Appendix 3 – Site and Soil Evaluation Report

smartalliances
ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS LTD

Site and Soil Evaluation Report
Watts – Te Awaiti

1.0 SITE INFOMATION

1.1 Location details:

Owner: Mr & Mrs Watts

Location: Ta Awaiti

Address: Tory Channel. Marlborough Sounds

1.2 Site Description:

Lot 1 DP10393 0.1ha

The site is rectangular in shape and is located adjacent to the Sounds Foreshore Reserve. A wet area and spring is located outside the rear boundary of the lot and a drain runs just out side the eastern boundary of the property. The site is generally flat with a slight fall to the sea and eastern side of the section. The site is vegetated with rough grass at present and features no existing developments.

1.3 Climate:

Annual rainfall (mm): Unknown

Annual Evaporation (mm): Unknown

1.4 Intended water supply:

Roof water supply or creek supply

1.5 Existing on-site systems:

None

1.6 Site Evaluator:

Company/agency: Smart Alliances Ltd

Address: PO Box 546
Blenheim

Phone: 579 6211

Fax: 579 6233

2.0 ON-SITE EVALUATION

2.1 Work Undertaken:

Details: Site visit & effluent design

Date: March 2006

Weather (on day and preceding week): dry

Photo Attached: NO

2.2 Topography:

Slope: flat

Drainage Patterns: site has previously featured poor drainage, however a drain has been formed along the eastern boundary which has dramatically improved drainage of the site.

Ground Cover: rough grass

Boundaries: Noted

Waterways: Wet area at rear of site and drain along eastern boundary.

Well/Bores: None

Buildings: Proposed 3 bedroom dwelling

Other: small site, take into consideration size constraints

Site History (land Use): -

Site Plan Attached: YES

2.3 Site Exposure:

Site Aspect: South

2.4 Environmental concerns: (e.g. High water table, wetlands, water ways etc.):

Proximity to coastal waters. Drain and wet area at rear of site.

2.5 Site Stability:

Is expert assessment necessary: No

2.6 Drainage Controls:

Depth to seasonal water table: in excess of 600mm from proposed disposal level

Need for cut off drains/diversion banks: N/A

Need for surface water collector/cut off drains: N/A

2.7 Set back Distances:

Set back distance: 2m from boundaries

Set back distance: 5m from wet area and spring at rear of site. Disposal field shall be located as far away as possible from coastal water.

Reserve area: Not required as effluent shall be treated through Secondary Treatment System.

3.0 SOIL INVESTIGATION

3.1 Soil profile determination Method: Auger Hole
A range of soil properties have been assessed in accordance with the procedures outlined in Appendix 4.1D of NZS1547:2000

3.2 Reporting

Test Site 1

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	200mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	700mm	Moist	Dark Brown	Loam	<30	-	Loam, with some light coloured fine sand particles, ribbon 25-30mm long. Contained many schist fragments.

Test site 2

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	200mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	650mm	Moist	Brown	Clay Loam	<30	-	Loam, with some light coloured fine sand particles, ribbon 40 mm long. Contained many schist fragments.

Test Site 3

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	150mm	Moist	Brown	Loam	<2	Moderate	Topsoil
3	720mm	Moist	Brown/Black	Loam	<30	-	Loam, with some light coloured fine sand particles, ribbon 25-30mm long. Contained many schist fragments. Slightly greasy feel due to organic matter

3.3 Estimated Soil Category:

Soil Test	1	2	3	4	5
Soil Category	3	3-4	3		

The estimated soil category has been determined based on Table 4.1.1 NZS 1547:2000 The assignment of soil category 3 is based on the texture and structure of the soil as described in 3.2 above and observations made during the site visit.

3.4 Recommended DLR / DIR

DLR: 3.6mm/day
Reason: DIR to be based on a category 4 soil to ensure the system design is conservative given the proximity to water bodies.

3.5 General Comments:

4.0 DESIGN

4.1 Soil Category found on site: 3-4

4.2 Average Daily Flow Rate (Q) (Litres): 840L/day

Design Occupancy: based on the following rates:
Dwelling – 3bedrooms x 2 persons x 140L/day = 840 L/day

4.4 Septic Tank Capacity (Litres): new 4500L Secondary Treatment System suited to intermittent use.

Treatment Quality:

Faecal Colliforms:<10^3/100mls

BOD_5:<100g/m^3

Suspended Solids:<60g/m^3

4.5 Loading Rate (DLR): 3.6mm/day

4.6 Bed Spacing (m): 1.0m

Note: Drip lines to be laid level following the ground contour. Lines shall be buried a depth of 150mm in to the topsoil

5.0 CALCULATIONS

$$A = \frac{840L}{3.6\ mm/day}$$

Disposal Area = 234 square meters of irrigated disposal field.

6.0 Assessment of other possible systems:

It would be possible to dispose of effluent through a septic tank and shallow bed disposal field. However due to the proximimity of the coastal water, drain and spring, the environmental risk is unacceptable.

7.0 Best Practical Option

The best practical option for management of domestic wastewater is through the use of the proposed system (as detailed in section 4.0 Above) It is my opinion that this system is the best practical method for preventing or minimizing any adverse effects on the environment.

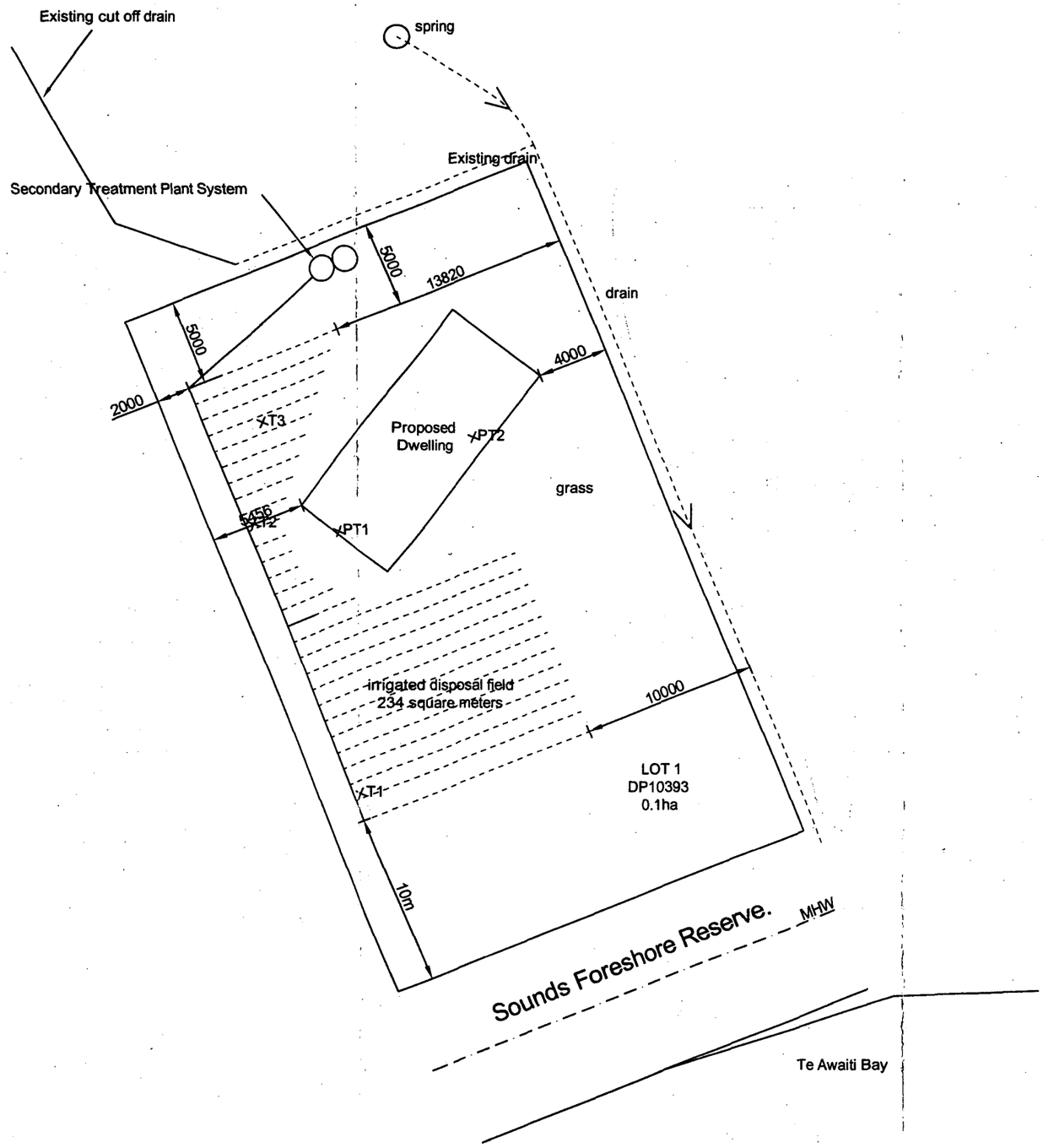
NOTES:

BUILDING SITE

PT1 = penetrometer test site 1
PT2 = penetrometer test site 2

EFFLUENT DISPOSAL FIELD
T1 = subsoil test site 1
T2 = subsoil test site 2
T3 = subsoil test site 3

Site plan should be read with report



A3

AMENDMENT DATE DETAILS	AMENDMENT DATE DETAILS	smartalliances ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS LTD TEL 03 579 6211 FAX 03 579 6233 PO BOX 548 BLENHEIM NEW ZEALAND	CLIENT WATTS	PROJECT TE AWAITI EFFLUENT DISPOSAL DRAWING SITE PLAN	DWG NO. SJ793-fig1 AMENDMENT 01 DATE 20-03-06 SCALE 1:300 (A3) CAD FILE REF: SJ793-F1 DRAWN APPROVED

smartalliances
ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS LTD

RECEIVED
16 APR 2008
MARLBOROUGH DISTRICT COUNCIL

Attn: Jenny Keene

Re: 0071882

Copy of Biolytix maintence sledule for your info.

Regards Sally

SmartAlliances Ltd
PO Box 546
Blenheim, 7240

T: 03 579 6211
F: 03 579 6233
E: info@smartalliances.co.nz

BIOLYTIX

Biolytix® New Zealand Extended Performance Warranty & Service Contract

This agreement is between:

Name/s (the owner): _____

Site Address: _____ P/Code _____

Postal Address: _____ P/Code _____

Equipment Phone Line Number: ( ) _____ (see Clause 6)

Contact # ( ) _____ **Facsimile #** ( ) _____ **Mobile #** _____

Email: _____

And: Biolytix® Technologies Pty Ltd ("Biolytix") **ACN 097 798 966** PO Box 591, Maleny QLD 4552

Purpose of the agreement: The professional maintenance and servicing of the Biolytix® Wastewater Treatment Filter.

Product/Filter type: _____ Serial Number: _____("the Equipment") (To be completed by Biolytix®)

Installation Date/Start Date: _____ (To be completed by Biolytix®)

Annual Service Fee: The Extended Performance Warranty is available after the first year, as indicated below for clients who have not held a contract with Biolytix® consecutively from the installation date and wish to start or renew a contract. The contract start date will be determined by Biolytix® and does not include the complimentary free year. A complimentary warranty for the first year is valid from the Installation date for newly purchased equipment only.

Optional Extended Performance Warranty: Please circle one of the following if you would like to extend your warranty after the first complimentary year. If no option is circled, 20 years will be the default.

Terms: ***5 Years 10 Years 20 Years***

Payment options:

For Second and subsequent years choose one payment option only:

- **Payment option (1):** per Annum (ONE PAYMENT ANNUALLY IN ADVANCE)
- **Payment option (2):** per Quarter (4 PAYMENTS QUARTERLY IN ADVANCE)
- **Your preferred payment method: Cash Cheque Direct Debit** (please circle one choice)

Additional travel costs and Travel allowance: See Clause 7 of Terms and Conditions

Terms of Agreement: See Terms and Conditions attached hereto.

BIOLYTIX® RESERVES THE RIGHT TO INCREASE ITS SERVICE FEE IN ACCORDANCE WITH CLAUSE 7 HERETO

WORK TO BE DONE BY BIOLYTIX®:

A. At the end of each 12 month period from the Installation date/start date-carry out a comprehensive service on the Equipment including:

1. Assess effectiveness of treatment;
2. Check dispersal and flush irrigation;
3. Check irrigation filters;
4. Check pumping equipment;
5. Check equipment alarm system;
6. Visually check final effluent quality;
7. Replace all worn parts;
8. Re-inoculate if necessary
9. Advise Owner of care and maintenance of Equipment;
10. Prepare and submit maintenance report to Owner and Local Authority.

B. Carry out any emergency repairs as required due to faulty components/parts.

OBLIGATIONS OF THE OWNER: See Clause 4 of the Terms and Conditions.

Signed by the Owner/s: _____ Date: _____

Signed by Biolytix® CEO as authorised representative: _____ Date: _____

TERMS AND CONDITIONS

		PARTICULARS
1.	**What is the Biolytix® performance warranty and when does it start?**	(1) Subject to the Obligations in Clause 4 being adhered to, Biolytix® warrants the performance of the Equipment to produce effluent quality as specified in the product specification for a period of one year from the Installation Date. (2) The Performance Warranty starts on the Installation Date AND DOES NOT COVER ANY PERIOD OF STORAGE PRIOR TO THE INSTALLATION DATE. (3) For new clients to the warranty who have not held a consecutive contract with Biolytix®, the performance warranty starts on a date determined by Biolytix®.
2.	**What is the Biolytix® extended performance warranty?**	Subject to the Obligations in Clause 4 being adhered to and your entering into this Agreement, Biolytix® warrants the performance of the Equipment to produce effluent quality as specified in the product specification for the period of the Extended Performance Warranty. (Not including any faults arising from faulty installation prior to an agreement being in place with Biolytix® or in the event that a consecutive service contract was not in place. Not including any faults or damage arising from the storage of any components or the Filter).
3.	**What you will receive under the agreement?**	Biolytix® will: (1) Carry out one service visit per year including labour, cost of replacement parts, and removal of solids build-up and an inspection of the irrigation system. (2) Carry out any emergency call-outs including labour, replacement parts and travel.
4.	**What are your obligations?**	You as the Owner must: (1) Operate the Equipment in accordance with: * the Operator's Manual (as updated or amended from time to time); * the Design Loading Rate as specified on the product identification place affixed to the Equipment; (2) Ensure the Equipment is not interfered with by anyone other than by the Service Technician as appointed by Biolytix®; except local, regional and/or national authorities that may need to take independent sampling. (3) Ensure that the Equipment is never submerged by water – e.g. Storm water. **FLOODING OF THE EQUIPMENT WILL RENDER THIS AGREEMENT NULL AND VOID;** (4) Ensure that the landscaping surrounding the equipment is not changed in a way that may allow storm water to inundate the equipment and that landscaping be maintained. (5) Ensure that the power supply to the Equipment is never turned off for more than 4 hours; (6) Inform Biolytix® of all power cuts of more than 4 hours to the Equipment; (7) Adhere to the requirements of , regional and/or national authorities; (8) Notify Biolytix® immediately if the residence at the Instalment Address is sold; (9) Pay the Annual Service Fee on time; (10)Provide Biolytix® with the Equipment Phone Line Number within one month of the Installation Date if the equipment provided has a telemetry alarm; and (11)Comply with the terms of this Agreement generally. • To validate the warranty you must sign this agreement and return it to Biolytix® • Comply with the loading specifications of the supplied Filter, as per the identity panel on the filter. • To read and keep on hand a copy of the Biolytix® Operator's Manual. • If a "term is not chosen on the agreement a 20 year term will be the default. (12) Ensure that vermin are not able to enter the system.
5.	**What can void this agreement?**	This Agreement and all its terms are null and void if you fail to adhere to the Obligations in Clause 4.
6.	**Should you have your equipment connected to a phone line?**	Yes, it is a requirement that the Equipment be connected to a phone line IF YOU HAVE PURCHASED EQUIPMENT WITH A TELEMETRY ALARM. It is your responsibility as the Owner to arrange for the phone line to be connected and to advise Biolytix® of the number WITHIN ONE MONTH OF THE INSTALLATION DATE.
7.	**What you have to pay?**	The following Fees are or may be payable: (1) Annual Service Fee: * There is no Annual Service Fee payable for the first year from the Installation Date for New Filters. * For second and subsequent years an Annual Fee is payable in advance. You can choose to pay either annually in advance or by quarterly payments in advance. (Please note that if the quarterly payment option is chosen, the total of the quarterly fees per annum will be higher than the one -off annual payment option.)

		* Biolytix® reserves the right to increase the Contract Fee at the end of each year during the term of the contract in proportion to the corresponding increase over that Year in CPI (All Groups) Index for New Zealand. Biolytix® will notify you of any such increase or decreases. (2) Travel Fees * Travel fees are currently payable at $1.00 a kilometre for the annual service visit only if the technician's return journey from site (location of equipment) exceeds 1 hour (up to 100 kilometres). *Biolytix reserves the right to increase the travel fee component allowed for in the contract fee in accordance with increases in travel costs incurred by Biolytix®. **Note:** Travel fees are not applicable for emergency repairs that are due to faulty parts/materials.
8.	**When are the annual fee and/or any travel fees payable?**	(1) The Annual Service Fee is payable in advance at the intervals circled in the Details Schedule. Biolytix® will issue a tax invoice for each required payment and payment must be received by Biolytix® within 14 days of the date of the tax invoice. If the tax invoice is not paid by the required date Biolytix® may: * charge interest on the overdue amount of 1.6% per month; and/or * terminate this Agreement. (2) If applicable, travel costs will be separately invoiced following the annual service and must be paid within 14 days of the date of the tax invoice.
9.	**What if your Council requires service visits above what is outlined in this agreement?**	If your local, regional and/or national authority specifies quarterly service visits or offsite testing, Biolytix® can approach your local, regional and/or national authority on your behalf and request that their requirement be amended. If they do not agree to amend their requirements then the cost of complying with your local, regional and/or national authorities will be an additional cost above and beyond this Contract fee, and the Agreement will have to be amended accordingly if you require Biolytix® services for this.
10.	**What is not covered in this agreement?**	Any requirements by local, regional and/or national authorities that are above and beyond those already covered by this Agreement are not covered. It is your responsibility to ensure you are aware of and comply with any such requirements. (Not including any faults arising from faulty installation prior to an agreement being in place with Biolytix® or in the event that a consecutive service contract was not in place. Not including any faults or damage arising from the storage of any components or the Filter).
11.	**Can this agreement be renewed?**	This Agreement can only be entered into for a maximum continuous period of 20 years from the Installation Date/start date. If you choose a Term less than 20 years you can renew this Agreement on the following conditions: * any new Agreement must commence immediately after the current Agreement has expired; * the continuous period of all Agreements is for a maximum period of 20 years; * you have not breached the Obligations in Clause 4.
12.	**How can you terminate this agreement?**	* You can terminate this Agreement by giving Biolytix® notice in writing. The Agreement will then be terminated on the first day of the next calendar year of the Term. You will not be entitled to any refund of Service Fees and or Travel Allowances paid to Biolytix® in advance. * Biolytix® can only terminate this Agreement if you fail to adhere to the Obligations in Clause 4.
13.	**What are your remedies for any breech of the performance warranty?**	Your sole remedy for any breach of the Performance Warranty by Biolytix® is that you can require Biolytix® to provide all parts and labour necessary to make the Equipment comply with the Performance Warranty within a reasonable time of Biolytix® becoming aware of the breach.
14.	**Exclusion of liability.**	Subject to Clause 16, Biolytix® excludes all liability (in negligence, contract or otherwise) to you in respect of any loss (direct, indirect or consequential), claim, expense, proceeding, property damage, personal injury, death, liability or loss of profits arising out of or relating to the Services, the Equipment or otherwise in relation to this Agreement.
15.	**No other warranties.**	Subject to Clause 16 and the Performance Warranty, Biolytix® makes no other warranties, undertakings or representations in relation to the Equipment or the Services and all other such warranties, undertakings or representations whether express or implied, statutory or otherwise relating to this Agreement are hereby excluded to the fullest extent permissible by law.
16.	**How does the Consumer guarantees Act 1993 impact on this agreement?**	Nothing in these terms and conditions shall affect the rights of the customer under the Consumer Guarantees Act 1993, provided that if the customer is, or holds itself out to be, acquiring the goods for the purposes of a business, then the guarantees under the Consumer Guarantees Act 1993 are excluded.

17.	**OWNER'S INDEMNITIES**	Biolytix® is not liable for, and the Owner must indemnify Biolytix® and its officers, employees and contractors against any claim, action, damage, loss, liability, cost, charge, expense, outgoing or payment arising out of or in relation to: (a) any loss or damage to the Equipment, any personal injury, any property damage, any death or any adverse public or environmental health consequence arising because necessary access to the Equipment by Biolytix® or its contractors or nominees is prevented; (b) any loss of or damage to property (including stock or plants) caused by Biolytix® or its contractors or nominees in gaining access to the Equipment to provide the Services, or otherwise in the course of providing the Services; (c) any property damage, personal injury or death resulting from the use of the Equipment or the provision of the Services at the Installation Address by any Biolytix® representative or contractor; (d) any theft of, vandalism to or deliberate misuse of pumps or other part of the Equipment; (e) any lightning strike damage to the Equipment or other electrical or electronic equipment at the Installation Address; (f) any damage to the Equipment that would be claimable by the Owner under a normal policy of insurance whether or not such policy cover exists; (g) any use of the Equipment other than in accordance with this Agreement and Biolytix® Requirements; (h) any breach of this Agreement by the Owner; (i) any claim related to the subject matter of this Agreement by any third party against Biolytix®, its officers, employees or contractors; (j) any act or omissions of the Owner (whether or not negligent or wrongful); (k) any loss or damage to the Equipment, any personal injury, any property damage, any death or any adverse public or environmental health consequences arising because the Owner has not paid the fees required under this Agreement. The benefit of this indemnity is held by Biolytix® on its own behalf and on trust for each of its officers, employees or contractors. Biolytix® may claim under this indemnity for itself or on behalf of any of its officers, employees or contractors. Subject to provisions in this Agreement Biolytix® excludes all liability (in negligence, under statute or otherwise) to the Owner in respect of any injury, death or property damage or financial loss (direct, indirect or consequential) arising out of or relating to any use of the Equipment by the Owner or access to the Installation Address by Biolytix® or its contractors.
18.	**ENTIRE AGREEMENT**	This Agreement constitutes the whole agreement between the parties relating to the subject matter. Any amendment to the terms of the Agreement can only be effected if such amendments are in writing and signed by both parties.
19.	**GOVERNING LAW**	This Agreement shall be governed by the laws of New Zealand and the parties submit to the non-exclusive jurisdiction of the Courts of New Zealand.
20.	**SEVERABILITY**	If any provision of this Agreement should be held to be invalid in any way or unenforceable, it shall be severed and the remaining provisions shall not be affected or impaired and this Agreement shall be construed so as to most nearly give effect to the intent of the parties as it was originally executed.
21.	**FORCE MAJEURE**	Biolytix® will not be liable for any failure or delays in performing any of its obligations under this Agreement where such failure or delay is due to a circumstance or event beyond its reasonable control.
22.	**NOTICES**	All notices which are required to be given under this Agreement shall be in writing and shall be sent to the recipient as set out in the Details Schedule or such other address as the recipient may designate by notice given in accordance with this clause. Notice may be delivered by had, facsimile, prepaid letter or email. Any such notice shall be deemed to have been received by the recipient when delivered (if by hand) or 48 hours after posting (if sent by prepaid letter) or on confirmation of transmission (if sent by facsimile or email).
23.	**DEFINITIONS**	**"Agreement"** means this agreement and includes the Details Schedule and Terms and Conditions, and as amended by agreement of the parties from time to time. **"Equipment"** The Biolytix® Filter/s only. **"Annual Service Fee"** refers to the service fee payable for the second and subsequent years of service and refers either to one annual fee or alternatively the total of four quarterly fees. **"Equipment Phone Line Number"** refers to the telephone number to which the Equipment is connected; **"I", "my", "you" and "Owner"** all refer to the Owner as detailed in the Details Schedule; **"Period of Extended Warranty"** refers to the time period as circled on the Details Schedule; **"Site/Installation Address"** means the site where the Equipment is installed; **"Year"** means 365 days.

Rd. 14408

A Strong Track Record

Biolytix has spent more than $3 million to refine its patented treatment process. Many discerning clients in Australia, New Zealand, and South Africa already enjoy its benefits for households and on a larger scale for Golf Course Estates, Eco-lodges, National Parks, Five Star Hotels and housing developments.

The Biolytix filter is the smallest system, making it easier to transport, install and hide in your garden.

20-Year Performance Guarantee

Receive A Free Report

Visit www.biolytix.com for "The 17 Vital Points You Need To Know Before Investing In A Waste Treatment System".

A "New Inventors" Winner

Winner Winner

Why Ian Kiernan ("Clean Up Australia") Chose Biolytix

"In 2001, when the task of selecting the sewage treatment plant for the new Lord Howe Island Museum fell to me, I looked at many options.

I chose a Biolytix™ Filter because our museum is a long way from spare parts and specialist servicing.

Its simple but smart design and promise of consistent, reliable performance, together with a guarantee of no odour, were very appealing. The system delivered... just as we were promised."

For more information or to get a free quote:

www.biolytix.com

or call our Head Office:

1300 881 472

The International Award-Winning

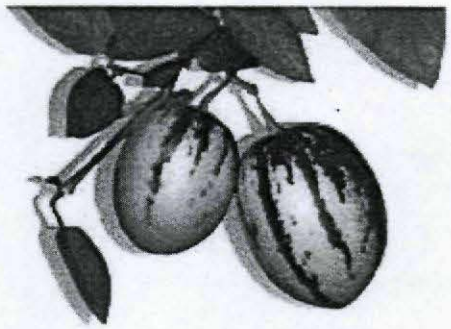
BIOLYTIX

Waste Treatment Systems

Recycle sewage, greywater, sanitary items and food scraps into a lush garden.

By the time the waste filters through the first layer, it is cleaner than septic output.
By the second layer it is cleaner than an aerated system. By the third layer, it's winning awards ....

Global Winner of an Environmental Technology Award at the World Expo, Japan 2005.



How Biolytix Shines

Most of our competitors make a lot of money from frequent servicing (usually 4 times per year!), and from replacing expensive parts, such as blowers. Below are just some of the many ways Biolytix™ protects your quality of life, and your wallet....

Global Environmental Leaders

Biolytix has the lowest greenhouse gas emissions of any waste treatment system in the world.

COMPETITOR COMPARISON

Biolytix Systems	Most Other Systems
✓ Guarantee performance and parts for 20 years	✗ Guarantee parts only for 2 yrs
✓ Only need 1 service per year	✗ 4 services per year essential
✓ Power costs less than $12 p/yr	✗ Power costs are more than $130 p/yr
✓ Silent operation	✗ Noisy and annoying blowers hum 12-20 hrs/day
✓ Natural process that needs no chemicals	✗ Rely on chlorine – so can't remove all pathogens
✓ Safe for people, pets and your soil	✗ Pathogens potentially sprayed around
✓ No odour guaranteed!	✗ Often stink after a high loading
✓ Smallest tank on market	✗ Are large and can disrupt the garden
✓ Continue to treat during power failure	✗ Stop working after power failure
✓ Alarm notifies Head Office if problems	✗ You inform service personnel of problems
✓ Handles peaks and troughs in loading	✗ Can fail after holidays or during a party
✓ Loves organic loads, such as milk down sink	✗ Food down the sink can lead to failure
✓ Handles a large range of household cleaners	✗ Must use a strict list of cleaners
✓ You can shower and wash when you want	✗ Must spread out water usage
✓ Recycles kitchen waste through a sink grinder	✗ Can't handle the extra load of sink grinder

HOW BIOLYTIX™ SOLVED THE WASTE TREATMENT RIDDLE

It was a humble beginning. In 1987 Dean Cameron couldn't find a waste treatment system that didn't have problems. When it comes to managing sewage he thought people shouldn't have to put up with foul smells, breakdowns and having to continually add chemicals. So he set out to invent the world's best system.

Convinced that nature had the answer, he studied such things as the decomposition of forest litter in rivers and on river edges. He discovered that the fastest decomposition was not occurring in the water, but rather on river edges.

"Historically, nearly all treatment systems leave the waste to fester in the water and expensively blow air into it",he said, "yet this is not how nature works". So Dean separated the waste from the water immediately and used selected organisms and smart engineering to convert it into structured humus. Before long he received fantastic results.

Investors, researchers and engineers quickly saw the benefits and created a dynamic team, including groups such as GHD Engineers, A Co-operative Research Centre (CRC), Spier Holdings, Queensland Uni and Murdoch Uni.

Dean's hunch turned out to be right.

Our Patent

"To use the waste material and the structured humus it produces as a filter for cleansing wastewater."

This cleverly turns the problem (the waste) into the solution (the humus to filter and clean the wastewater).

ecoEng LIMITED

Biolytix™ Filters

www.biolytix.com

Prepared by Andrew Dakers
ecoEng Ltd
Dakers@paradise.net.nz
13 Sept 2005

1 Background.

The Biolytix™ filters were developed and are manufactured by the Australian company Biolytix Technologies.

> The Managing Director of Biolytix Technologies is **Dean Cameron** Managing Director, based in, Maleny, Queensland
>
> The Project Engineer is **Gary Ingram**, based in Sandy Bay, Tasmania.
>
> Christchurch contact: Antony Willemse, ph 942 8901. Email: willemse@paradise.net.nz

The standard domestic filter is specifiedas BF6 2500 PAT. (i.e. a 2500 litre tank fitted with an effluent pump, air pump and telemetry phone alarm system. The process used in the Biolytix™ filters are similar to the biological process use in the wastewater treatment system, formerly known as **Dowmus.** The Dowmus filters that have been installed in New Zealand are essentially the "BF1" filter. Dean Cameron advises that;

> *There are about 60 Dowmus systems in the Auckland region and all are working well as primary systems - although there have been some issues with the sand filters used to bring the effluent quality up to secondary standard but the Dowmus process has proven very robust. Biolytix™ is servicing most of these units and upgrading them as required to newer bed configurations. High secondary effluent is being achieved from some prototype Biolytix™ Filters Model 5 installed in 2002*

The performance of the BF6 unit has been dramatically improved (over the BF1) *by using a deeper bed with much more retention time coupled with a fine barrier filter. To achieve this a new bed configuration was developed and internal bed support in the form of structural plastic media was developed to support the humus filter elements so that they do not compact and so reduce LTAR of the bed. Ecologically you can see that the process is very similar to the Dowmus.* (Dean Cameron, pers comm., 2005).

Gary Ingram reports (pers comm., 2005) that the new Biolyix BF6 system is different from the Dowmus unit (BF1) in that the *BF6 system has an enhanced bed design that provides strength to the filter bed (i.e. prevents bed compaction and reduction in natural aeration capacity of bed).* He notes that the BF6 system is equipped with completely re-engineered filter bed layers, pumping system, and electrics. Telemetry phone line alarm has also been added as standard components. Biolytix Technologies subjected their filters to a formal risk analysis to assist in engineering design of system and this resulted in *very low failure risks.*

Gary Ingram reports that the BF6 filter version has now been operating commercially in Australia for nearly 2 years and has been performing extremely well.

2 The Biolytix™ process

The BF6 unit uses an Everhard polymer tank fitted with a patented layered filter structure. The primary filtering layer consist of biologically active humus layer along with other layered media including peat. The manufacturer's describe the process as follows:

> *It cleverly turns the organic matter, which is the main problem in the first place, into the solution. The fine humus produced is then structured by soil invertebrates into a sponge-like porous filter medium. Like a rich organic top soil, earthworms and beetles continually burrow through it and keep it open, free draining and aerobic. Because it emulates the highly efficient breakdown that occurs in the surface layers of moist organic soils, our patented process generates no odour. Just as a forest floor can cope with a massive short term organic loading and break it down over time, so Biolytix Filtration can easily handle party peaks and long absences. These often cause competing processes to fail.*

For a more detailed explanation of the filter process refer to **Section 6**

3 Guarantee and Accreditation

The Biolytix™ units are new to New Zealand but well proven in Australia. A 20 year guarantee for the filters are available provided the system is maintained by accredited Biolytix™ service personnel.

The Biolytix Company report that:

> ***The Biolytix™ Filter, BF6 has been accredited in all Australian states (interim accreditation in Tasmania). To obtain accreditation the Biolytix Filter was independently tested to AS1546 and was proven to treat domestic wastewater up to 1,600 litres per day with 4 day peaks of 2,150 litres per day.***

Biolytix Award

Biolytix™ has been chosen In Top Five Australian Eco-Tech Companies: Biolytix™ was recently selected as one of the top five Australian Companies to be nominated by the Australian Government for the Global Eco-Tech Awards in Japan . The world winners are selected in September 2005.

4 Treatment Performance

The quality of the treated effluent is of a very high standard in terms of BOD_5 and suspended solids as presented in Table 1. Bacterial levels (F.Coliform) are not usually an issue if dispersal is by subsurface irrigation. However with respect to nutrients and coliform, the manufacturer reports:

- *Typically we were getting nutrient levels at around 8mg/L total phosphorus and 28mg/L total nitrogen*
- *Typically a 3-4 log reduction of coliforms is achieved through the Biolytix Filter bed..*

Table 1. BF6 effluent quality

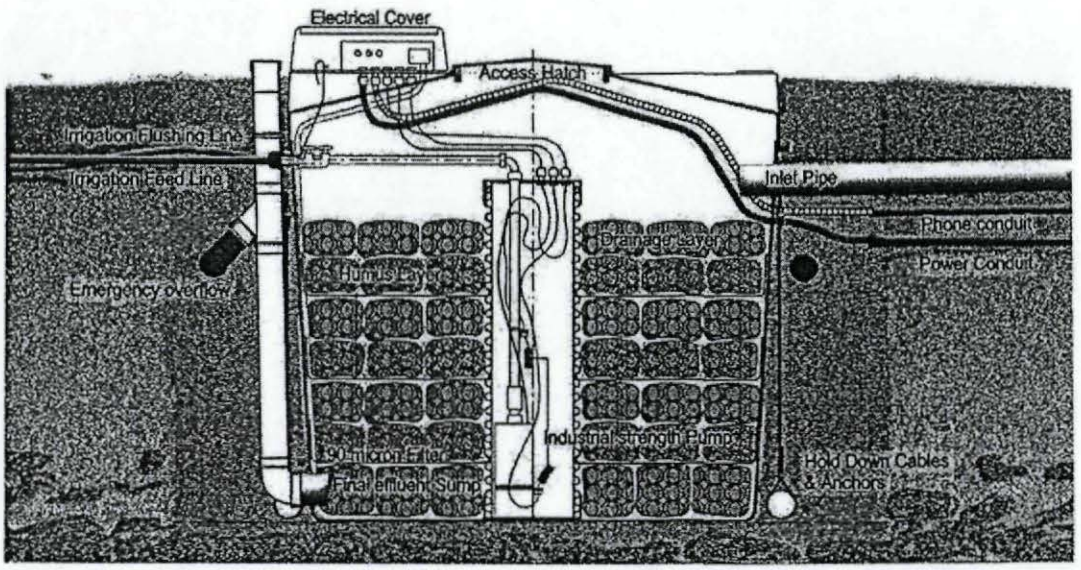
Characteristic	Results	Maximum	Average
BOD_5	100%<20 mg/L 90%<11.6 mg/L	14 mg/L	8.8 mg/L
Suspended solids	All < 30 mg/L 90%<8.9 mg/L	14 mg/L	5.4 mg/L
Dissolved Oxygen	100%>2.0	Minimum 2.2 mg/L	4.26 mg/L

5 A rationale for Choosing the Biolytix™ Treatment System.

- The system is simple, easy to install and easy to manage.
- The Biolytix™ filters achieve a very high and consistent standard of treatment of the wastewater, reducing the risk of clogging of the soil infiltration zone.
- The Biolytix™ filter process has high resilience to fluctuating loads and influent quality.
- The Biolytix™ filter tanks are totally sealed units preventing inflow from stormwater. The treated wastewater is pumped directly to the subsurface irrigation area through small bore pressure pipe so there are no manholes and therefore stormwater leakage.
- A servicing contract for ongoing operation and maintenance of the system will be in place with trained and competent agents.

6 How The Biolytix™ Waste Treatment System Works

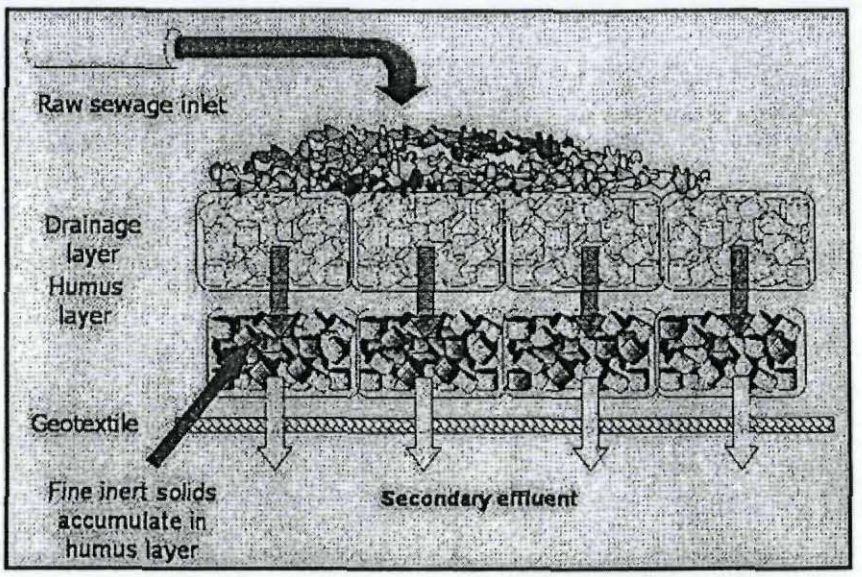
The following have been provided by Dean Cameron, Managing Director, Biolytix Technologies, Maleny, Queensland



Cross Section of a typical Biolytix Filter – BF6

The Biolytix™ Filter is a robust, organic soil ecosystem that converts sewage, wastewater, sanitary items and food wastes into irrigation water. All the wastes are simply fed onto the Biolytix™ Filter bed using standard plumbing. The top layer is made up of coarse mesh bags with plastic media in them. This houses the wet soil ecosystem. It accommodates worms, beetles and billions of microscopic organisms. These soil creatures are vital "macerator" organisms, breaking up the organic material, converting the waste into humus and structuring it so that its drainage and air porosity are continually renewed and maintained indefinitely. The organic matter particles then wash through and accumulate on the surface of a finely structured humus and coco-peat layer. Here it is reprocessed again and again and structured into a sponge-like filter by the soil organisms that live in it.

The fine structured compost has remarkable properties. It is 90% water by weight, yet has a high cation and anion exchange capacity. This means it adsorbs and holds back nutrients, chemical compounds and toxins for the trillions of living organisms to digest over time. (Competing treatment processes don't have this ability.) It also has powerful odour-absorbing capacity, which is why we can guarantee no odours.



Sewage entering the top section of the Biolytix™ Filter

After the last layer, the effluent has been well treated and a geofabric filter, about the diameter of the tank, filters out all particles larger than 90 micron. This three dimensional filter is biologically cleaned and does not need any maintenance. It protects the irrigation system from clogging up.

The water component of the wastewater finally accumulates in the sump where some more of the very fine sediment is settled out in a quiescent zone before the clear, reclaimed water can be pumped or drained to irrigation or reuse.

Each filter has an emergency storage of 1300Litres

The Smart Biolytix Patent

Biolytix™ has the patent to use the structured humus as the filter to cleanse the wastewater. This cleverly turns the problem (the waste) into the solution (the filter to cleanse the wastewater).

As the technology is fully aerobic it does not require an energy-intensive aquatic or odourous septic stage. The layered, flexible modular filter elements are designed to also be installed into a conventional septic tank unit, but are equally suited to be used within any vertical cylindrical tank (normally a minimum depth of approximately 1.5m is required).

Normally the filter is constructed within a standard 2500 litre polymer tank (1.88m diameter by 1.63m high). The only mechanical components in the standard treatment unit (BF6 filter) are a single-phase industrial strength pump and a tiny but robust (5 watt) air pump.

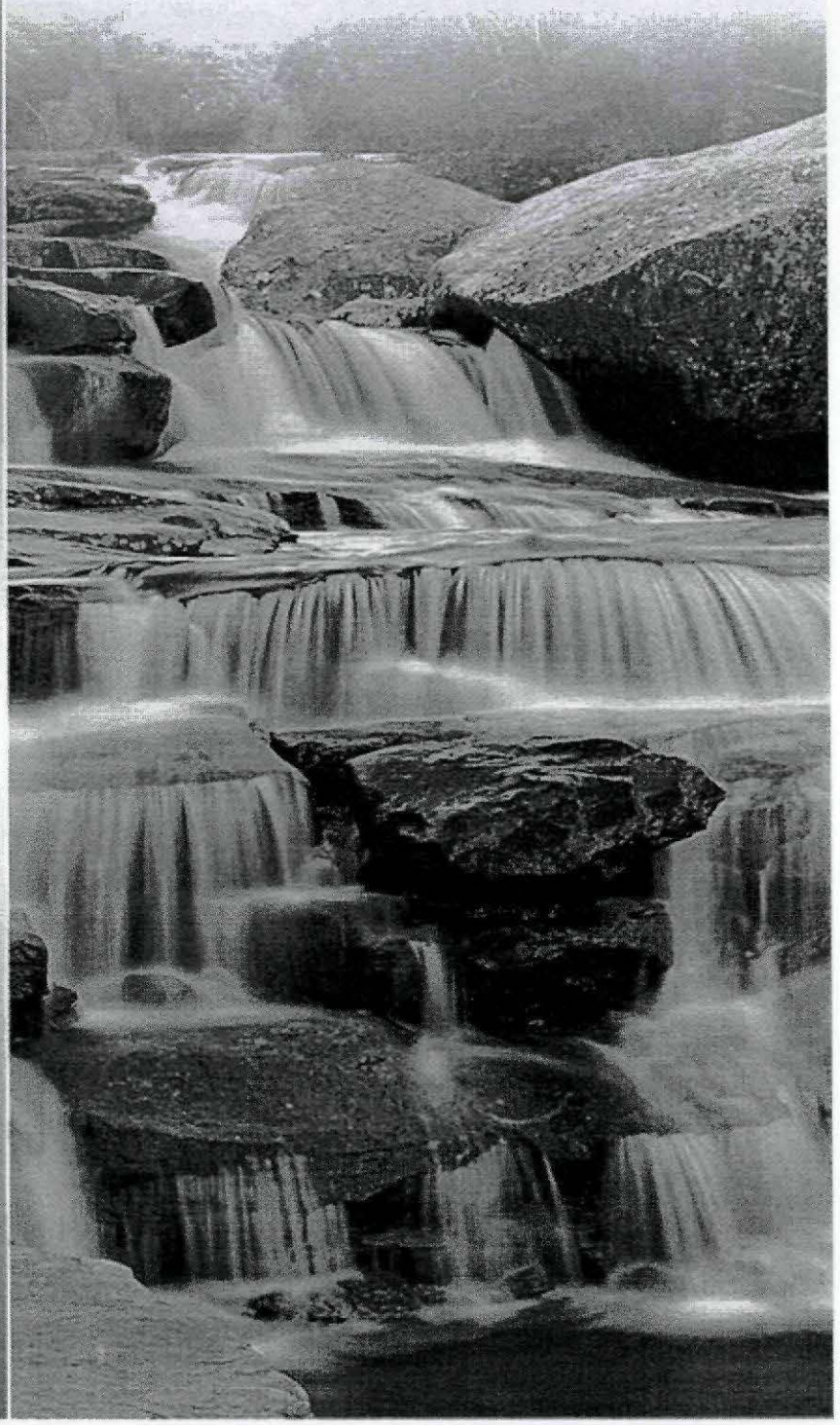
The Biolytix™ Filter can be scaled according to the wastewater loading.

'The Evolution Continues...'

TEXAS

TEXTILE ADVANCED SEWAGE S(

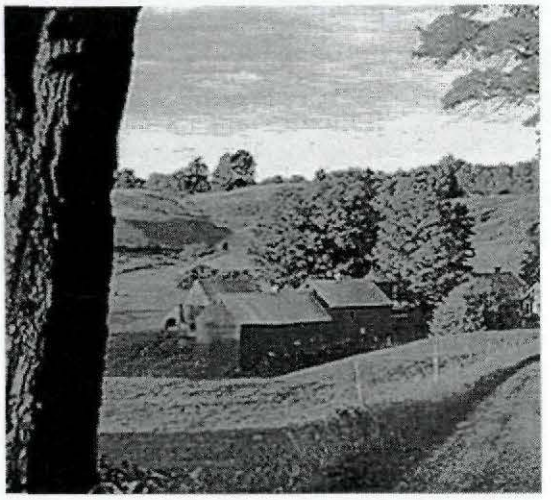
For domestic and Commercial applicatio



Developed in the USA Perfected and manufactured in NEW ZEALAND

Developed in the USA and perfected in New Zealand, the Texass (Textile Advanced Sewage S utilizes a textile media to efficiently filter the effluent over multiple passes, finally producir very high quality end product that is ideal for irrigating lawns, gardens and tree lots.

Texass
Textile advanced sewage solution



There have been various approaches to treating and filtering effluent over the years, the basic septic tank relying on simple settling out of solids with anaerobic action to clean the liquid before finally emptying back into the soil via ground sewage, filtering through sand or gravel. This old process results only 20% of the treatment happening in the tank with the result that the released liquid is still unclean, and accordingly unhealthy for both the environment and ourselves.

Today Government and local bodies are charged with keeping our environment and its ecology as pristine as possible. Regulations require any installation that handles the treatment of sewage will perform to approved standards, efficiently and effectively, day in – day out...and the final product must achieve certain measurable standards before it re-enters our environment.

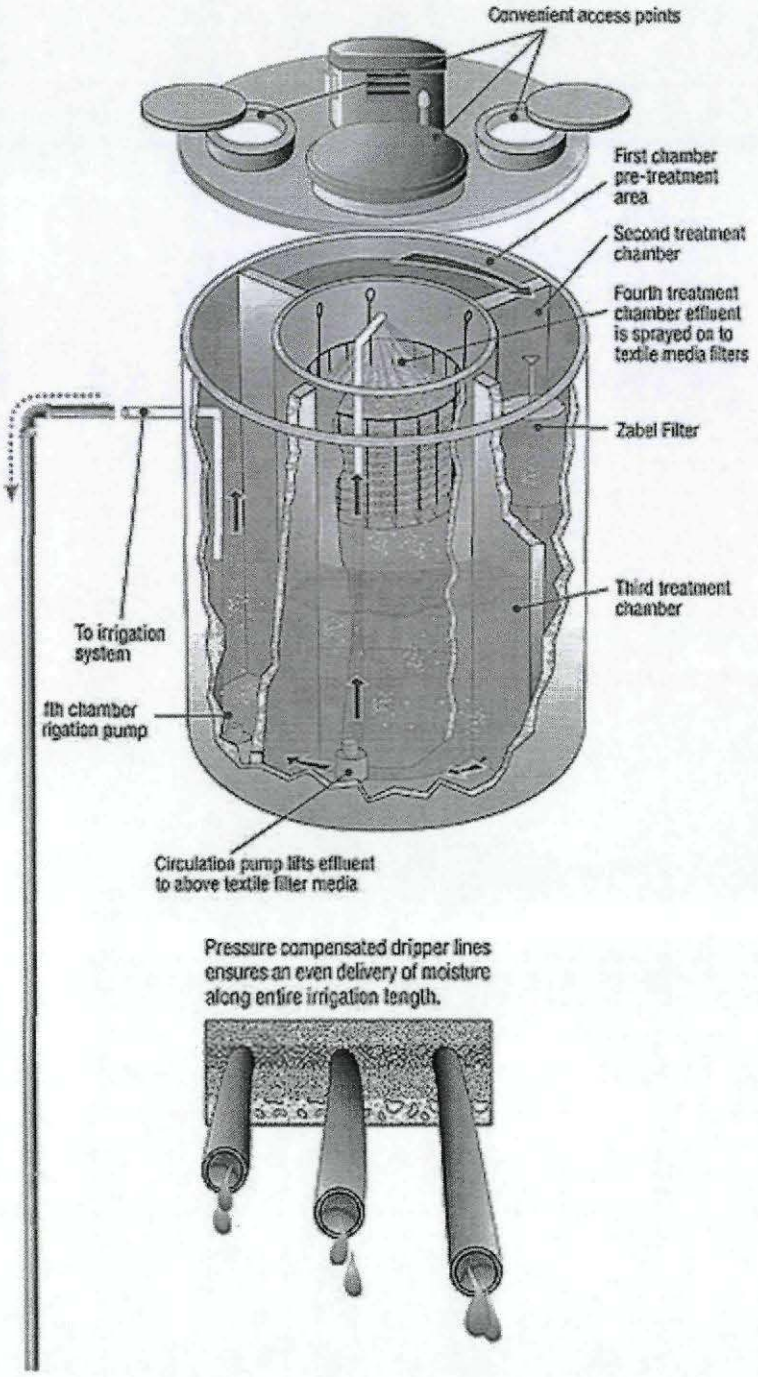
Working with proven American designed technology , Oasis Clearwater has perfected Texass, a textile filtering system that efficiently cleans the effluent through recirculation. After passing through solids settling and small particle filtering compartments, the effluent is pumped and sprayed several times through the unique textile filter.

Each pass cleans the liquid further until it is at the appropriate quality for dispersing through the irrigation system. The resulting ir exceeds both New Zealand's and Australia's stringent standards for the disposal of wastewater.

The Texass unit is manufactured as a complete unit from installation, there is no onsite construction ne footprint, below-ground-tank ensures there is a mir landscape.

Six key reasons why people prefer the Texa

Rugged durability and performance...
All the system components are of the highest standar free operation.
The textile filtering media is manufactured to a consiste for a high performance sewage treatment plant.
Texass units are contained in specially designed, conc where the installation access is difficult, we can suppl polypropylene tanks.



Easy installation

Relative to some other systems, the Texass system i install with no expensive back fill materials needed anc techniques required.
Installation is carried out by our trained installers, includ Each Texass installation has a 2-year warranty on all a when installed by our qualified installers.

Size does matter

In our case it's small!
Because the Texass system is so efficient, the o compact. This reduces excavation and disruption at the

Economical operation

The Texass system is cost effective to run.
The textile filtering media is manufactured to a consiste sand (used in some systems to filter effluent) its super performance can be assured from day one.
The recirculation system does not have to run constan activated intermittently. The first pump sprays the effl filter several times before the second pump sends the the irrigation system.

Maintenance minimal

The Texass system incorporates leading edge technol maintenance procedures straightforward and substanti systems. The Texass system has been designed and any need to enter the unit, with all critical components access lid on top of the tank.

We're here to help

Texass Systems and our Distributors are dedicated t your on-site waste water problems. We are firmly comn the highest quality products ensuring the protection of c systems are designed to Internationally recognised perf

Advantages of the Texass System

Home owners

- Protects water quality and enhances owners' quality of life.
- Saves water, money and protects our environment.
- Low operating and maintenance costs.

Councils and Developers

- High reliability, low maintenance systems.
- Reduced operating costs.
- Increased public health protection.

Engineers

- Proven design and Engineering.
- Reliable performance, reduced costs.
- Systems for domestic and commercial applications.
- Ideal for failed system renovation.

Contractors and Installers

- One chamber – one hole – one connection.
- Low maintenance, full range of spares available.
- On going manufacturer backup.

Technical Specifications

Primary Pre-treatment chamber	3500 litres
Secondary Pre-treatment chamber	750 litres
Packed Bed Reactor and Recirculation well	2150 litres
Pump well	1050 litres
Total operating capacity	7450 litres
Total holding capacity	9400 litres

- Control panel – Audio and visual alarm – sequential timers
- Tank construction - All concrete

Consistent with our policy of product improvement, we reserve the right to alter specifications without notice.

Texass design criteria

Design criteria and specifications for any Texass s daily hydraulic flow rates. Contact your local Texa your needs, they are trained specialists who requirements and specify the system to fit your situa

System size	Peak daily flow rates	T
up to 10 persons	1800 litres per day	T
11 to 17 persons	3000 litres per day	T
over 17 persons	refer to your Texass distributor	

Commercial systems available to 75m³ per day in m
Refer to Texass Systems Head Office¹ for further inf

Parameter	Units	Averag
BOD5	mg/L	<15
Suspended solids	mg/L	<15
Total N	mg/L	<15

Certifications

N.Z TP 58 APPROVAL – 3rd Edition
AUS/NZS 1547.2000 – On Site Domestic Waste Wa
AUS/NZS 1546 s 1: 1998 – Septic Tank Manufactur

<< RETURN TO PRODUCT INFORMAT

ABACUS DESIGN

ARCHITECTS PROJECT MANAGERS ENGINEERS

Site and Soil Evaluation Report

1.0 SITE INFOMATION

1.1 Location details:

Owner: Mr & Mrs Watts

Location: Ta Awaiti

Address: Tory Channel

1.2 Site Description:

1.3

Lot 1 DP10393 0.1ha
The site is rectangular in shape and is located adjacent to the Sounds Foreshore Reserve. A wet area and spring is located outside the rear boundary of the lot and a drain runs just out side the eastern boundary of the property. The site is generally flat with a slight fall to the sea and eastern side of the section. The site is vegetated with rough grass at present and features no existing developments.

1.3 Climate:

Annual rainfall (mm): Unknown

Annual Evaporation (mm): Unknown

1.4 Intended water supply:

Roof water supply or creek supply

1.5 Existing on-site systems:

No existing systems

1.6 Site Evaluator:

Name: Bronwen Frazer

Company/agency: Abacus Design

Address: PO Box 309
Blenheim

Phone: 5778857

Fax: 5779966

2.0 ON-SITE EVALUATION

2.1 Work Undertaken:

Details: Site visit & effluent design

Date: March 2006

Weather (on day and preceding week): dry

Photo Attached: NO

2.2 Topography:

Slope: flat

Drainage Patterns: site has previously featured poor drainage, however a drain has been formed along the eastern boundary which has dramatically improved drainage of the site, Further remedial drainage work is recommended below.

Ground Cover: rough grass

Boundaries: noted

Waterways: Wet area at rear of site & drain along eastern boundary

Well/Bores: none

Buildings: proposed 2 bedroom dwelling

Other: small site take into consideration size constraints

Site History (land Use):

Site Plan Attached: YES

2.3 Site Exposure:

Site Aspect: South

2.4 Environmental concerns: (e.g. High water table, wetlands, water ways etc.):

proximity to coastal waters, Drain and wet area at rear of site.

2.5 Site Stability:

Is expert assessment necessary: no

2.6 Drainage Controls:

Depth to seasonal water table: +0.6m below disposal level

Need for cut off drains/diversion banks: N/A

Need for surface water collector/cut off drains: N/A

2.7 Set back Distances:

2.0m from boundaries

Set back distance: 5m from wet area and spring at rear of site. Disposal field shall be located as far away as possible from coastal water.

Reserve area: not required as effluent shall be treated through a Secondary Treatment Plant system

3.0 SOIL INVESTIGATION

3.1 Soil profile determination Method: Auger Hole
A range of soil properties have been assessed in accordance with the procedures outlined in Appendix 4.1D of NZS1547:2000

3.2 Reporting

Test Site 1

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	200mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	700mm	Moist	Dark Brown	Loam	<30	-	Loam, with some light coloured fine sand particles, ribbon 25-30mm long. Contained many schist fragments.

Test site 2

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	200mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	650mm	Moist	Brown	Clay Loam	<30	-	Loam, with some light coloured fine sand particles, ribbon 40 mm long. Contained many schist fragments.

Test Site 3

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	150mm	Moist	Brown	Loam	<2	Moderate	Topsoil
3	720mm	Moist	Brown/Black	Loam	<30	-	Loam, with some light coloured fine sand particles, ribbon 25-30mm long. Contained many schist fragments. Slightly greasy feel due to organic matter

3.3 Estimated Soil Category:

Soil Test	1	2	3	4	5
Soil Category	3	3-4	3		

The estimated soil category has been determined based on Table 4.1.1 NZS 1547:2000 The assignment of soil category 3 is based on the texture and structure of the soil as described in 3.2 above and observations made during the site visit.

3.4 Recommended DLR / DIR

DIR: 3.6mm/day
Reason: DIR to be based on a category 4 soil to ensure the system design is conservative given the proximity to water bodies.

3.5 General Comments

4.0 DESIGN

4.1 Soil Category found on site: 3-4

4.2.1 Number of Bedrooms: two bedroom

4.3 Average Daily Flow Rate (Q) (Litres): 720L

Design Occupancy: 4 people
Flow Allowance: 180L per person per day

4.4 Septic Tank Capacity (Litres): minimum 4500L Secondary Treatment Plant suited to intermittent use

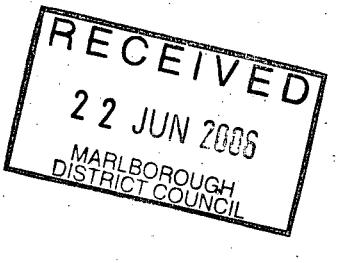
4.4 **Treatment Quality:**

Equal to or better than: 20g/m3 BOD5: 30g/m3 Total Suspended Solids

4.6 Loading Rate (DLR): 3.6mm/day

4.7 bed spacing (m): 1m line spacing

Note: Drip lines to be laid level following the ground contour. Lines shall be buried a depth of 150mm into the topsoil.



5.0 CALCULATIONS

$$A = \frac{720L}{3.6mm/day}$$

Disposal Area = 200 square meters of irrigate disposal field.

6.0 Assessment of other possible systems:

It would be possible to dispose of effluent through a septic tank and shallow bed disposal field. However due to the proximity of coastal water, drain and spring the environmental risk is unacceptable.

7.0 Best Practical Option

The best practical option for management of domestic wastewater is through the use the proposed system (as detailed in section 4.0 above) It is my opinion that this system is the best method for preventing or minimizing any adverse effects on the environment.

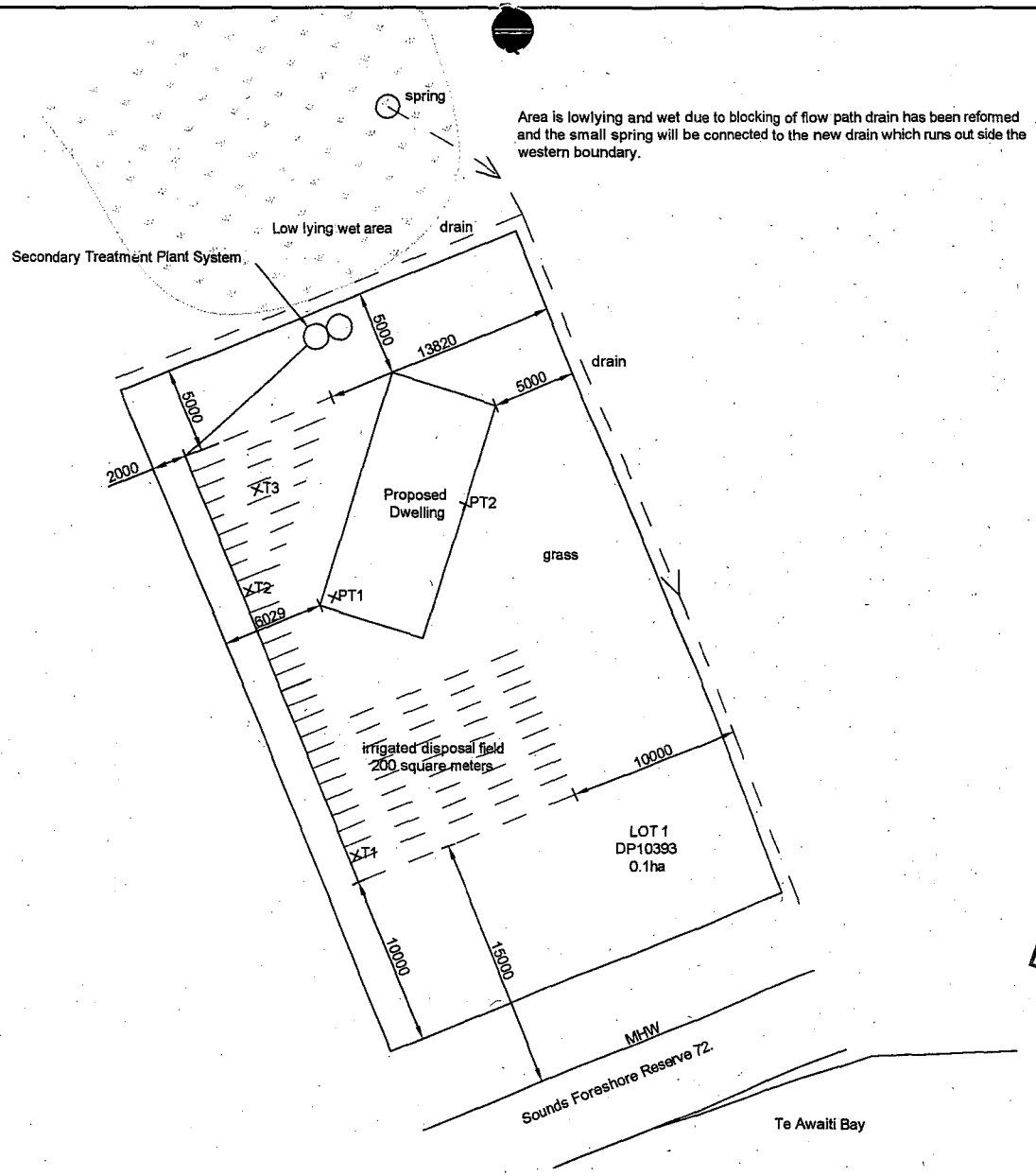
NOTES:

BUILDING SITE

PT1 = penetrometer test site 1
PT2 = penetrometer test site 2

EFFLUENT DISPOSAL FIELD
T1 = subsoil test site 1
T2 = subsoil test site 2
T3 = subsoil test site 3

Site plan should be read with report



Info

		CONSULTANTS ABACUS DESIGN	CLIENT WATTS	PROJECT TE AWAITI EFFLUENT DISPOSAL	DATE 20/03/06	AMENDMENT 01
				DRAWING SITE PLAN	DWG NO. SJ793-fig1	SCALE 1:300 (A3)
AMENDMENT DATE DETAILS	AMENDMENT DATE DETAILS	abacusdesign@xtra.co.nz - TEL 03 577 8857 - FAX 03 577 9966 - PO BOX 309 - 141 HIGH STREET - BLENHEIM - NEW ZEALAND			CAD FILE REF: SJ793-F1	

060654