



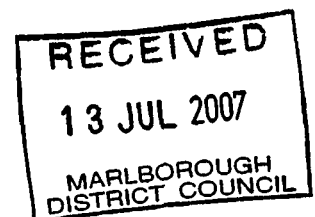
R. McCallum

Engineering Report

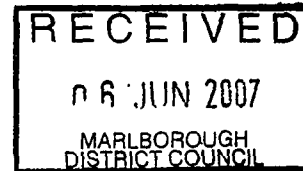
On-Site Wastewater Management

184 Wakamarina Road, Canvastown

6 June 2007

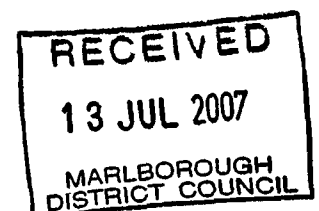


R. McCallum
On-Site Wastewater Management
184 Wakamarina Road
Canvastown



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1 Introduction

- 1.1 It is understood that R. McCallum is proposing to construct a new residential dwelling at 34 Hillocks Road, Spring Creek. It is understood that the completed building will be a permanent residence with two bedrooms. Details of the proposed development are shown on the appended site plan.
- 1.2 The purpose of this report is to present the results of site investigations carried out in relation to onsite wastewater treatment and management. The site investigation was carried out on 1 June 2007.

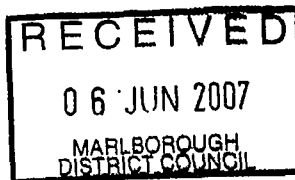
2 Description

- 2.1 The existing Wakamarina Road forms the eastern boundary of the property with an unformed legal road adjacent to Wakamarina River comprising the western boundary. The site is zoned as 'Rural 2' and is not shown to be on 'unstable' ground according to the Marlborough District Council Sounds Resource Management Plan.
- 2.2 The legal description of the property is Lot 1 DP 8271 and the land area is 0.11 ha.
- 2.3 The site generally comprises an essentially flat alluvial terrace with a short slope leading down to a lower terrace located in the western part of the site, as indicated on the appended site plan. The site is generally vegetated in open paddock with a stand of exotic trees planted in the southern part of the site.
- 2.4 The geological map for the area (Rattenbury *et al.* 1998) indicates the site is underlain by alluvial terrace deposits of Pleistocene age.
- 2.5 The test pit excavation reported in Section 3 generally confirms the stratigraphy as indicated on the geological map.

3 Site Evaluation

- 3.1 The proposed land application area is positioned to the south of the proposed dwelling at the site, as indicated on the appended site plan. There is sufficient room available so as to ensure that the land application area is located a minimum distance of 30m from the Wakamarina River water body.
- 3.2 The existing spring water supply to the property and the neighbouring property to the north is however located within approximately 20-25m from the edge of the land application area. An assessment of environmental effects is provided in Section 4 of this report.





- 3.3 The proposed land application area is flat and is vegetated in open paddock and is planted with several established exotic trees. Groundwater was not encountered within the subsurface investigation reported herein and is expected to be located at a depth in excess of one metre below ground level.
- 3.4 Three test pits were dug at the site in the approximate location of the proposed land application area. Based on the soil assessment carried out, an average drainage category of 3.5 has been adopted. The representative soil properties are:

W1

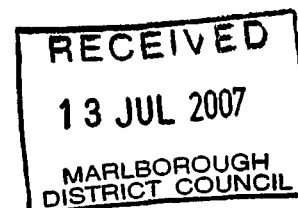
(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.05	A1	Topsoil	Brown	Loam	None	Very loose	Very soft	Strong	Moist	2
0.2	A2	Topsoil	Light brown	Silt loam	2%	Loose	Soft	Strong	Moist	3
0.6	B	Alluvial	Orange-brown	Clayey silt loam	None	Loose	Stiff	Moderate	Moist	3.5

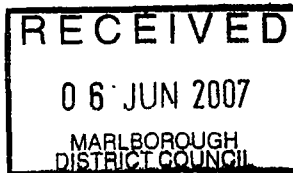
W2

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.05	A1	Topsoil	Brown	Loam	None	Very loose	Very soft	Strong	Moist	2
0.2	A2	Topsoil	Light brown	Silt loam	2%	Loose	Soft	Strong	Moist	3
0.6	B	Alluvial	Orange-brown	Clayey silt loam	None	Loose	Stiff	Moderate	Moist	3.5

W3

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.05	A1	Topsoil	Brown	Loam	None	Very loose	Very soft	Strong	Moist	2
0.2	A2	Topsoil	Light brown	Silt loam	2%	Loose	Soft	Strong	Moist	3
0.6	B	Alluvial	Orange-brown	Clayey silt loam	None	Loose	Stiff	Moderate	Moist	3.5





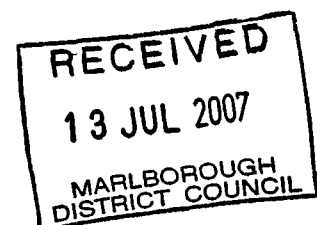
- 3.5 In accordance with Plan Change 7 Rule 27.2.4.5.5 an assessment of the best practical option has determined that secondary treatment and dose pumped shallow bed land application is appropriate and the most practical option for this property when proximity of the existing spring water supply and the property boundary constraints are taken into account.
- 3.6 A secondary treatment system involves aerobic biological processing and settling or filtering of effluent received from a primary unit. A RX Plastics RXST 33 15 aerated treatment system coupled with evaporation bed land application is considered suitable.

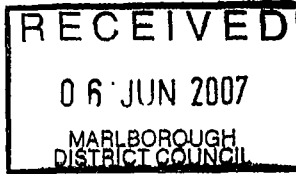
A secondary treatment system such as the system proposed will normally produce average effluent quality equal to or better than:

BOD after 5 days (average) < 20 g/m³
Suspended solids (average) < 30 g/m³

A RXP system specification is attached (Appendix 4).

- 3.7 A wastewater flow design allowance of 180 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 spring water supply for the dwelling. Based on a permanent occupancy of 4 people (as per MDC Guidelines For New On-Site Wastewater Management Systems) the design flow is 720 litres per day. A minimum wastewater storage capacity of 3,000 litres is required.
- 3.8 The total length of 1500mm wide land application bed required is 16m (refer wastewater design sheets Appendix 3). It is recommended that this length of application bed be constructed as a single length of 16m. A typical bed detail is provided on drawing 002.
- 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 at yearly intervals. 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 Vehicular access to the system for maintenance will be available.





4 Assessment of Environmental Effects

Activity - Install Land Application Area Within 30 metres of Spring Water Supply

4.1 Effects

It is proposed to install a secondary treatment system and bed land application system at the site, with part of the land application area being located within 30m of the existing spring water take supplying the proposed dwelling and existing neighbouring property to the north.

A possible environmental effect resulting from the proposed activities is the contamination of the existing water supply through the vertical movement of secondary-treated effluent, that is not treated or consumed in the soil.

4.2 Mitigation Measures

Treatment

The treatment system proposed is a RXP aerated secondary treatment system, which produces high quality effluent (refer 3.6 above), and therefore has a minimum impact on the environment.

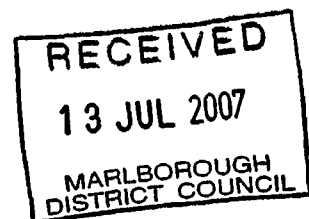
Coliform numbers, the indicators used to measure the various pathogens present in sewage effluent, are initially very low in the secondary-treated effluent. These will not be a concern for it is well established that bacterial, (and viral etc), numbers are reduced exponentially with passage of effluent, whether primary-treated or secondary-treated, through mid-range textured soils.

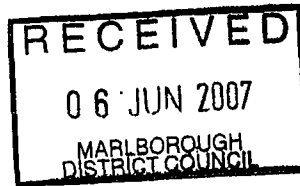
This is evidenced by Note 1 in Table 4.2B1 of NZS 1547:2000 where it is noted that a "path length of 0.3 - 0.4 metres would be sufficient to reduce (bacterial) numbers to insignificant levels in normal soils i.e. soils that are of a mid-range texture, not too sandy or too clayey, and not saturated all the time".

We are of the opinion that the soils on the property (refer 3.4 above) fall into this mid-range soil category.

5 Recommendations

A RXP Secondary Treatment System and dose pumped land application bed system is recommended. Installation is to be in accordance with requirements and recommendations of NZS 1547:2000.





6 Limitations

This report is valid for two years from the date of issue and covers the design of a wastewater treatment and management system for R. McCallum at 184 Wakamarina Road, Canvastown. 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.

7 References

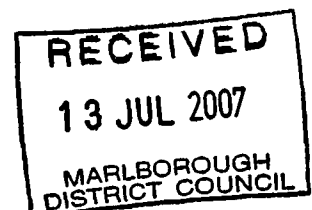
1. NZS 1547:2000 On-site Domestic Wastewater Management
2. Marlborough District Council Guidelines for new on-site wastewater management systems.
3. Rattenbury, M.S., Cooper, R.A., and Johnston, M.R. (compilers) 1998. New Zealand Geological Map 9: Geology of the Nelson area, 1:250,000, Institute of Geological and Nuclear Sciences.

Report prepared by:

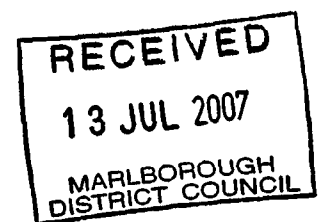
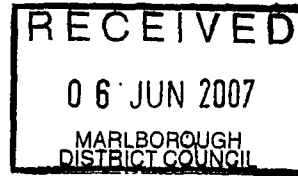

Dave Dravitzki
Engineering Geologist
6 June 2007

Report reviewed by:


Jan Dimmendaal
Chartered Engineer

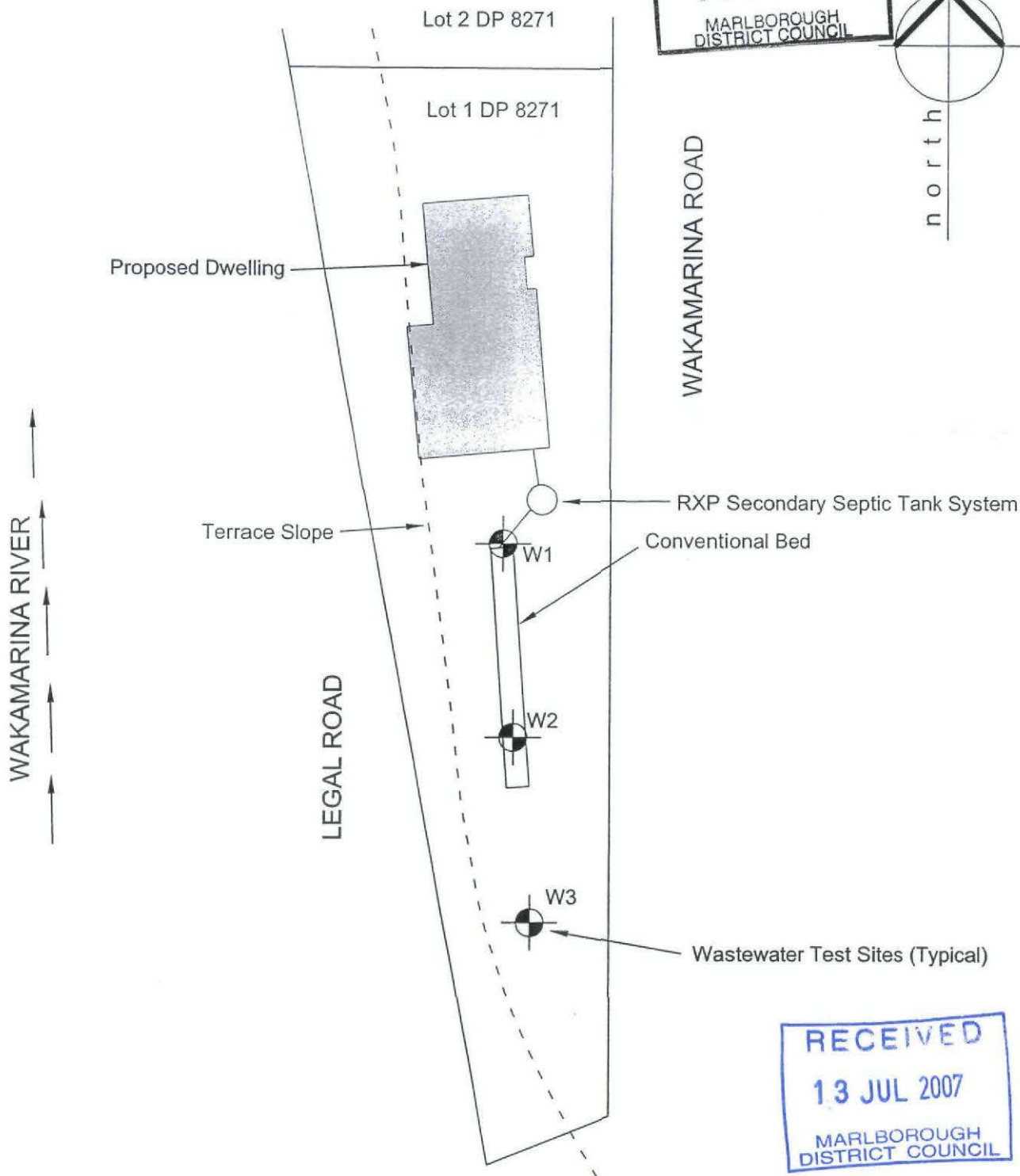
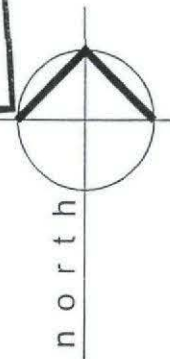


Appendix 1 – Site Plan



NOTES
 Do not scale from this drawing. Only figured dimensions are to be taken from this drawing. The contractor must verify all dimensions on site before commencing any ordering of materials, work or shop drawings. The contractor must report any discrepancies to the Engineer before commencing work. If this drawing exceeds the quantities taken in any way, the Engineer is to be informed before the work is started. This drawing is Copyright and must not be reproduced without the consent of Smart Associates Ltd. The Engineer is to be given at least 2 weeks notice of the beginning of construction works, and at least 48 hours notice of critical items (eg concrete pours, painting etc). The Engineer reserves the right to alter the design in light of site circumstances including previously unforeseen design issues.

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* Approx. Existing Spring Water Take Location

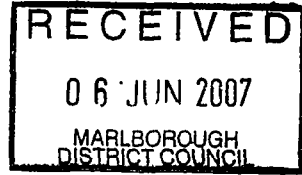
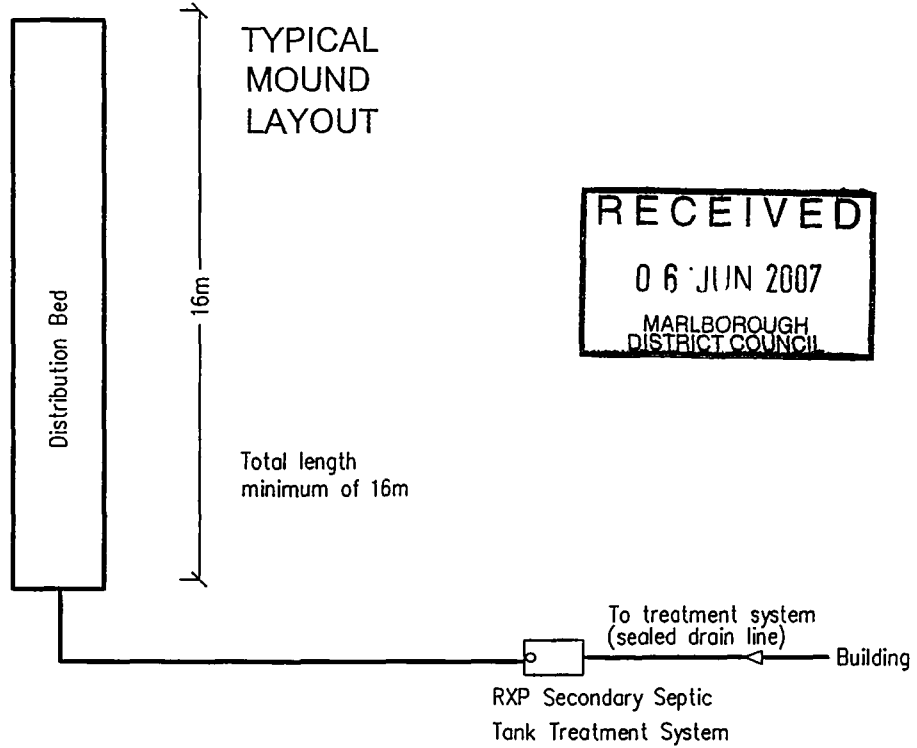
Appendix 2 – Drainage Field Specification

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DISTRICT COUNCIL

NOTES
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End cleanouts at ends of all distribution lines



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.

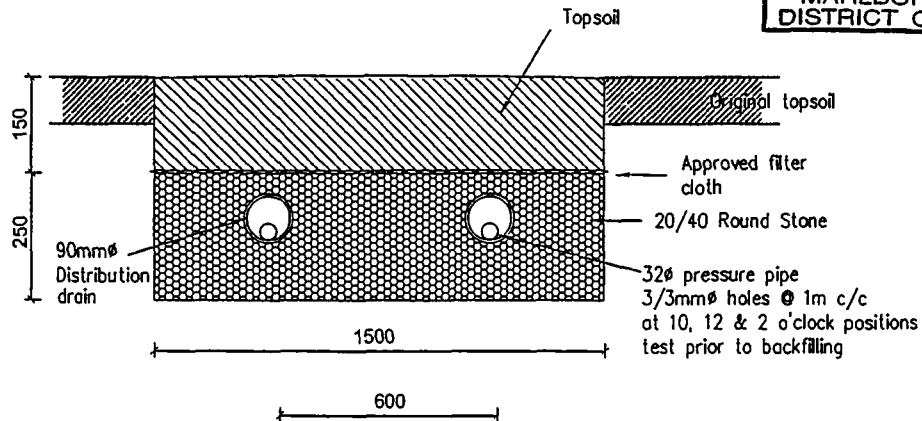
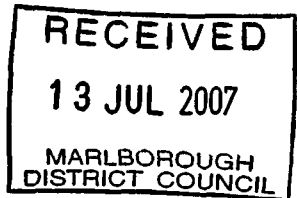
Normal use in the house of soaps, detergents, bleaches, plumbing fixture cleaners, drain cleaners and disinfectants will not harm the functioning of the system or the soil absorption system.

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.

NOTE - BEDS

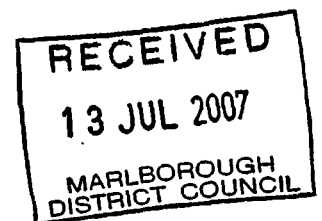
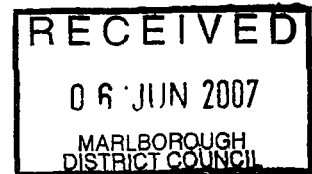
- (1). Distribution drains to be U-PVC 90mm ϕ perforated pipe with perforations comprising at least 2% of surface area. (20mm ϕ holes at 100mm centres at 4 & 8 o'clock positions).
- (2) Distribution pipes to be laid flat or at a gradient not greater than 1 in 200.
- (3). Sides & base of trench to be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



TYPICAL BED CONSTRUCTION

REVISIONS

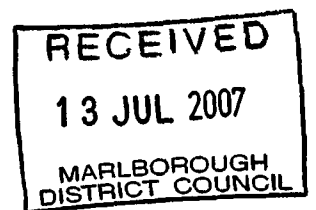
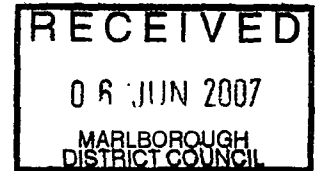
Appendix 3 – Wastewater Design Sheets



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

Site Evaluation: R. McCallum, 184 Wakamarina Road, Canvastown		Job No: 0518
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): <i>OK when installed properly with a correctly sized drainage area and maintained.</i>	Secondary treatment: <i>Work very well in domestic situation producing a relatively high quality effluent.</i>	
Recommendation for this site: <i>Secondary treatment system with dose pumped effluent treatment beds (RXP System)</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 3.5 - Imperfectly - moderately well drained loam</i>
Design		
RECOMMENDED D.L.R.	<i>30</i>	mm/day
(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)		
4 Permanent People At 180L/person/day:	<i>720</i>	L/day from Appendix 4.2D AS/NZS 1547:2000
DESIGN DAILY FLOW:	<i>720</i>	L/day
Septic tank size (min):	<i>4,500</i>	(Table 4.3A1)
AREA REQUIRED:	<i>24.0</i>	m ²
LENGTH REQUIRED:	<i>16.0</i>	m with 1.5m wide beds
RESERVE AREA REQUIRED:	<i>100%</i> of specified drainage area	
RECOMMENDATION :		
<i>RXP secondary treatment and dose pumped effluent disposal beds to be a minimum total length of 16m (Pump sized by manufacturer).</i>		

Appendix 4 – RXP System Specification





- You are here:
- [Home](#)
- >
- [Septic & Effluent](#)
- >
- [Septic Tanks](#)

SEPTIC TANKS

Environmental Concerns

Discharge of sewage and wastewater to our environment has a serious impact on soil structures and water aquifers. With local and regional authorities requiring you, a rural resident with no sewage reticulation, to manage, treat and dispose of your own sewage and wastewater within the boundaries of your property, this issue may become a serious concern for you and the management of your property.

To meet the range of effluent quality standards that may vary between authorities you need a septic tank or sewage treatment system designed to minimise these adverse effects.

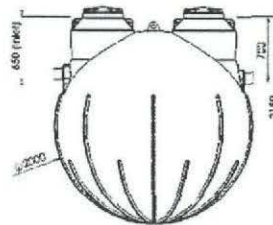
The RX Septic Tank range is currently New Zealand's most innovative tank design developed specifically to maximise the treatment of sewage and wastewater prior to discharge to approved disposal options.

RXST33

3300 litre - Single Stage Filtered Septic Tank-200kgs

Excavation hole size:-

3000 L x 3000 W x 2200 Deep



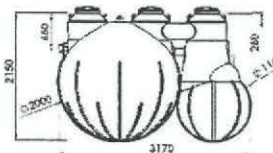
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RXST 33 10

4300 litre - Single Stage Filtered Septic Tank and Pump Chamber-300 kgs

Excavation hole size:-

3800 L x 2600 W x 2200 Deep



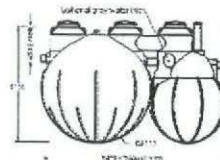
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RXST 33 15

4800 litre - Two Stage Filtered Septic Tank-

Excavation hole size:-

4000 L x 2600 W x 2200 Deep



[Click to Enlarge](#)

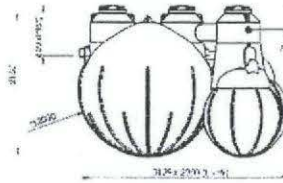
RXST 33 12 10

5500 litre - 2 Stage Filtered Septic Tank and Pump Chamber-375 kgs

Excavation hole size:-

4000 L x 3500 W x 2200 Deep





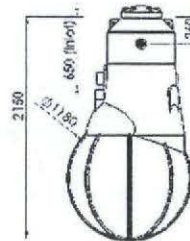
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RXST PC 100

1000 litre Pump Chamber-100kgs

Excavation hole size:-

2000L x 2000 W x 2200 Deep



[Click to Enlarge](#)

Research and Development

We pride ourselves on our ground breaking research and development. This combined with the ability to understand the industry and listen to our customers' point of view have made us one of the industry leaders in rotomoulding, injection moulding and plastic extrusion for many years.

Before we bring any new product to the market, we thoroughly explore and test all aspects of the design and function to ensure that by the time it reaches you, we know it will perform to our usual exacting standards.

Our latest product brings you effective, creative thinking to the problem of recycling sewage and wastewater in a rural environment.

Innovative Rotomoulding

The RX Septic Tank range is the result of over 4 years commitment to developing the best septic tank range available today. Our goal was to make a simple, lightweight, polyethylene sewage tank and at the same time avoid the failings of existing plastic tank systems that have been tried with varying degrees of success in the past.

Designed recognising the latest industry standards and incorporating many innovative features we believe our Septic Tank range is unequalled by any other existing polyethylene tank system available today.

Lightweight

The RX Septic Tanks and pump chambers are manufactured from the industry's strongest grade polyethylene, giving a long life and performance after installation. This diverse product range can be used in both new and existing applications and be installed to existing tanks to increase treatment capacity.

Strength

In developing the new tank the RX Plastics Design Engineering team have proven that the sphere tank is the strongest configuration for inground use. Extensive Finite Element Analysis (FEA) testing results have proven this and we believe it to be one of the strongest polyethylene tanks in the market.

Warranty

RX Septic Tanks are covered by the RX Plastics extended warranty and covers the product to be free of defects in workmanship, materials for a period of 15 years for all polyethylene rotomoulded tanks. The manufacturers warranty apply to all other componentry used in the RX Septic Tank range.

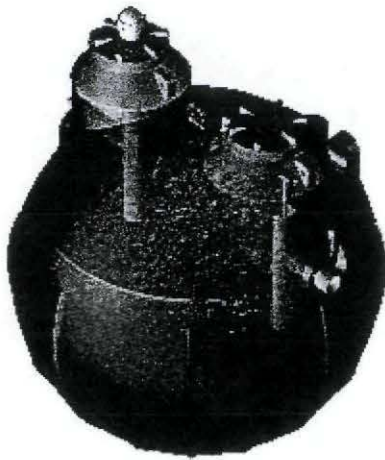


Transportation & Installation

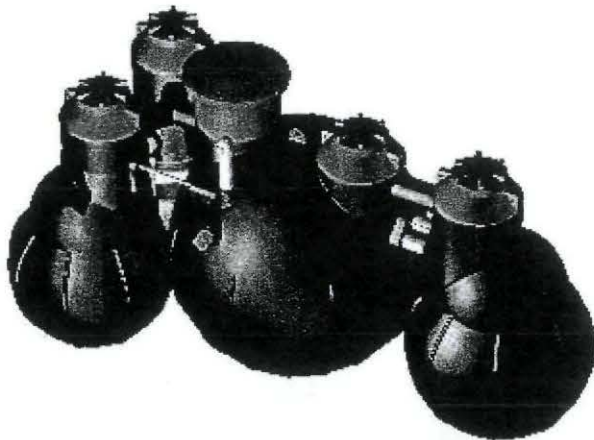
All RX Septic Tanks are delivered ex-factory on purpose made pallets for easy storage and forklift maneuverability.

For ease of installation systems delivered to site are lifted from the pallet and positioned in the prepared excavation ready for backfilling. Required installation procedure is as per instructions provided with all systems.

Technical



- Lightweight polyethylene polymer construction
- Patented rubber ring inlet
- Flow balance baffle
- Innovative tank design
- Reinforced strengthening ribs
- Efficient settling of solid waste
- 3mm tube mesh biological filter



AIR TECH™
9000

Aerated Wastewater Treatment System

The AirTech(TM) 9000 system is an efficient; lightweight sewage system 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.

Compliance and Certification

The RX Septic Tank Range meets the objectives of:
 Australia and New Zealand joint standard 1546 1:1998
 Australia and New Zealand joint standard 1547 2000
 ARC Environment TP 58 Second Edition



Design and Testing verified by registered engineers and consultants

Process analysis undertaken at Lincoln University: Andrew Dakers, M.E. Natural Resources Engineering.

Member On-site Wastewater Manufacturers Group

Local Authority Approved

Meets World Health Organisation (WHO) effluent quality standards

Updated March 25, 2006

Links referenced

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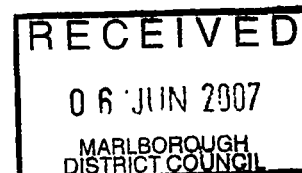
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</img/content/296/315/10-pump-chamber.jpg>

Location <http://www.rxplastics.co.nz/index.cfm/1,105.html>



PO Box 360, Ashburton, New Zealand Phone +64 3 307 9081 Fax +64 3 308 8483 Email rx.plastics@xtra.co.nz

