

Engineering Report



**New Dwelling
Proposed On-site Wastewater Management System**

**Lot 4 DP8632
Oyster Bay, Port Underwood**

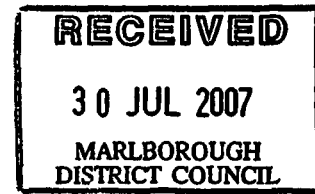
for

D & R Levien Holdings Ltd

**Jan Dimmendaal
Chartered Engineer
Smart Alliances Ltd
27 June 2007**

Project 0551

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30 JUL 2007

MARLBOROUGH
DISTRICT COUNCIL**1. Introduction**

- 1.1 D & R Levien Holdings Ltd is proposing to construct a new 3 bedroom holiday home on their property. The subject property is located down a right of way that branches off Port Underwood Road, at the head of Oyster Bay.
- 1.2 There is an implement shed on the property, which has been converted to a dwelling. At the time that the shed was converted to a dwelling a septic tank and conventional trench effluent land application was also installed. The system provides a total trench length of approximately 39m with the trench width being unknown.
- 1.3 It is understood that the ablution facilities in the shed will be removed on completion of the new dwelling.
- 1.4 The property is situated on the lower slopes of a north east trending ridge. Benches have been created on the lower half of the property bounding onto the right of way. The existing shed and proposed dwelling site are located on the upper terrace with the lower terrace immediately above the right of way being occupied by the existing wastewater land application trenches. There is a small copse of trees on the west end of the lower terrace.
- 1.5 The property legal description is Lot 4 DP 8632. The land area is 4000m².

2. Design - Wastewater Treatment and Disposal

- 2.1 The site investigation identified the most suitable land application area as being on the terrace currently occupied by the existing trenches. (refer Site Plan Appendix A).
- 2.2 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	
0.10	A gradual	Topsoil	Dark brown	Silty Loam	None	Very Loose	V.Soft	Strong	Moist	3
0.65	B gradual	Spoil	Pale brown mottled orange grey	Clay loam	None	Med. Dense	Stiff	Moderate	Moist	4

W 2

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.05	A gradual	Topsoil	Dark brown	Silty Loam	None	Very Loose	V.Soft	Strong	Dry	3
0.60	B gradual	Spoil	Pale brown mottled orange grey	Clay loam	None	Med. Dense	Stiff	Moderate	Dry	4

W 3

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% +2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.05	A gradual	Topsoil	Dark brown	Silty Loam	None	Very Loose	V.Soft	Strong	Just dry	3
0.65	B gradual	Spoil	Pale brown mottled orange grey	Clay loam	None	Med. Dense	Stiff	Moderate	Just dry	4

- 2.3 An overall soil category of 4 has been adopted.
- 2.4 The assessed land application area has good exposure to sunlight and wind.
- 2.5 There are no watercourses within 30m of the proposed land application area.
- 2.6 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 dose pumped effluent trench wastewater disposal is the most practical option for this property when the available land area and soil drainage characteristics is taken into account. The option of secondary treatment and irrigation was rejected as there is not sufficient land area available.
- 2.7 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 Secondary** treatment system coupled with a dose pumped trench land application system. System performance details are:
- BOD after 5 days (average) < 20 g/m³
Suspended solids (average) < 30 g/m³
- A KiwiTreat system specification is attached (Appendix C).
- The design loading rate for Secondary Treatment and Category 4 soil is 30mm/day.
- 2.8 Prior to the installation of the new dose pumped trenches the existing trenches and associated pipe work will have to be removed. These trenches are not suitable for use with the new system.
- 2.9 The length of 600mm wide dose pumped trench required is 48m (refer wastewater design sheets Appendix C). The trenches proposed are as per Figure 4.5A1, AS/NZS 1547:2000 with a total depth of 400mm. Four trenches of 12m length installed at 1.6m centres are recommended. A typical trench detail is provided in Appendix C.
- 2.10 The wastewater flow design allowance of 145 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 stream/reticulated supply water source for the dwelling and the use of standard water reduction fixtures as specified in AS/NZS 1547:2000, Appendix 4.2D, note 2 (dual flush 11/5.5 litre water closets, shower-flow restrictors, aerator faucets and water conserving automatic washing machines). The design has been based on a 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.

- 2.11 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.
- 2.12 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 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.
- 2.13 Access from the foreshore to the system for maintenance will be available via the house access.

3. Recommendation

A KiwiTreat Secondary Treatment System combined with dose pumped effluent trench land application is recommended for this site. Installation is to be in accordance with requirements and recommendations of NZS1547:2000.

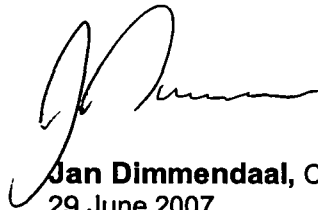
4. Limitations

This report is valid for two years from the date of issue and covers the design of a wastewater treatment and effluent land application system for D & R Levien Holdings Ltd at Oyster Bay, Port Underwood. Any other areas are outside the scope of this report.

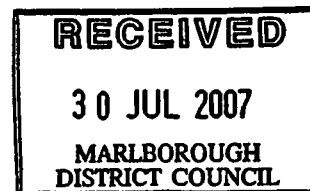
The reliance by other parties on the information or opinions in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

5. References

1. NZS 1547:2000 On-site Domestic Wastewater Management
2. Marlborough District Council Guidelines for new on-site wastewater management systems.

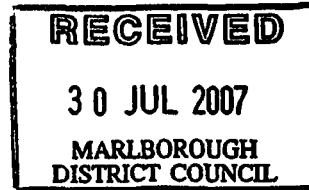


Jan Dimmendaal, Chartered Engineer
29 June 2007



Appendix A

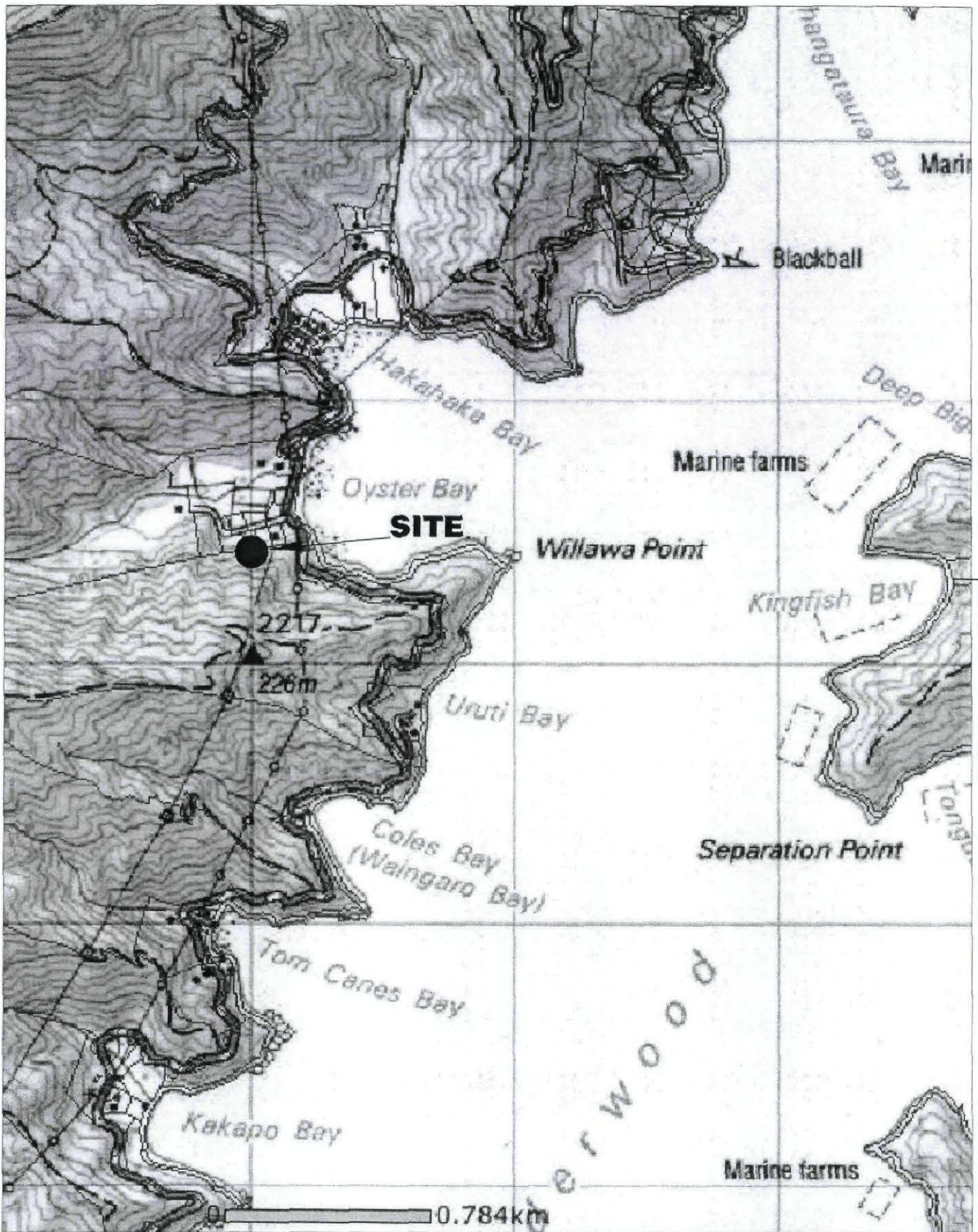
Location and Site Plan



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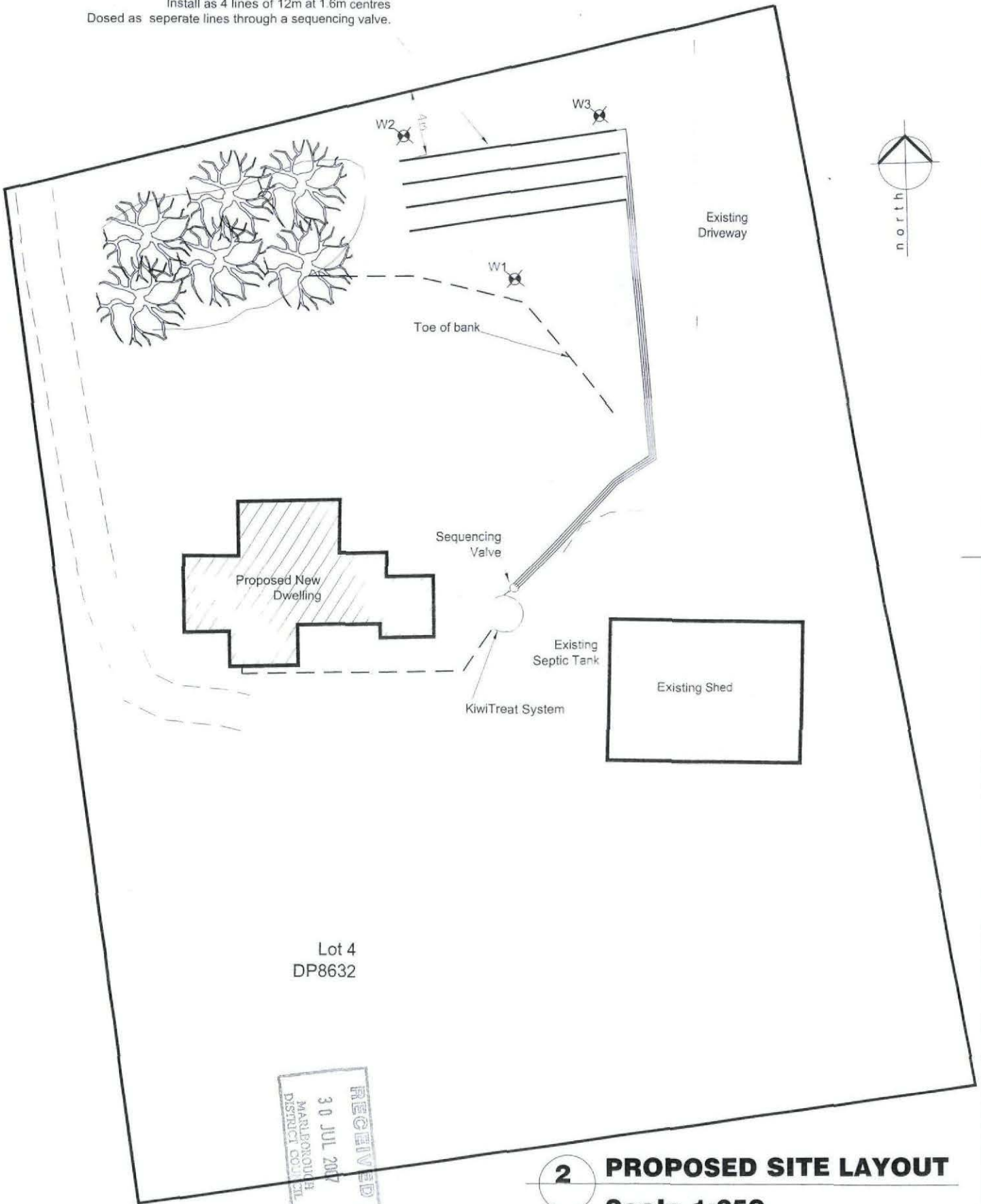
30 JUL 2007

MARLBOROUGH
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REVISIONS

Dose pumped effluent trenches. Total minimum length 48m.
 Install as 4 lines of 12m at 1.6m centres
 Dosed as separate lines through a sequencing valve.

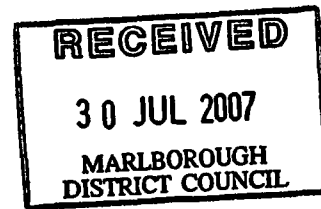


2 PROPOSED SITE LAYOUT
Scale 1:250

REVISIONS

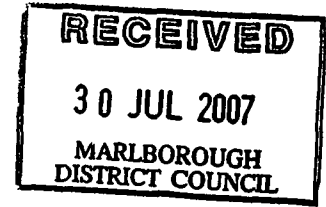
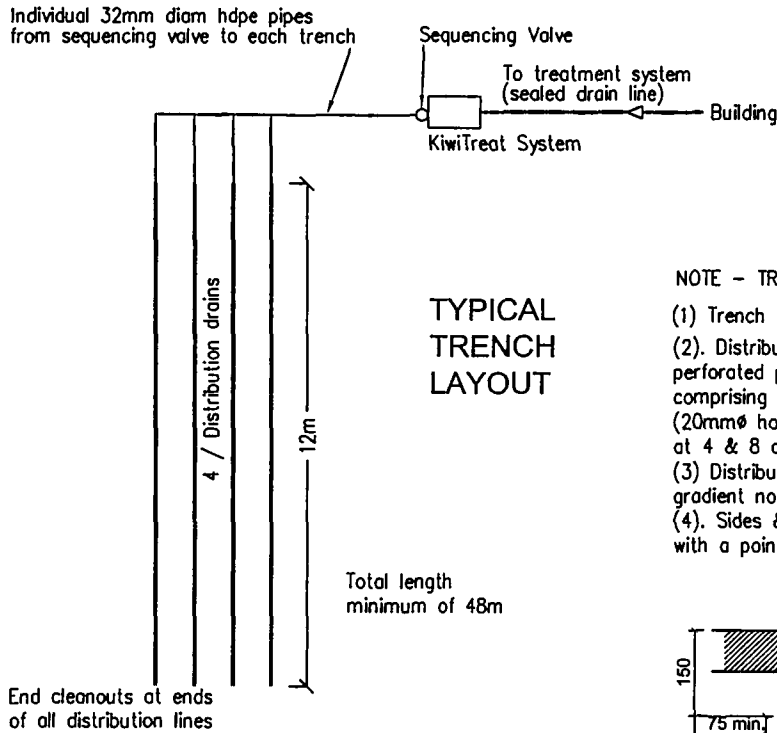
Appendix B

Wastewater Design Sheet and
Typical Trench Detail



SOIL PERMEABILITY ASSESSMENT / EFFLUENT DESIGN SHEET
 To AS/NZS 1547:2000

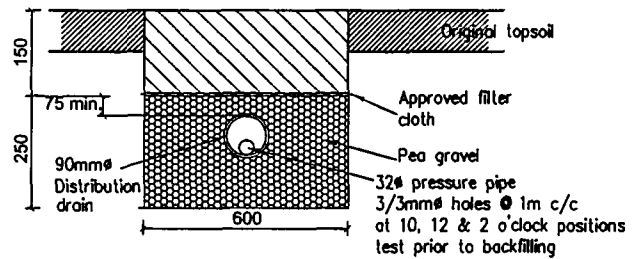
Site Evaluation: Oyster Bay, Port Underwood		Job No: 0551
Intended water Supply:		
<i>Public Supply Rain-water (roof-collection) Bore/Well/Dam</i>		
Local experience with existing on-site systems:		
Septic Tank or similar (Primary treatment):	Secondary treatment:	
<i>OK when installed properly with a correctly sized drainage area and maintained.</i>	<i>Work very well in domestic situation producing a relatively high quality effluent.</i>	
Recommendation for this site: <i>KiwiTreat Secondary Treatment System with dose pumped effluent disposal trenches</i>		
DRAINAGE CONTROLS:		
Need for surface water collector / cut-off drains?		
AVAILABILITY OR RESERVE / SETBACK AREAS		
Reserve area available for extensions, % of design area:		
Setback distance? (between development and disposal system):	<i>Min. as required by Resource Management Act</i>	
Ksat, (m/day):	ESTIMATED SOIL CATEGORY: <i>Category 4 - Imperfectly drained clay loam</i>	
Design		
RECOMMENDED D.L.R.	<i>30</i>	mm/day
(NOTE: Where DIR is 10mm/week or less, ETA/VETS trenches to Flg 4.5A7 NZS1547:2000 should be specified to enable the utilisation of such soils)		
6 Permanent People At 145L/person/day:	<i>870</i> L/day from Appendix 4.2D AS/NZS 1547:2000	
DESIGN DAILY FLOW:	<i>870</i>	L/day Stanard Water Reduction fixtures used in new dwelling
Septic tank size (min):	<i>4,000</i>	(Table 4.3A1)
AREA REQUIRED:	<i>29.0</i>	m ²
LENGTH REQUIRED:	<i>48.3</i>	m with 600 wide trench
RESERVE AREA REQUIRED:	of specified drainage area	
RECOMMENDATION :		
<i>KiwiTreat Secondary Treatment System and 600mm wide dose pumped effluent disposal trenches to be a minimum total length of 48m (Lines to be laid at 1.6m centres, Pump sized by manufacturer). Trenches to be installed as 4 trenches of 12m alternatively dosed through a sequencing valve.</i>		



TYPICAL TRENCH LAYOUT

NOTE - TRENCHES

- (1) Trench spacing 2m. minimum between edges
- (2) Distribution drains to be U-PVC 90mm \emptyset perforated pipe with perforations comprising at least 2% of surface area. (20mm \emptyset holes at 100mm centres at 4 & 8 o'clock positions).
- (3) Distribution pipes to be laid flat or at a gradient not greater than 1 in 200.
- (4) Sides & base of trench to be carefully scratched with a pointed tool before laying filter media.



SYSTEM USE & MAINTENANCE

1. The household sewage should not contain anything other than human waste and toilet paper, and food material such as may go down a kitchen sink drain. Garbage grinders are not recommended, although they need not be forbidden. More frequent de-sludging of the system may be needed if a garbage grinder is used.

Normal use in the house of soaps, detergents, bleaches, plumbing fixture cleaners, drain cleaners and disinfectants will not harm the functioning of the system or the soil absorption system.

2. Prohibited discharge to the system

- * Oil/grease from a deep frier (for example).
- * Stormwater or any drainage other than sewerage generated in the house.
- * Petrol, oil or other flammable/explosive substances
- * Garden, garage, and workshop chemicals (e.g. pesticides, paint cleaners, photographic chemicals, motor oil or trade waste).
- * Disposable nappies & sanitary napkins.

3. It is an MDC requirement that any wastewater treatment system be regularly serviced and maintained by a contractor experienced in this field.

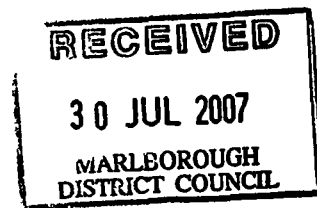
TYPICAL TRENCH CONSTRUCTION



PROJECT	D & R Levien Holdings Ltd,		
PROJECT No.	0551		
TITLE	DRAINAGE FIELD SPECIFICATION		DRAWING No.
DRAWN	JD	CHECKED	SCALE
COMPUTER FILE:			NTS
			DATE 06/07
			REVISION

Appendix C

KiwiTreat System Specification





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

KiwiTreat.

Eco System

**For Treatment of
Domestic Wastewater**

Producer Statement.

Purpose and Scope.

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.

Wastewater Characteristics.

Hydraulic Load.

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.

Organic Load.

The strength of the wastewater from a house is calculated in terms of grams per day of BODs.

The design figure is 560 grams per day, and is derived from the industry accepted figure of 70 grams of BODs per person per day.

KiwiTreat.

Eco System

For Treatment of Domestic Wastewater

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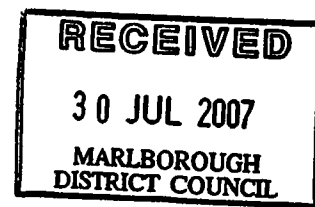
Sewage flow: Average per day = 1600 litres.

Based on a minimum design flow of 200 litres/person/day, with a peaking factor of 200 litres per hour.

Organic Load.

The strength of the wastewater from a house is calculated in terms of grams per day of BOD₅.

The design figure is 560 grams per day, and is derived from the industry accepted figure of 70 grams of BOD₅ 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 BOD₅ to be treated by the aerobic module of 392 grams per day.

Process Description.

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.

Septic Tank.

The primary treatment is achieved by the utilisation of a septic tank upstream of the aerobic module.

A ReIn 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 ReIn 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.

Aeration Module.

The aeration module utilizes a second ReIn 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.

Plate Pack Media.

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.

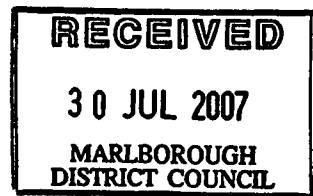
Aeration.

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 BOD₅ 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.

Clarifier.

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.

Pump Station.

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.

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.

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.

System Monitoring.

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.**

Discharge Quality.

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.

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

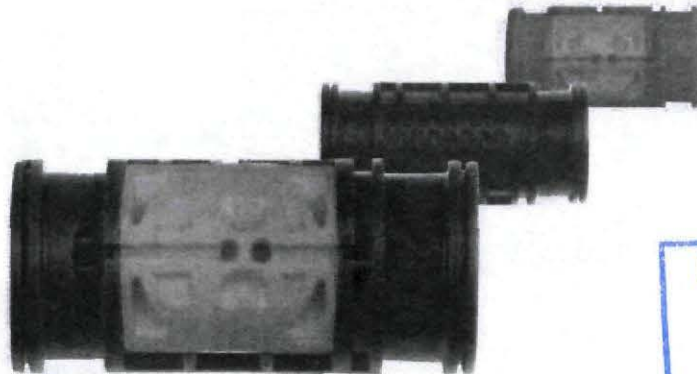
Home Away

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.

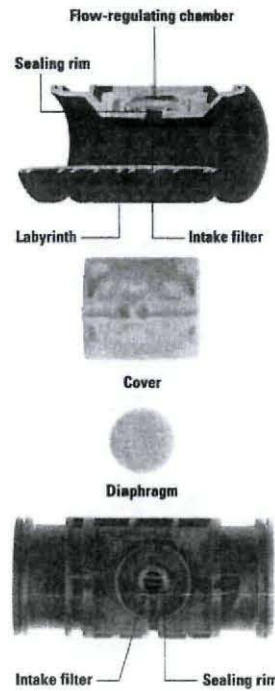
INTEGRAL DRIPLINES



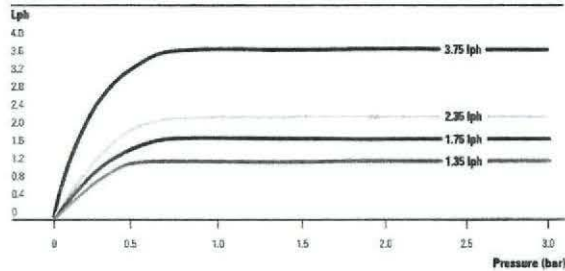
Maximum Recommended Dripline Length (m) on Flat Terrain

Flow Rate (lph)	Emitter Spacing (m)	Pipe Diameter: LD. 13.8 mm			Pipe Diameter: LD. 15.3 mm			Pipe Diameter: LD. 17.6 mm		
		Dripline Inlet Pressure (bar)								
		1.0	2.0	3.0	1.0	2.0	3.0	1.0	2.0	3.0
1.35	0.2	61	93	112	75	116	129	84	147	180
	0.3	86	132	159	105	163	187	117	206	263
	0.4	108	168	202	133	206	248	147	259	318
	0.5	130	201	243	158	246	297	175	308	379
	0.6	149	232	281	181	283	341	200	354	436
	0.8	188	290	350	224	350	424	246	438	539
1.0	219	342	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	176	98	174	213
	0.4	78	136	167	95	167	226	124	219	269
	0.5	93	163	201	113	200	275	148	261	321
	0.6	107	188	232	130	229	322	169	299	366
	0.8	133	235	290	161	285	410	209	370	457
1.0	157	278	342	189	335	494	245	435	537	
2.35	0.2	36	62	76	41	79	94	54	101	124
	0.3	51	89	108	56	108	133	76	141	175
	0.4	64	112	138	72	136	166	96	178	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	297	159	302	374
1.0	130	230	283	144	273	339	187	355	440	
3.75*	0.2	26	46	56	30	56	69	40	74	91
	0.3	37	65	80	43	79	98	56	104	129
	0.4	47	83	102	54	100	124	70	132	163
	0.5	57	100	122	64	120	149	84	157	194
	0.6	65	115	142	73	138	171	95	180	223
	0.8	82	144	177	90	171	213	118	223	277
1.0	96	170	209	107	202	251	139	263	326	

* 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".

PLASTRO INTERNATIONAL LTD.

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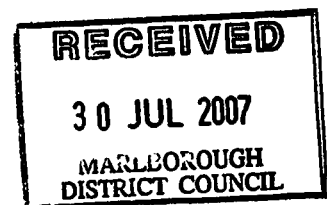
Guideline for irrigation of treated effluent using Plastro Hydro P.C N.D drip-line

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 m²
 Assume field size is 50 metres x 6 metres

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



Pump Duty is 1175 lph @ Xm 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

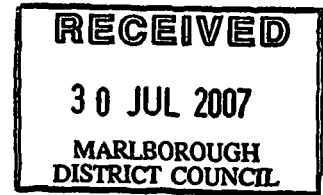
Function	Month 3	Month 6	Month 9	Month 12
Check anaerobic chamber		Service Technician		Service Technician
Clean bio-filter		Service Technician		Service Technician
Check aeration tank		Service Technician		Service Technician
Operation of aeration pump	Owner	Service Technician	Owner	Service Technician
Check 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

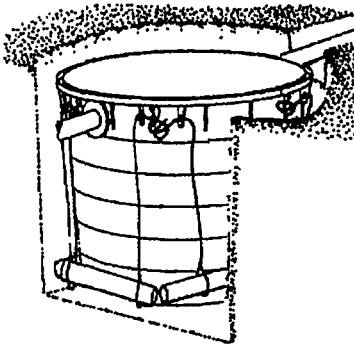
1. Excavate the site for installing the tanks and pump station in ground as per building code and local authority requirements. Ensure adequate fall to septic tank inlet. Additionally, tanks are to be sited:
 - Away from building foundations
 - Away from traffic areas, both vehicular and pedestrian
 - 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.

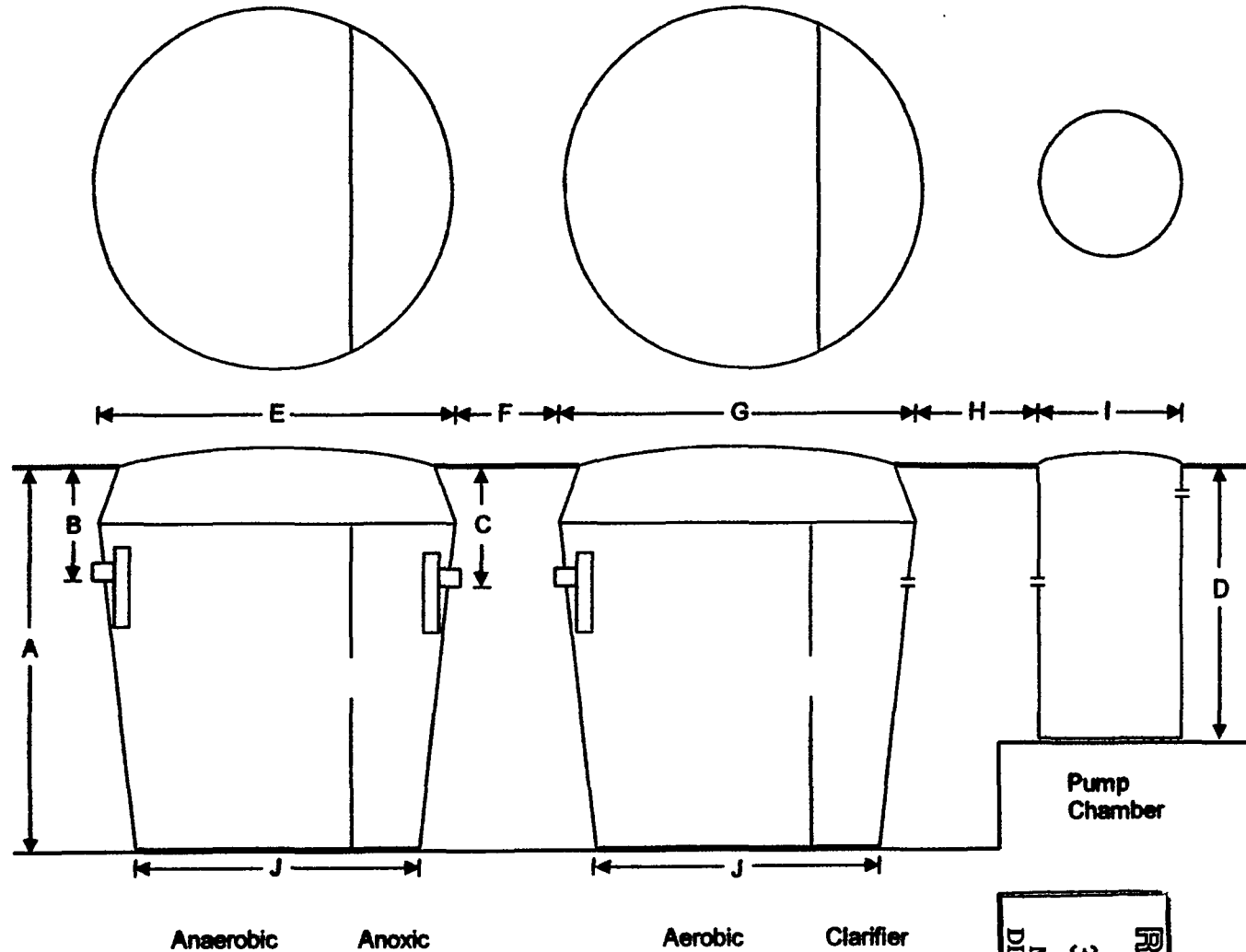
2. Discharge pump.

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 Rein Tanks
Layout And Dimensions**

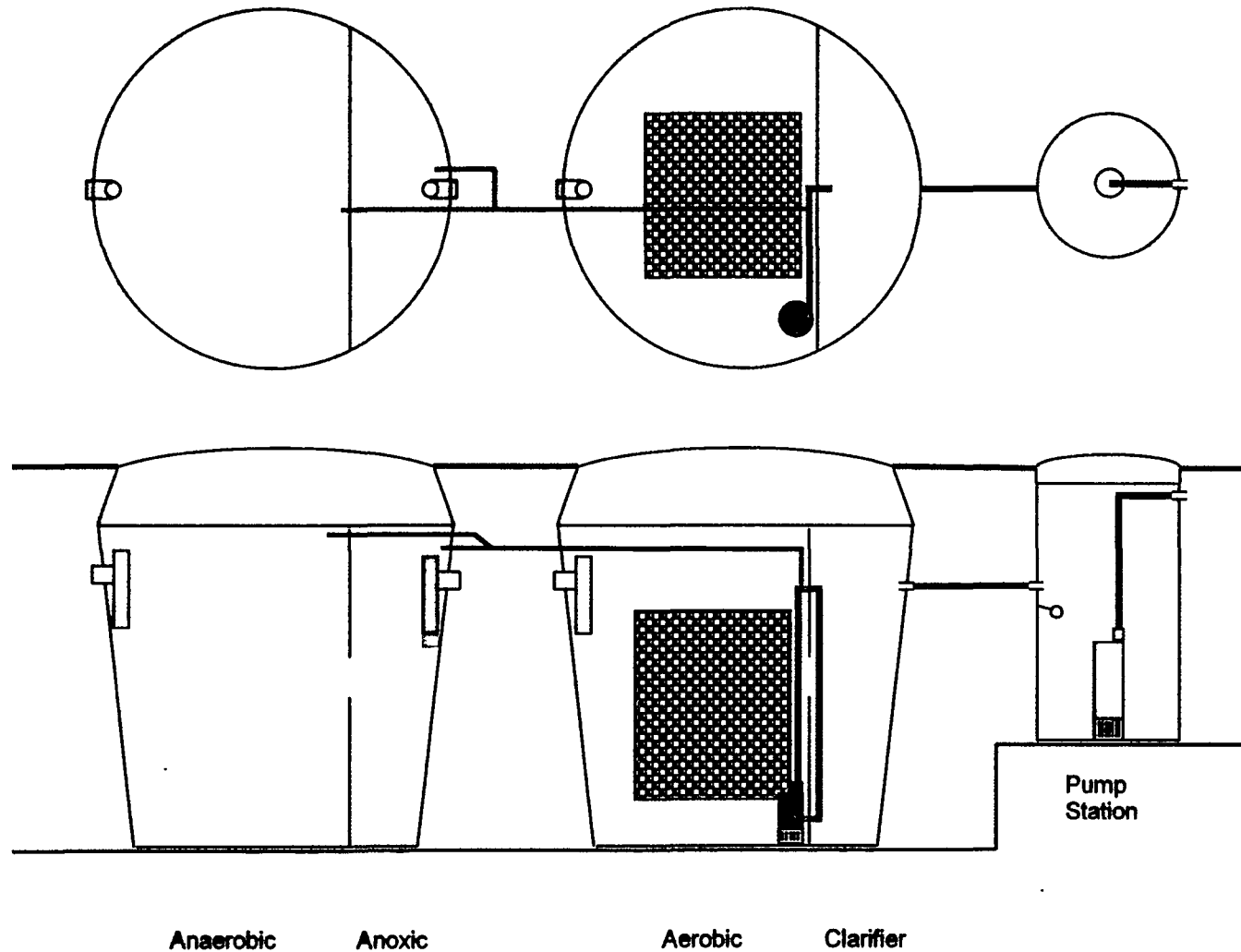


Nominal Dimensions (mm)		
A	Base to ground level	1900
B	Inlet invert	480
C	Outlet invert	530
D	Pump chamber base to ground level	1300
E	Septic tank diameter	2000
F	Spacing not less than	500
G	Aeration tank diameter	2000
H	Spacing not less than	500
I	Pump chamber diameter	600
J	Tank base diameter	1600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

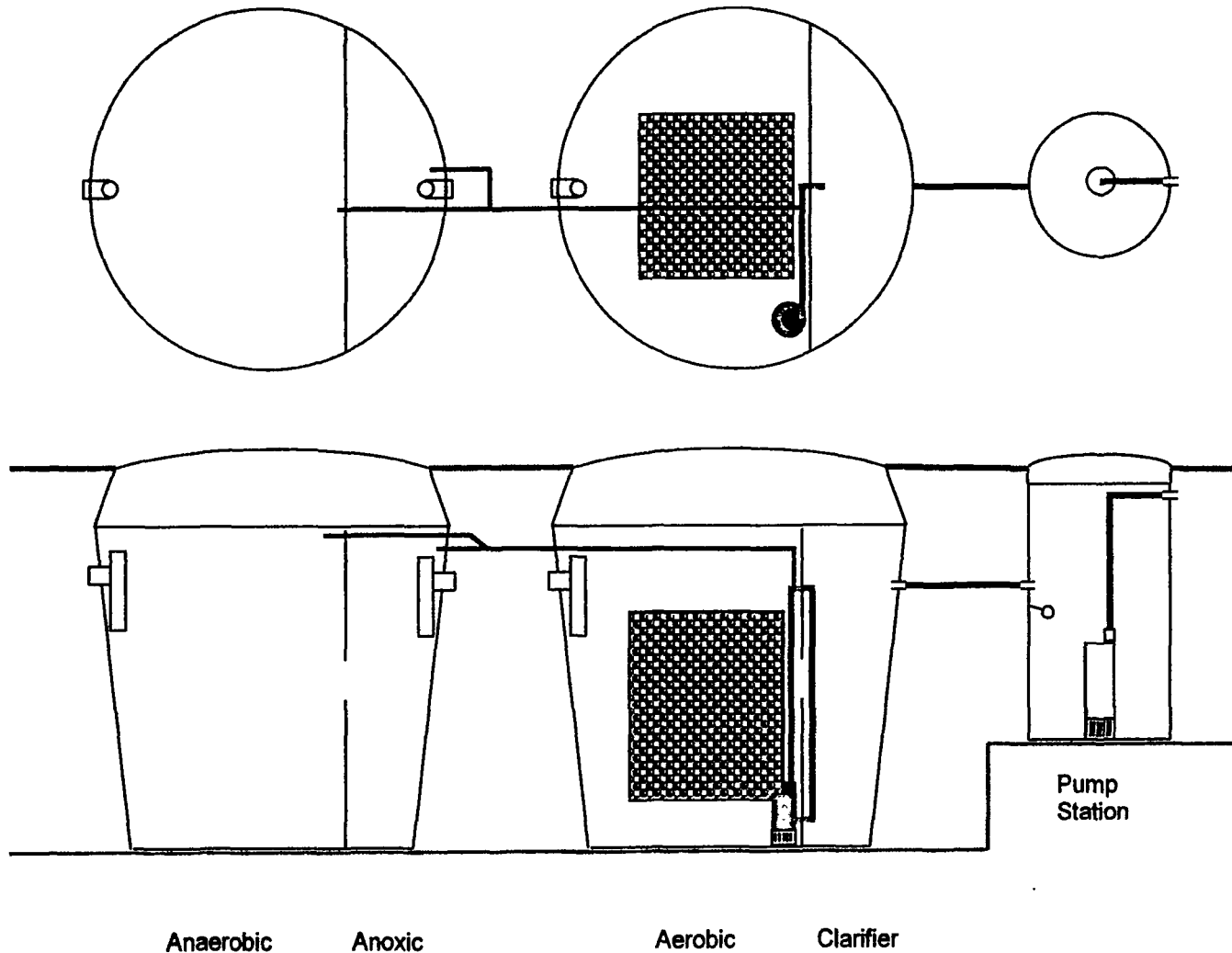
-  **Media Pack**
Surface area 36m²
Volume 0.45m³
-  **Activated sludge return**
-  **Bio-filter**
-  **High level alarm float**

Working volumes (litres)





Anaerobic chamber	2160
Anoxic chamber	840
Aerobic chamber	2090
Clarifier	810
Pump chamber	170
Total working capacity	6070
Total holding capacity	6500

5 KiwiTreat Eco System

Internal Layout (Diagrammatic)



Legend

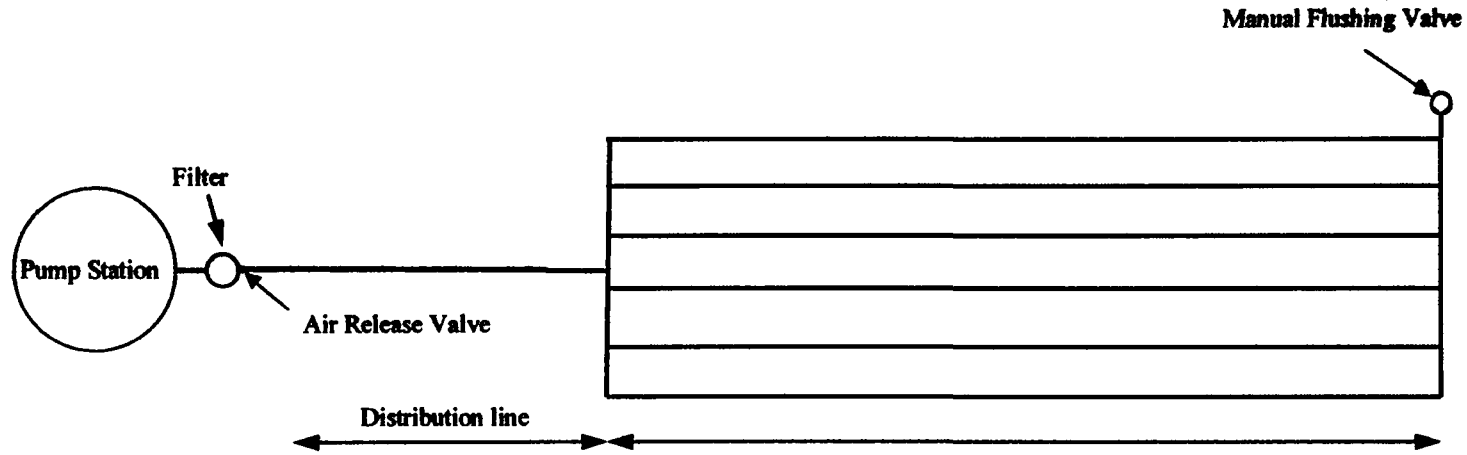
-  **Media Pack**
Surface area 36m²
Volume 0.45m³
-  **Activated sludge return**
-  **Bio-filter**
-  **High level alarm float**

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

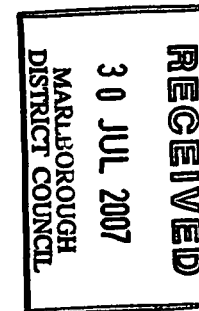


Drip line
 (Six lines at approximately 45 metres each)
 Drip lines spaced 1 metre apart

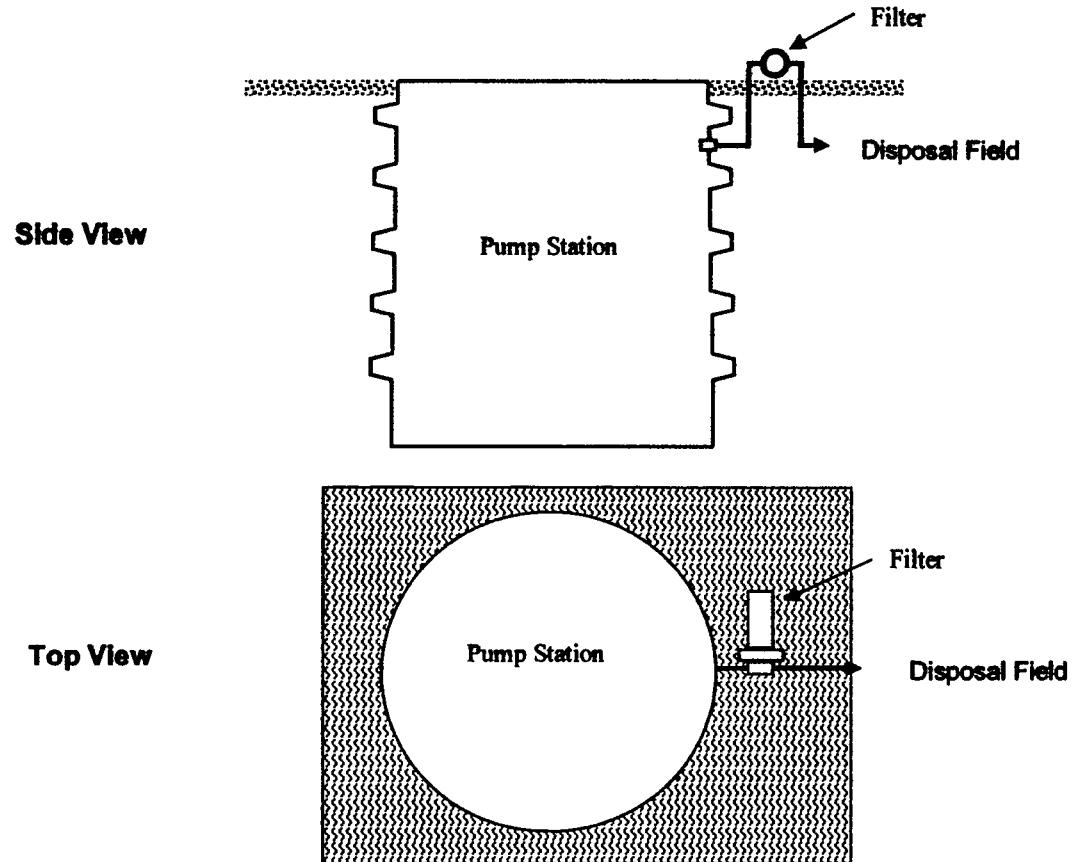
The disposal field must not be located at a level higher than one metre the top of the aeration tank, unless agreed by KiwiTreat Ltd

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

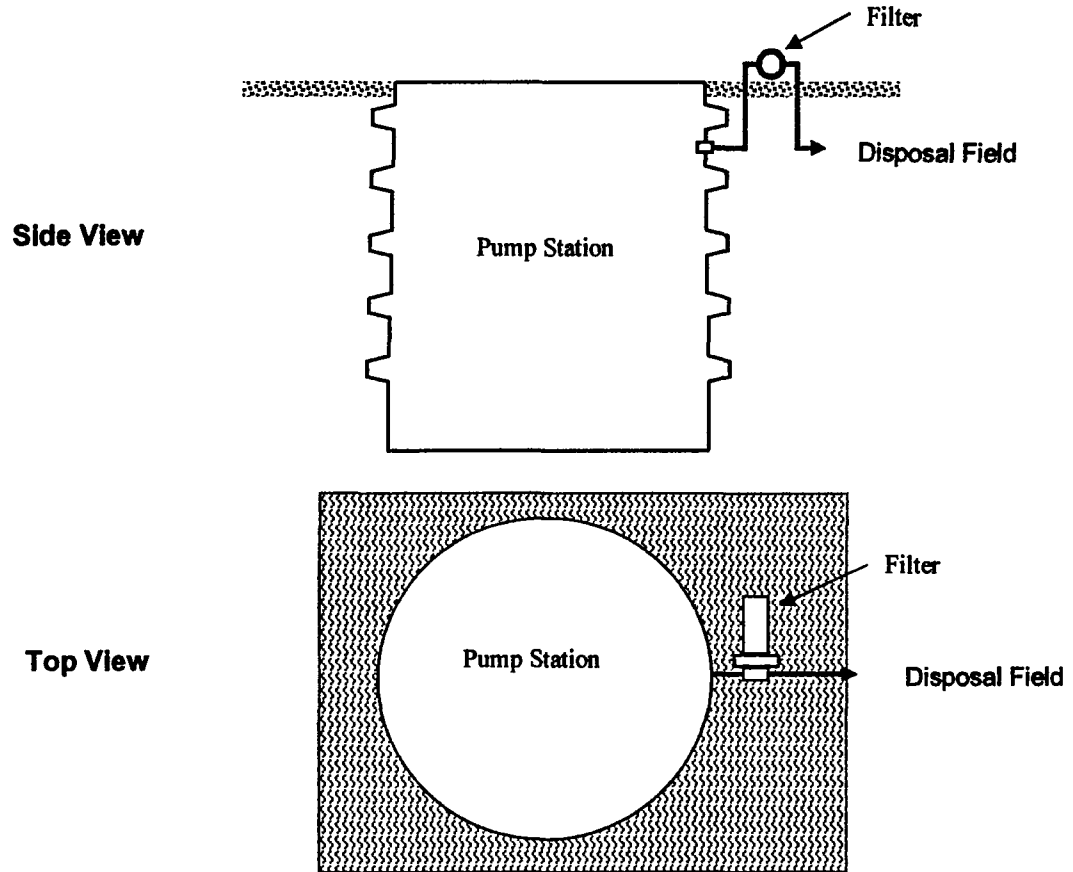
Drip-line is to be buried 100 to 150mm under the surface and in an area free of any material that may damage or limit the effectiveness of the drip-line.



Filter Arrangement



Filter Arrangement



Manual Flushing Valve (MRV)

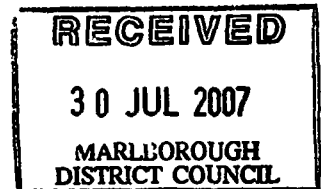
The MRV is used to remove sediment buildup within the drip-line by means of a cleansing action by momentarily increasing the velocity of the liquid.

The MRV should be flushed at every inspection by 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.