design is the responsibility of the installer.

Appendix C

KiwiTreat Specifications



KiwiTreat

Eco System

For The Treatment
Of
Domestic Wastewater.

Producer Statement

Designed and Built in New Zealand
By

KiwiTreat Ltd

Horrelville.
RD 1.
Rangiora
Phone: 03 3125787
Fax: 03 3125780

Eco System

To provide a sewage treatment plant of the aerated activated sludge type suitable for up to eight equivalent persons, that produces treated wastewater of suitable quality to meet the requirements of the Regulatory Authorities.

The system is designed to:

1. Meet the requirements of AS/NZS 1547:2000 On-site domestic wastewater management.
2. Be user friendly.
3. Have extremely low maintenance and service requirements.
4. Be very reliable in operation and performance.
5. Meet the discharge quality requirements of AS/NZS 1546.3.2001 On-site domestic wastewater treatment units.
6. Be acceptable in areas of environmental and conservational interest.
7. Be very cost effective at the treatment and disposal of the resultant liquid.

This system is designed to give continuous peace of mind performance.

The wastewater volume generated by a household has been calculated using well-proven and documented guidelines.

Sewage flow: Average per day = 1600 litres.
Based on a minimum design flow of 200 litres/person/day, with a peaking factor of 200 litres per hour.

The strength of the wastewater from a house is calculated in terms of grams per day of BOD_5.
The design figure is 560 grams per day, and is derived from the industry accepted figure of 70 grams of BOD_5 per person per day.

The septic tank reduces the organic load by acting as a primary sedimentation tank and an anaerobic digester. The reduction allowance is 30% of organic strength. This results in a BOD_5 to be treated by the aerobic module of 392 grams per day.

The sewage treatment plant is an activated sludge type, incorporating a measured batch discharge, and with an in-plant surge capacity of 1700 litres.

The initial component of the plant is a septic tank that acts as a primary settling tank and solids digester.

A chamber where aerobic treatment occurs follows this. During the aeration phase, activated sludge is pumped back to the septic tank to enhance the treatment process.

The treated wastewater then passes through a clarifier to the pump station, where it is then pumped to the disposal area through a large sediment filter, when sufficient volume is available for discharge.

The primary treatment is achieved by the utilisation of a septic tank upstream of the aerobic module.
A Reln two-chamber 3200 litre septic tank is used, with a primary chamber working volume of 2160 litres, and a secondary chamber working volume of 840 litres.
The Reln tank carries the AS/NZ Standard 1546:1-1998 Lic. 1651, and is made by a Quality Endorsed Company (AS/NZS ISO9001:2000 QEC 5189)

Most of the insoluble waste remains within the primary chamber. The liquid fraction and small volume solids pass through to the secondary (anoxic) chamber, where significant quantities of nitrogen and nitrogenous compounds are removed from the system. This has the effect of maintaining the pH levels of the resultant liquid within an acceptable range for the aerobic bacteria working in the downstream processes.
The inclusion of a bio-filter at the discharge area of the primary tank helps to further improve the quality of the wastewater before the aeration stage, by further reducing the solids fraction. This filter also assists in moderating surge volumes.

The aeration module utilizes a second Reln 3200 litre tank, which allows the wastewater to come into contact with both suspended biomass and attached growth biomass. This contact and subsequent degradation of the fine particulate and soluble organic material occurs in the controlled introduction of air. The settled effluent in the aeration chamber is re-seeded with acclimatised stable biomass. This process provides all the advantages of a step treatment system.

The volume available for aeration in this tank is 2090 litres, with an additional volume of 810litres for clarifying the liquid before flowing to the pump station.

The aeration system has a design F/M ratio of 0.05 when taking the plate pack attached biomass into account. The above figures are well within the industry accepted guidelines.

A high surface area to volume plastic media is fitted to the aeration chamber.

This media provides a suitable growth surface for stable attached growth biomass.

The growth characteristics of this biomass promote good nitrification, some de-nitrification (with inherent stability) and good settling characteristics of the waste sludge.

The media pack has a total surface of 38m2, and a volume of 0.45m3.

The activated sludge tank is subject to **controlled** aeration for 24 hours each day.

This process promotes denitrification and hence stable biomass and suitable pH in the mixed liquor of the aeration tank.

More than 2.4 grams of oxygen per gram of BOD_5 is provided to the system through a venturi. This is the chosen method of aeration, for the following reasons:

1. It supplies large volumes of air in relation to the energy input.
2. It operates without creating a buildup of bacteria around the air discharge area.

3. It aerates to the full depth of the tank, and therefore treats the total volume of the liquid in the aeration chamber.

4. It has the ability to be shut down at specified times for further de-nitrification to take place, which helps promote stable biomass and suitable pH.

5. The venturi system does not require any maintenance or servicing.

The air for the venturi is sourced from outside the tank, so only fresh air is made available for the process.

A 810-litre clarifier chamber is part of the activated sludge system.
The purpose of this chamber is to assist in the removal of suspended solids before the treated liquid reaches the pump chamber for disposal.
The chamber also controls surging to ensure that the wastewater is properly treated before further downstream processing.

This 360 litre chamber has a working volume of over 170 litres. The treated liquid is pumped to the disposal area, through a sediment filter.

Disinfection, if required, is by chlorination, which takes place after the pump out chamber.
The chlorinator remains effective by means of chlorine tablets moving down a magazine system into the operating area as required.
There is no possibility of chlorine contamination of any of the previous treatment stages.

Disposal is through a non drain pressure compensated drip-line via a non-return valve.
The drip-line is protected by a high capacity filter.
The system includes 300 metres of pressure compensated, self-flushing non drain drip-line specifically manufactured for effluent disposal.
The site conditions and the environmental conditions of the area will govern

the size of the disposal area.
It is recognised that treatment quality and the disposal of the resultant liquid are of paramount importance to all concerned.

The system is monitored by audible and visual alarms.
The alarms monitor the following:

1. The aeration sequence.
2. The disposal sequence.
3. The correct operation of the disposal line.
4. The venturi system.

Treatment quality of the resultant liquid is recognised to be of paramount importance.
The system is designed to meet the following standards:

BOD5 – not greater than 20mg/litre
Suspended solids – not greater than 30mg/litre.
Faecal coliforms – not more than 30cfu/100 mls, when disinfected.
Free chlorine – not less than 0.5mg/litre, when chlorinated.

Servicing of the system is recommended to be at six monthly intervals

This system can be switched to a slower processing mode which is advantageous in holiday situations when the house is not being used.

Hydro P.C. N.D.

The Pioneer No-Drain Integral Dripline

An integral dripline with incorporated flow-regulated cylindrical no-drain drippers

Main features:

- The built-in no-drain device eliminates water draining from the dripline when water has been turned off
- This feature protects driplines from sucking in of small soil particles or other debris - thus making it **ideal for Subsurface Drip Irrigation systems (S.D.I.) and short pulse irrigation in greenhouses**
- Unique flow regulating concept: A wide effective labyrinth, leading into the flow control chamber, where a sensitive floating diaphragm regulates and maintains a constant flow rate at variable inlet pressure
- Constant flow rates along long run driplines or on undulating terrain
- High clogging resistance due to:
  - The drippers large intake filter being continuously flushed by the water flow
  - Large cross sectional labyrinth
  - Self-cleaning mechanism at the flow regulated water outlet chamber

Applications:

- Sub-surface drip systems

Materials:

- Tubing: Linear LDPE
- Dripper: PE
- Diaphragm: Silicon

Specifications:

- Flow rates: 1.35, 1.75, 2.35, 3.75 lph
- Operating pressure range: 0.8 - 3.5 bar
- Sealing pressure: 0.1 bar Opening pressure: 0.3 bar
- Dripline diameters: 16, 17, 20 mm
- Constant Inside Diameter (I.D.) regardless of dripline wall thickness
- I.D.: 13.8, 15.3, 17.6 mm
- Available in wall thickness of: 1.1, 1.15 mm (45 - 47 mil)
- Manufactured from superior durable plastics for long life
- Protected against UV degradation
- Resistant to chemicals and fertilizers commonly used in agriculture
- Complies with emission uniformity category class A (ISO 9261)

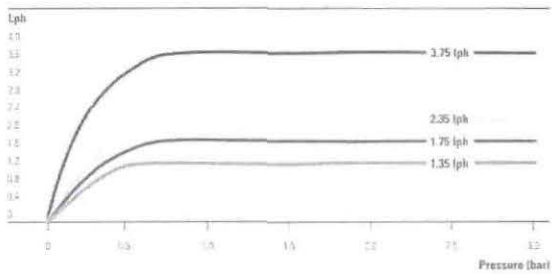
Hydro P.C. N.D.

Maximum Recommended Dripline Length (m) on Flat Terrain

Flow Rate (lph)	Emitter Spacing (m)	Pipe Diameter: I.D. 13.8 mm Dripline Inlet Pressure (bar) 1.0	2.0	3.0	Pipe Diameter: I.D. 15.3 mm Dripline Inlet Pressure (bar) 1.0	2.0	3.0	Pipe Diameter: I.D. 17.6 mm Dripline Inlet Pressure (bar) 1.0	2.0	3.0
1.35	0.2	61	93	112	76	116	139	84	147	180
	0.3	86	132	159	105	163	197	117	206	253
	0.4	106	168	202	133	206	248	147	259	318
	0.5	120	201	242	159	245	297	175	308	379
	0.6	149	232	281	181	283	341	208	354	436
	0.8	186	298	350	224	350	424	246	438	539
	1.0	219	347	414	264	412	499	289	514	634
1.75	0.2	43	76	92	54	94	122	71	124	152
	0.3	62	107	131	76	132	178	99	174	213
	0.4	78	139	167	95	167	226	124	219	283
	0.5	90	163	201	113	200	275	148	261	321
	0.6	107	188	232	130	229	322	168	299	388
	0.8	133	235	290	161	285	410	209	370	457
	1.0	157	278	342	188	336	494	245	435	537
2.35	0.2	36	62	76	41	76	94	54	101	124
	0.3	51	88	108	58	103	133	76	141	175
	0.4	64	112	138	72	139	169	95	176	220
	0.5	77	135	166	87	163	201	113	212	263
	0.6	88	156	191	99	187	232	129	244	302
	0.8	110	194	239	122	232	287	159	302	374
	1.0	130	230	283	144	279	339	187	365	440
3.75*	0.2	26	48	56	30	56	69	40	74	91
	0.3	37	65	80	43	79	98	56	104	129
	0.4	47	83	102	54	102	124	70	132	163
	0.5	57	100	122	64	120	145	84	157	194
	0.6	65	115	142	73	138	171	95	180	223
	0.8	82	144	177	90	171	215	119	223	277
	1.0	96	170	209	107	202	251	139	263	328

* Flow rate for I.D.17.6: 3.6 lph

Hydro P.C. N.D. - Performance Curves



The data in this leaflet is intended to provide general information only.
For design purposes, see PLASTRO EMITTERS manual "Hydraulic performance data for designers".

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Guideline for irrigation of treated effluent using Plastro Hydro P.C N.D drip-line

This design is based on the following parameters:

Accepted Daily Loading Rate = 5mm. (Set by local council or engineer).

Daily Load 1500 litres

Emitter Plastro Hydro 16/40 P.C N.D Integral Drip-line

Emitter Flow Rate 2.34 lph

Emitter Spacing 0.6 metres

Drip-line Spacing 1.0 metres

Distance from Treatment Plant to Disposal Field = 25 metres

Pump Station Depth 1.3 metres

Field Size 1500 litres/5.0mm per day = 300 m_2

Assume field size is 50 metres x 6 metres

Total Flow Rate Required = $\frac{\text{300 metres x 2.35 lph}}{\text{0.6 metre spacing}}$ = 1175 lph

Pump Duty is 1175 lph @ **X**m head, where **X** is the sum of the head losses based on the following table:

Head Loss Table

Item	Head Loss (m)	Comments
Emitter	8.2	Minimum pressure required
Drip-line	0.5	50 metres
Sub-main	3.4	2 x 4 metres drip-line
Main	2.7	50 metres drip-line
Filter	2.0	For a semi blocked filter
Pump Station Depth	1.3	
Elevation	0	No up or down slope
TOTAL	**18.1**	

Therefore total head loss for calculation is 18.1 x 10% = 20 metres

Hence, Pump Duty required is 1175 lph @ 20 metres.

The pump used is a Tesla Diver 75M with a rated duty of 1200 lph @ 33 metres

Servicing Schedule

KiwiTreat Secondary Treatment System

KiwiTreat Ltd specify that their systems should be serviced in accordance with the following regime:

An annual full service by the manufacturers approved service technician.
Regular servicing by the service technician, or the property owner.
The property owner must undertake specific training from KiwiTreat Ltd.
The owner will be required to submit certification, to the regulatory authority, and KiwiTreat Ltd, that the servicing has been carried out in accordance with the service schedule, specified below.

Servicing Chart

Function	Month 3	Month 6	Month 9	Month 12
Check anaerobic chamber		Service Technician		Service Technician
Clean bio-filter		Service Technician		Service Technician
Check aeration tank		Service Technician		Service Technician
Operation of aeration pump	Owner	Service Technician	Owner	Service Technician
Check pump station		Service Technician		Service Technician
Operation of disposal pump		Service Technician		Service Technician
Clean sediment filter	Owner	Service Technician	Owner	Service Technician
Check drip-line pressure	Owner	Service Technician	Owner	Service Technician
Check disposal area	Owner	Service Technician	Owner	Service Technician
Check high level alarm	Owner	Service Technician	Owner	Service Technician
Chlorinator tablets	Owner	Service Technician	Owner	Service Technician

Note:
The desludging of the anaerobic chamber is the responsibility of the owner and should be carried out every three years.
Chlorinator tablets required only if chlorinator is fitted.

KiwiTreat Eco System
For Treatment of Domestic Wastewater

Pre-installation Considerations.

Siting of tanks

The siting of tanks is subject to regulatory authority approval and may require the submission of a certified engineering design to allow construction close to buildings and in trafficable areas.

General
In general, tanks should be installed clear of any buildings so as not to affect any structural elements of buildings.

As a guide tanks should be installed sufficiently clear of buildings to provide an angle of repose of at least 45 degrees between the bottom of the footing and the base of the tank.

Soil
Tanks should be installed in stable soil conditions. Where there is doubt the installer should give full details and specifications on how it is intended to provide a sound foundation for the tank.

Surface water
Surface waters must be diverted from the tank installation. Special measures need to be taken in cases of high ground water or flood prone areas.

Location on site
The siting of tanks and disposal area is subject to approval by the regulatory authority. In any case, there shall be compliance with building clearances and block/section boundaries as provided for in the by-laws and Regulations.

Drainage
The drainage system shall comply with AS/NZS 3500.2 or the NZ Building Code. All drainage levels should be considered to ensure appropriate gradients leading into the septic tank.

Desludging
The system should be sited with due consideration for future desludging operations. Where access for desludging by a vehicle is not available the application for approval of the installation must state the manner in which it is intended to desludge the tank at the necessary intervals without creating a health nuisance.

KiwiTreat Eco System
For Treatment of Domestic Wastewater

Installation Instructions

Excavation

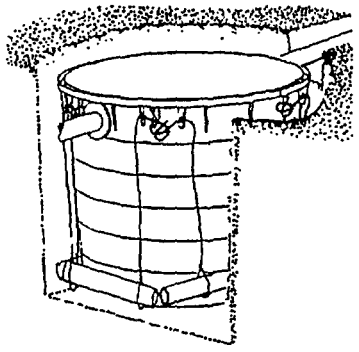
1. Excavate the site for installing the tanks and pump station in ground as per building code and local authority requirements. Ensure adequate fall to septic tank inlet. Additionally, tanks are to be sited:
   - Away from building foundations
   - Away from traffic areas, both vehicular and pedestrian
   - Away from or fenced off from animals tock pastures and areas
2. Refer to tank dimensions for correct levels.
3. Do not bury tank lid. Manhole Cover and Inspection Covers must be finished above normal ground level to allow for ongoing tank inspection and maintenance.
4. In excavation prepare a level 50mm bed of compacted sand or soft fill free of large and/or sharp objects.
5. Carefully lower the tanks into excavation - do not drop.
6. Align the inlets and outlets of each tank.
7. Ensure the tank bases are level.

Pipe Connection

1. Glue the 100mm PVC sewer pipe supplied into the outlet T-junction of the septic tank. Repeat the process at the inlet T-junction of the aeration tank.
2. Connect the septic tank and aeration tank with 100mm coupler supplied.
3. Connect the aeration tank and the pump station using the 25mm male fittings and the 25mm pipe supplied.
4. Connect the sludge return 13mm pipe supplied, between the aeration and septic tanks, via the 15mm tank connectors.
5. The 25mm and 13mm pipe can be located within the pump station.

Pumps

1. Attach the aeration pump (DAB Nova 300) to the riser pipe supplied, and connect the other end of the riser pipe to the venturi pipe system with the mac union attached. Pass the pump cable through the cable gland on the tank lid, and tighten the gland. Fit the small filter supplied to the 15mm threaded tank fitting on the tank lid.
2. Attach the discharge pump (Tesla Diver 75M) to the riser pipe supplied, and connect the other end of the riser pipe to the outlet of the pump station with the mac union attached. Pass the pump cable through the cable gland on the tank wall, and tighten the gland.



Tank Anchoring

1. Tie anchoring ropes to the pre-drilled lugs in the rim of each large tank. Leave the looped end to hang free.
2. Place four durable anchoring beams (not included) through the looped ends of the ropes. The ropes should be tensioned before backfilling.
3. Anchor beams can be made from 100mm PVC sewer pipe and should be 2 metres long and positioned to exceed the tank's extremities.

Bio-filter

Install into the outlet T-junction of the septic tank.

Sediment filter and drip-line.

Install as per separate instructions.

Completion

1. After filling the tanks with water, backfill with clean filling and compact thoroughly. Important – no large or sharp objects in the backfill material.
2. Ensure that any possible surface water run-off is directed away from the pipe trenches and the tanks installation.
3. Fasten all manholes and inspection covers.

Electrics

Install as per separate instructions.

KiwiTreat Wastewater Treatment System

Electrical Requirements.

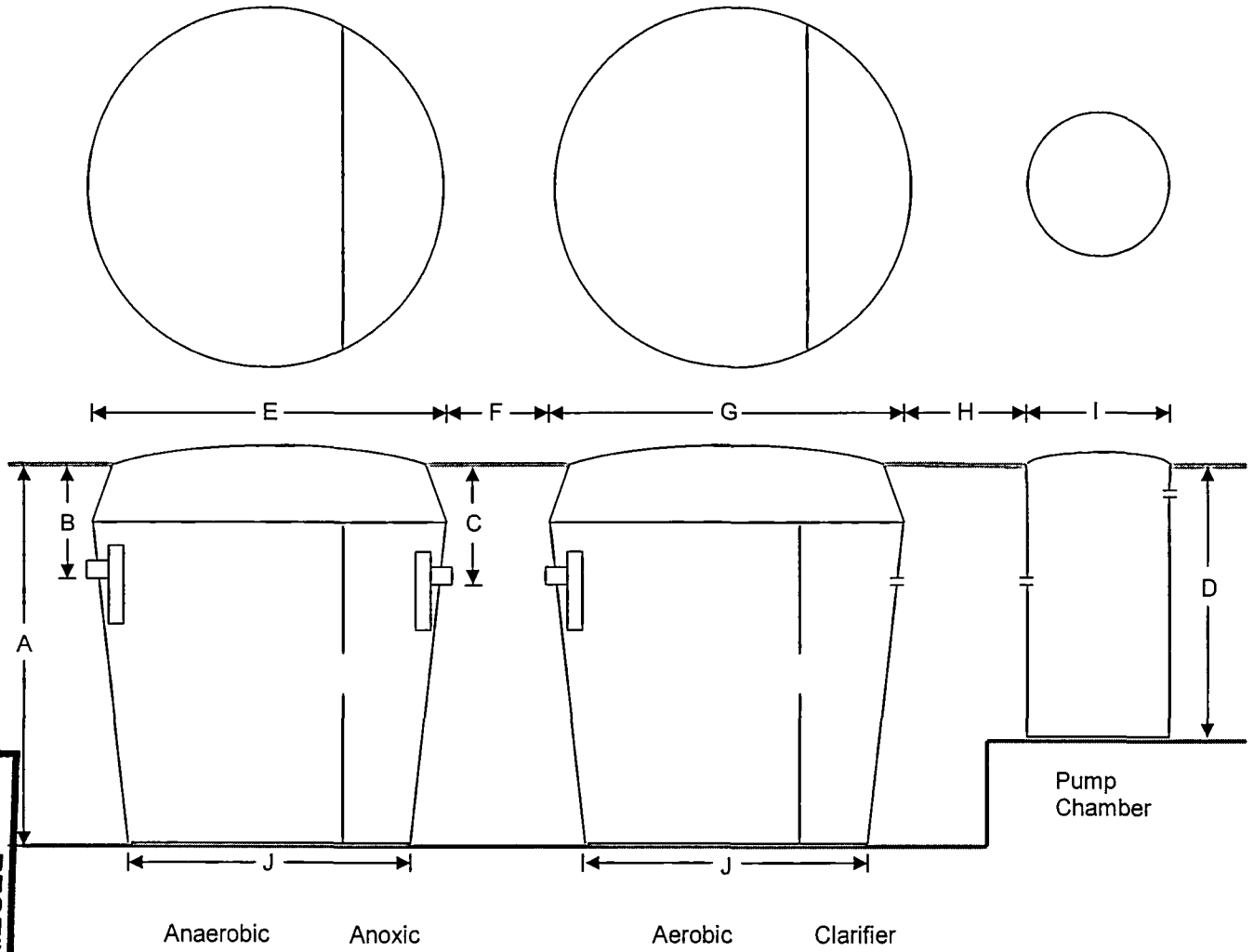
This system has three separate and distinct functions controlled electrically.

1. **Aeration pump.**
Installed in the aeration tank, this pump is a DAB Nova 300A (0.22kW) with an attached float switch controller. The cable from this pump is to be connected to the timer supplied. The timer is to be set to activate the pump for 15 minutes every hour.

2. **Discharge pump.**
Installed in the pump station, this pump is a Tesla Diver 75M (0.55 kW) with a float controller. The pump is supplied with an external control box which houses the capacitor. The wiring diagram is located inside the lid of the control box.

3. **High level alarm.**
The float for this is installed in the pump station. This float is to be connected to the control box supplied. The system is to alarm at high water level.

Installation Using Reln Tanks
Layout And Dimensions



Nominal Dimensions (mm)		
A	Base to ground level	1900
B	Inlet invert	480
C	Outlet invert	530
D	Pump chamber base to ground level	1300
E	Septic tank diameter	2000
F	Spacing not less than	500
G	Aeration tank diameter	2000
H	Spacing not less than	500
I	Pump chamber diameter	600
J	Tank base diameter	1600
	Overall height of Reln tank	2038
	Weight of septic tank	139
	Weight of aeration tank	161
	Weight of pump chamber	20

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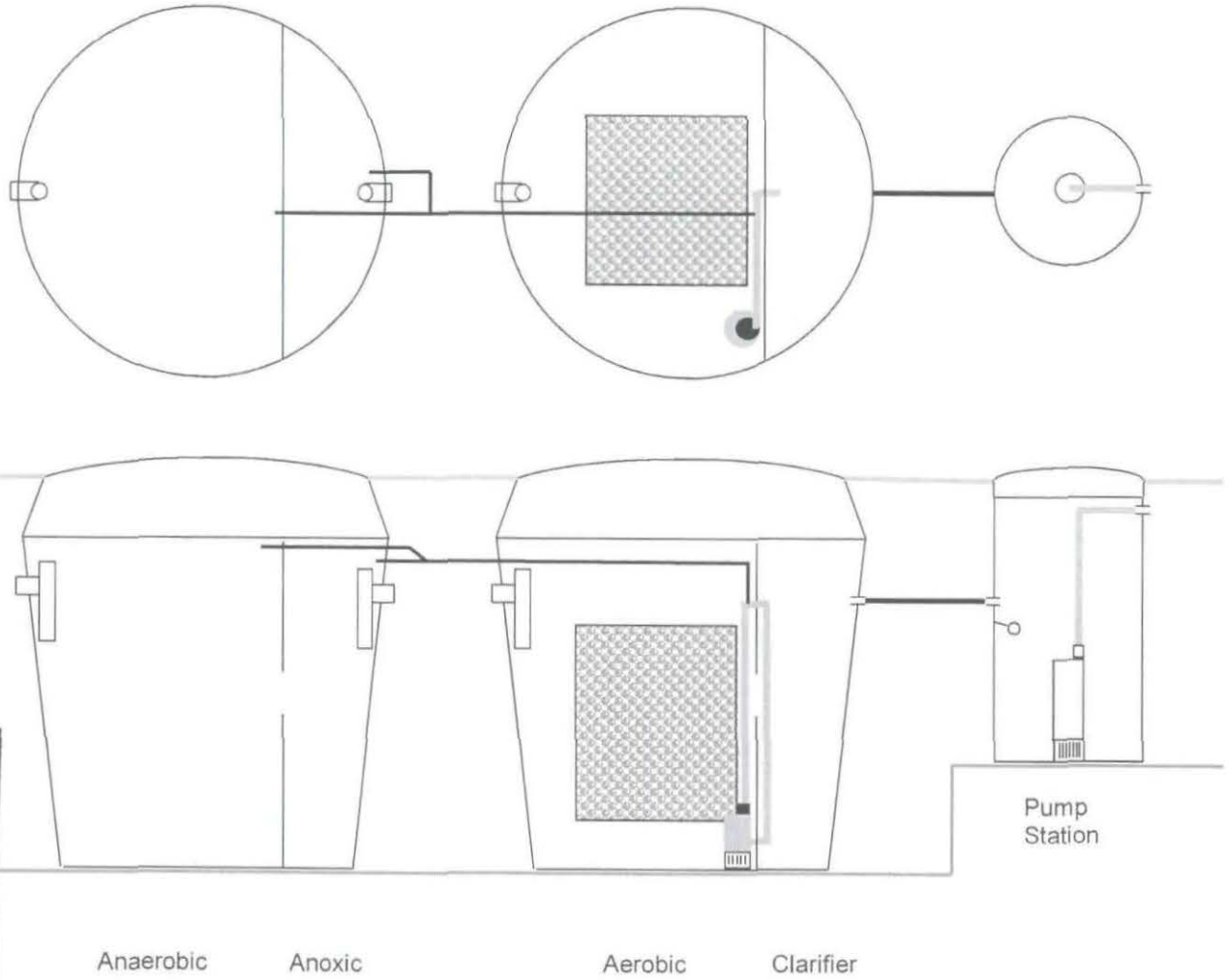
Internal Layout (Diagrammatic)



Legend

Media Pack
Surface area 36m2
Volume 0.45m3

Activated sludge return

Bio-filter

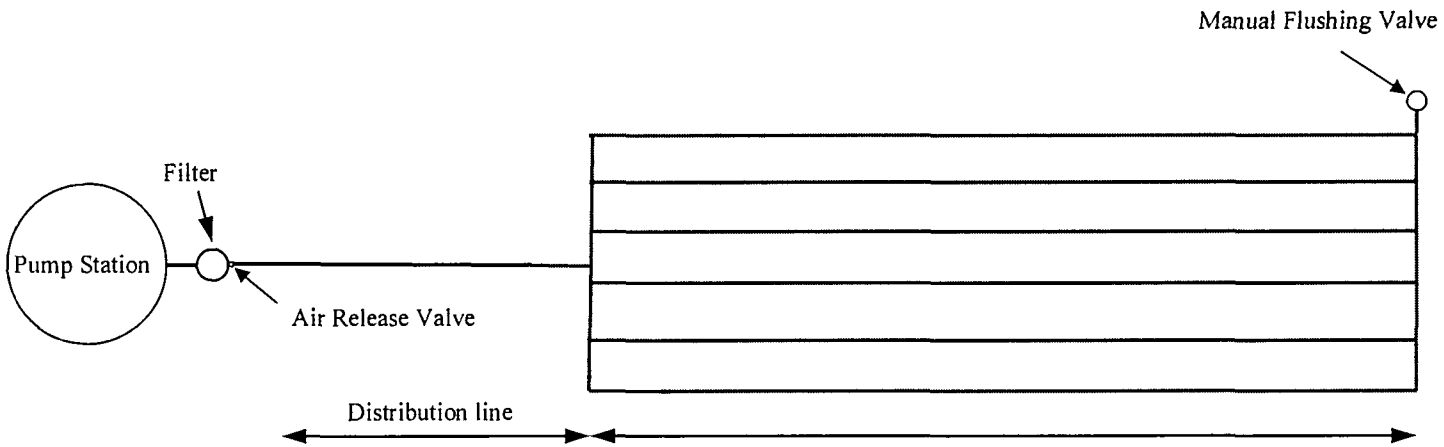
High level alarm float

Working volumes (litres)

Anaerobic chamber	2160
Anoxic chamber	840
Aerobic chamber	2090
Clarifier	810
Pump chamber	170
Total working capacity	6070
Total holding capacity	8500

KiwiTreat Eco System

Preferred layout of disposal line

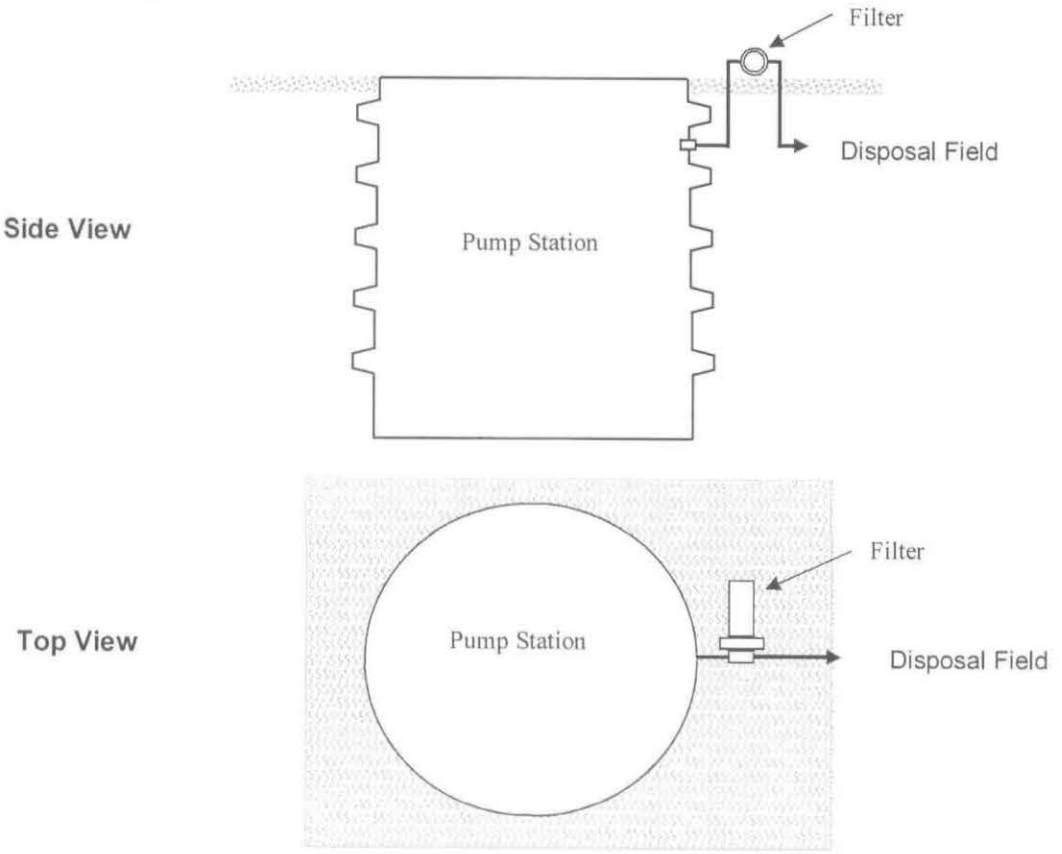


The disposal field must not be located at a level higher than one metre the top of the aeration tank, unless agreed by KiwiTreat Ltd

——— Pressure compensated effluent dripline (300 metres supplied)
——— 20mm low density Polythene pipe (25 metres supplied)

Drip-line is to be buried 100 to 150mm under the surface and in an area free of any material that may damage or limit the effectiveness of the drip-line.

Filter Arrangement



Manual Flushing Valve (MRV)

The MRV is used to remove sediment buildup within the drip-line by means of a cleansing action by momentarily increasing the velocity of the liquid.

The MRV should be flushed at every inspection be the Service Technician.

The MRV should remain open for 30 to 60 seconds, or as long as it takes to remove the sediment from the drip-line.

The MRV is to be installed in the area of lowest elevation in the drip-line.

The MRV is housed in a toby box.

Air Release Valve (ARV)

The ARV ensures that the vacuum that may occur after the pumping cycle does not allow:

1. Debris to be drawn into the drip-line
2. Collapse of the drip-line

The ARV is positioned immediately after the sediment filter, and is housed in a toby box.

Sediment Filter

The filter is installed to capture and retain debris that could reduce the efficiency of the emitters.

The filter used in this system is a 32mm Arag with a 100 mesh (108 micron) stainless mesh.

The sediment filter is installed immediately after the pump station and is housed in a toby box.

Standard Disposal Field Layout

KiwiTreat recommend that the drip-line be installed subsurface. This minimizes the risk of any contact with the treated wastewater by stock, pets, and children.

It is recommended that the system be installed using the grid system as shown. This evens out flow, reduces friction loss, and ensures against failure by reducing the effect of constriction by, for example, buried stones.

Changes to the recommended grid system may be approved by KiwiTreat Ltd.

The drip-line must be secured on the appropriate fittings using the clips supplied.