Glen Parker-7022

From: Richard Race [richardr@designbase.co.nz]
Sent: Tuesday, 21 October 2008 2:26 p.m.
To: Glen Parker-7022
Subject: FW: W. & A. McCulloch, Miro Bay, Project Number 0403

Hi Glen,

Attached is a email response from Smart Alliances who designed the Wastewater system. Is this enough information for the resource consent issue?

Regards
Richard.

From: Dave Dravitzki [mailto:dave@smartalliances.co.nz]
Sent: Tuesday, 21 October 2008 2:05 p.m.
To: 'Richard Race'
Subject: RE: W. & A. McCulloch, Miro Bay, Project Number 0403

Hi Richard, no problems with the system. Just the minimum length of drip line will need to increase from 317m to 420m in order to meet the MDC design regulations which require maximum and permanent occupancy to be assumed.

Regards,

Dave Dravitzki
Engineering Geologist

SmartAlliances Ltd
PO Box 546
Blenheim,7240
T: **03 579 6211**
F: **03 579 6233**
E: dave@smartalliances.co.nz

From: Richard Race [mailto:richardr@designbase.co.nz]
Sent: 21 October 2008 13:46
To: dave.dravitzki@smartalliances.co.nz
Subject: W. & A. McCulloch, Miro Bay, Project Number 0403

Hi Dave,

We had a wastewater engineering report produced by yourself back in July 07 for the McCulloch Residence, Miro Bay. Project Number 0403.
When this was lodged for resource consent late last year, the proposed residence was a 3 bedroom holiday home. When the building consent was lodged the client changed the dwelling into a 4 bedroom holiday home.

Now council have placed a hold notice on the current job. Are you able to confirm if the

wastewater system that Smart Alliances designed back in 07, be able to handle a 4 bedroom holiday home or if a whole new system will have to be designed.
If you can look into this as soon as possible as the builder has already started on site.

Regards,
Richard Race
Architectural Designer

DESIGNBASE LIMITED
ARCHITECTURAL + ENGINEERING

49 Esk Street
PO Box 156
Invercargill
Phone: +64 3 218 2429
Fax: +64 3 218 2319
Email: richardr@designbase.co.nz

Glen Parker-7022

From: Richard Race [richardr@designbase.co.nz]
Sent: Wednesday, 22 October 2008 6:21 p.m.
To: Glen Parker-7022
Subject: RE: W. & A. McCulloch, Miro Bay, Project Number 0403

U070863 for Lot 2 DP 347730

On Wed, 22 Oct 2008 09:23:55 +1300, "Glen Parker-7022"
<Glen.Parker@marlborough.govt.nz> wrote:
> Richard
> We have two discharge permits for McCulloch properties in Miro Bay,
> U070863 for Lot 2 DP 347730 and U070868 for Lot 3 DP 3701. Which
> property is this application for?
>
> _____
>
> From: Richard Race [mailto:richardr@designbase.co.nz]
> Sent: Tuesday, 21 October 2008 5:16 p.m.
> To: Glen Parker-7022
> Subject: FW: W. & A. McCulloch, Miro Bay, Project Number 0403

>
>
>
>
>
> _____
>
> From: Dave Dravitzki [mailto:dave@smartalliances.co.nz]
> Sent: Tuesday, 21 October 2008 5:14 p.m.
> To: 'Richard Race'
> Subject: RE: W. & A. McCulloch, Miro Bay, Project Number 0403
>
>
>
> No problem Richard. Files attached.
>
>
>
> Cheers,
>
Dave.

>
>
> From: Richard Race [mailto:richardr@designbase.co.nz]
> Sent: 21 October 2008 14:47
> To: 'Dave Dravitzki'
> Subject: RE: W. & A. McCulloch, Miro Bay, Project Number 0403
>
>
>
> Thanks for the fast reply Dave,
>
>
>
> Are you able to update and send through your wastewater system design
> sheet and irrigation system calculations as a .pdf so I can forward
> them onto the council.
>
>
>
> Many thanks,
>
> Richard Race

smartalliance
ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS

Irrigation System Calculation

Project Title: W & A McCulloch — Date:
File Ref: 0403 — Operator:

Acceptable daily loading rate (mm/day)	3.6
Daily influent (l/day)	1440
Emitter type	Raam 17
Emitter flow rate (l/h)	1.6
Emitter Spacing (m)	1
Dripline Spacing (m)	1
Distance from Treatment system to Irrigation Field (m)	5
Field Size (m^2)	400
Field length assuming square area	20
Number of lines	21
Total Dripline Length (m)	420
Total flow Rate Required (l/h)	672

Pump Duty

Flow (l/h)	672
Head (m)	12

Head-Loss Table

Item	Head loss (m)
Emitter	5
Lateral	0
Submain	1
Main	0.06
Water meter	0
Filter	3
Tank Depth	2
Elevation	0
Sub Total	11.06
Total	12

NOTE:
This design is indicative only and detailed design is the responsit

21.10.08
D. Dravitzki

Comments
Minimum pressure required
Head loss insignificant
Using Netafim Raam 17 as a submain
Using 25mm LDPE x main length
For a 15mm Multijet Turbine Water Meter
For a Semi blocked filter
including 10%

ɔility of the installer.

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WASTEWATER SYSTEM DESIGN SHEET

To AS/NZS 1547:2000

Client: McCulloch, Miro Bay **File No: 0403**

Intended water Supply:

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

Local experience with existing on-site systems:

Septic Tank or similar (Primary treatment): Secondary treatment:

~~*OK when installed properly with a correctly sized level drainage area and maintained.*~~ *Produce high quality effluent suitable for irrigation.*

Recommendation for this site: *Secondary treatment system utilising irrigation system effluent disposal (Biolytix System)*

DRAINAGE CONTROLS:

Need for surface water collector / cut-off drains?

AVAILABILITY OR RESERVE / SETBACK AREAS

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

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

Ksat, (m/day): ESTIMATED SOIL CATEGORY: *Category 4 - Imperfectly drained loam*

Design

RECOMMENDED D.I.R. *25.0* mm/week

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

8 Permanent People At 180 L/person/day: *1440* L/day from Appendix 4.2D AS/NZS 1547:2000

DESIGN WEEKLY FLOW: *10080* L/week

Septic tank size (min):

AREA REQUIRED: *403.2* m²

LENGTH REQUIRED: *420.0* m . **(Refer Irrigation System Calculation sheet)**

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

RECOMMENDATION :

Biolytix Secondary treatment with dripper line irrigation to be a minimum total length of 420m using 1.6 l/hr emitters Lines to be laid at 1.0m spacing to follow contours (when possible), at 150mm below ground level. Installation of the irrigation system to be in accordance with the product Installer Guide. Detailed design of the irrigation system is to be responsibility of the installer.

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ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS LTD

SmartAlliances Ltd
PO Box 546
Blenheim, 7240

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

W. & A. McCulloch

Engineering Report

Proposed Residential Dwelling

Lot 2 DP 347730, Miro Bay

30 July 2007

W. & A. McCulloch
Proposed Residential Dwelling
Lot 2 DP 347730
Miro Bay, North West Bay, Pelorus Sound

Contents

1 Introduction

1.1 This report presents the details of an additional geotechnical and engineering appraisal undertaken at Lot 2 DP 347730, Miro Bay, North West Bay, Pelorus Sound. It is understood that the current owners, W. & A. McCulloch, are proposing to construct a three bedroom residential dwelling at the site, at the location shown on the site plan presented in Appendix 1 of this report.

1.2 No building development exists on the site to date. Smart Associates have previously undertaken engineering investigations for the underlying subdivision, and an Engineering Report was prepared, reference W2003-817, dated July 2003.

1.3 As the currency of this report has elapsed and the proposed house location differs from that investigated for the underlying subdivision, additional site appraisal and engineering assessment has been undertaken in order to meet the current Marlborough District Council regulations.

1.4 The property legal description is Lot 2 DP 347730, and the land area is 4,332m^2.

1.5 The property is located on the side slopes of a spur ridge landform on generally moderate slopes of 20°-22° with a southwest aspect. The proposed building site is vegetated in moderately dense regenerating native bush. An existing track is located on a right of way along the southern boundary of the property. A 2m wide water easement runs diagonally across the section although the water supply pipe does not follow the easement.

1.6 The subject site is zoned as 'Sounds Residential' and is not shown to be on 'unstable' land according to the Marlborough District Council Sounds Resource Management Plan.

1.7 The site assessment was carried out on the 18th July 2007 by Mr Dave Dravitzki of this office.

2 Geotechnical Assessment

2.1 The geotechnical assessment (refer Appendix 2) generally considers the site in the area assessed to be stable. Although the deposits underlying the site comprise ancient landslide deposits, no evidence of active or recent slope instability was identified at the site at the time of investigation reported herein.

2.2 The borehole and test data indicate that the subsoils underlying the location of the proposed dwelling generally comprise orange-brown silty clay loam colluvial soils of a very stiff (medium dense) consistency.

2.3 It is recommended that all foundations be designed and constructed in accordance with NZS 3604: 1999 with a minimum founding depth of 1.0m below cleared ground level. Structural items outside the scope of NZS 3604:1999 for the construction of any proposed dwelling on the site must be designed by a Chartered Professional Engineer.

3 Access

3.1 The proposed building site is serviced by the existing track and right of way to the Miro Bay foreshore, which generally meets the MDC requirements of an overall gradient of 1:6 with no section steeper than 1:5.5 for a length greater than 20m.

4 Water Supply

4.1 It is understood that the site is serviced by an existing water supply located on the site which will provide the water supply the proposed dwelling.

4.2 In order to minimise the demand on the water supply, it is recommended that rain water from the proposed dwelling at the site be collected and used to aid the water supply for the domestic use of the proposed residential dwelling.

4.3 It is recommended that tanks giving a total minimum storage capacity for domestic use of 30,000 litres be installed for any new dwelling constructed at the site. Tanks are to be connected in series.

4.4 Water for fire-fighting purposes should satisfy the New Zealand Fire Service Code of Practice for Fire Fighting Water Supplies. It is recommended that a domestic sprinkler system be incorporated into the design of the proposed dwelling, connected to the 30,000 litre tank necessary for domestic use.

5 Stormwater Control

5.1 Natural drainage is well developed away from the building site with strong natural drainage vectors to the southwest which should be able to accommodate an appropriately designed dispersed stormwater discharge for all stormwater from roofed and paved areas that is not retained for domestic use.

5.2 It is recommended that appropriate scour protection be provided to the discharge outlet of any proposed stormwater system so as to minimise against potential erosion and scour.

6 Wastewater Treatment and Management

6.1 The site investigation identified a suitable wastewater land application area proximal and upslope and to the east of the proposed building site, as indicated on the site plan.

6.2 The landform element is linear planar with southwest facing slopes (bearing 260°) of approximately 15°-22°. The existing vegetation comprises moderately dense regenerating bush.

6.3 Three test pits were dug in the proposed effluent land application area and their locations are shown on the site plan. Based on the soil assessment carried out, an average drainage category of 4 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	
0.1	A	Topsoil	Brown	Silt Loam	2%	Very Loose	Very Soft	Strong	Moist	2
0.3	B	Colluvial	Orange + Yellow-Brown	Clayey silt loam	5%	Loose	Stiff	Strong	Moist	3
0.6	C	Colluvial	Orange-brown	Clay loam	None	Medium Dense	Very Stiff	Weak	Moist	4

W2

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.1	A	Topsoil	Brown	Silt Loam	2%	Very Loose	Very Soft	Strong	Moist	2
0.3	B	Colluvial	Orange + Yellow-Brown	Clayey silt loam	5%	Loose	Stiff	Strong	Moist	3
0.5	C	Colluvial	Orange-brown	Clay loam	None	Medium Dense	Very Stiff	Weak	Moist	4
0.6	Struck Boulder									

W3

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.1	A	Topsoil	Brown	Silt Loam	2%	Very Loose	Very Soft	Strong	Moist	2
0.3	B	Colluvial	Orange + Yellow-Brown	Clayey silt loam	5%	Loose	Stiff	Strong	Moist	3
0.6	C	Colluvial	Orange-brown	Clay loam	None	Medium Dense	Very Stiff	Weak	Moist	4

6.4 In accordance with Plan Change 7 Rule 27.2.4.5.5 an assessment of the best practical option has determined that secondary treatment and drip irrigation wastewater disposal is the most practical option for this property, when average soil drainage characteristics and site topography considerations are taken into account.

Although the July 2003 report had considered this area as being suitable for conventional trench effluent application, guidelines published since the time of that report do not favour placing conventional beds on slopes steeper than 14° (1:4), and this method of land application is no longer considered to be suitable for the subject site.

6.5 A secondary treatment system involves aerobic biological processing and settling or filtering of effluent received from a primary unit. As it is expected that the dwelling will be used intermittently, the following system is considered suitable this situation:

Biolytix BF6 3000 PAT treatment system coupled with drip irrigation. System performance details are:

BOD after 5 days (average) $< 8.8\ g/m^3$
Suspended solids (average) $< 5.4\ g/m^3$

A Biolytix system specification is attached (Appendix 5).

The design irrigation rate for Category 4 soil is 25mm/week (i.e. 3.6mm/day).

6.6 For the purposes of design it has been assumed that the proposed 3 bedroom dwelling to be constructed at the site will have a permanent occupancy of 6 people (as per MDC Guidelines for new on-site wastewater management systems) to calculate a design flow of 1080litres/day for the new dwelling. A minimum wastewater storage capacity of 4000 litres is required. The 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 stream water supply source for the proposed dwelling.

6.7 The length of drip line required for any new dwelling is 317m (refer wastewater design sheets Appendix 4). The irrigation system design requires 1.6 litre/hr emitters with lines laid at 1.0m spacing and at 150mm below ground level. The installation of the irrigation system is to be in accordance with the product installer guide supplied by the manufacturer.

6.8 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.

6.9 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.

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

7 Power

7.1 A reticulated power supply exists in the area. A connection to the reticulation for the proposed dwelling will have to be sought through Marlborough Lines.

8 Conclusion

8.1 It is confirmed that the proposed building site at the subject property is a stable building site, and that the property is considered to be suitable for the proposed residential building development provided the conditions and recommendations covered in this report are implemented.

8.2 It is confirmed that there is sufficient area available for the adequate treatment and discharge of wastewater proximal to the proposed building site.

9 Recommendations

9.1 It is recommended that all foundations be designed and constructed in accordance with NZS 3604: 1999 with a minimum founding depth of 1.0m below cleared ground level. Structural items outside the scope of NZS 3604:1999 for the construction of any proposed dwelling on the site must be designed by a Chartered Professional Engineer.

9.2 It is recommended that rain water from any proposed dwelling at the site be collected and stored to aid the stream water supply source for the proposed residential development.

9.3 It is recommended that tanks giving a total minimum storage capacity for domestic use of 30,000 litres be installed for any new dwelling constructed at the site. Water for fire-fighting purposes should satisfy the New Zealand Fire Service Code of Practice for Fire Fighting Water Supplies.

9.4 It is recommended that all stormwater collected on the site from roofed and paved areas that is not retained for domestic purposes be collected in a controlled manner and be directed into an appropriately designed dispersed stormwater discharge and that appropriate scour protection be provided to the discharge outlet of any proposed stormwater system so as to minimise against potential erosion and scour.

9.5 A Biolytix Secondary Treatment System coupled with a drip irrigation system is recommended for this site. Installation is to be in accordance with the requirements and recommendations of AS/NZS1547:2000.

10 Limitations

This report is valid for two years from the date of issue and covers the inspection of the building area shown on the appended site plan in order to assess the development risk in the context of land and foundation stability, house site location, foundation requirements, access, stormwater control, water supply and wastewater treatment and management only, on behalf of Mr and Mrs W & A McCulloch. 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.

The conclusions and recommendations expressed herein have been prepared with respect to the proposed development at the site, and should not be taken out of context from the proposed development discussed herein or the remainder of this report.

11 References

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

Report prepared by:

Dave Dravitzki
Engineering Geologist
30 July 2007

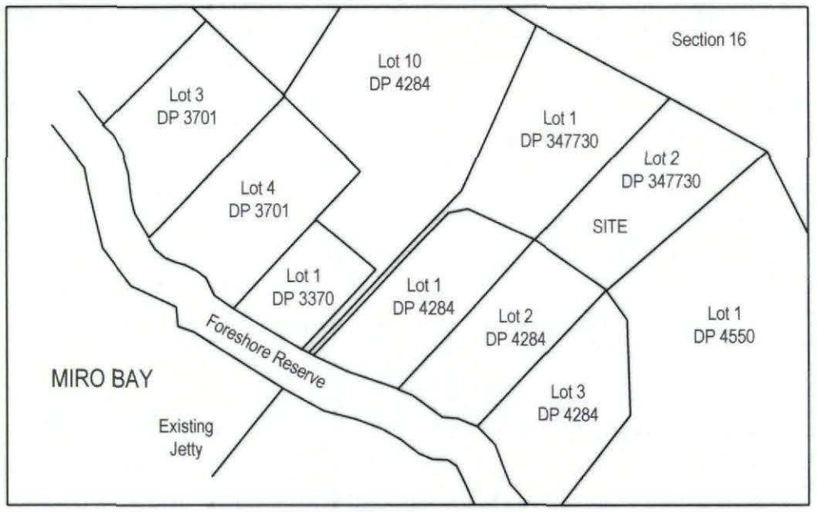
Report reviewed by:

Jan Dimmendaal
Chartered Engineer

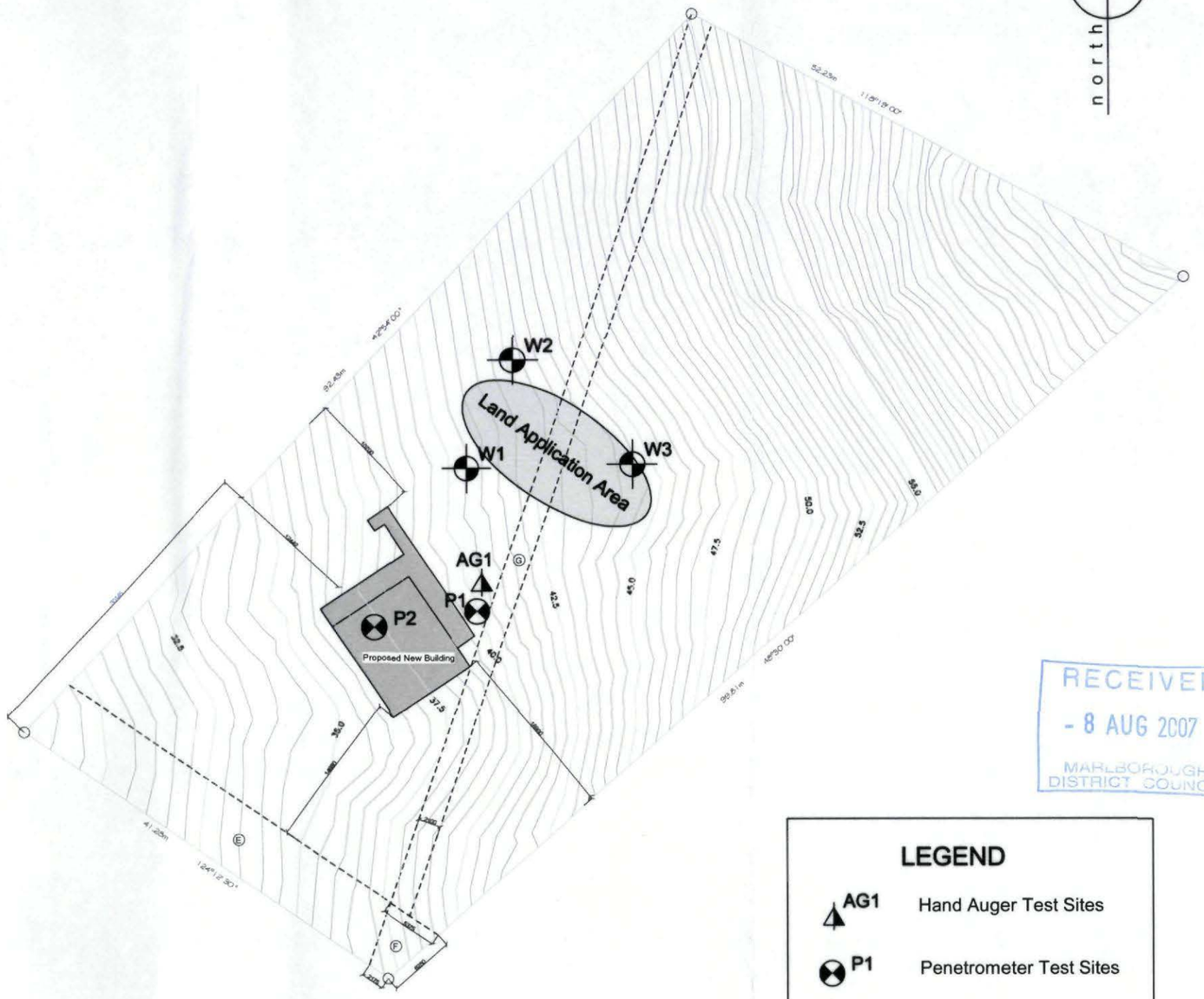
Appendix 1 – Location & Site Plan

REVISIONS

1. **LOCALITY MAP A**
NTS



2. **LOCALITY MAP B**
NTS



3. **SITE PLAN**
1:500

north

RECEIVED
- 8 AUG 2007
MARLBOROUGH DISTRICT COUNCIL

LEGEND

AG1	Hand Auger Test Sites
P1	Penetrometer Test Sites
W2	Wastewater Test Sites

Note: Adopted from Design Base Ltd drawing 06061-01-A101, dated 6.6.07

smartalliances
ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS LTD

SmartAlliances Ltd
PO Box 546
Blenheim, 7240
T: 03 579 6211
F: 03 579 6233
E: info@smartalliances.co.nz

W & A McCULLOCH PROPOSED RESIDENTIAL DWELLING LOT 2 DP 347730, MIRO BAY	LOCATION & SITE PLAN		DRAWING No. **001**
PROJECT No. **0403**	DRAWN DD	CHECKED JD	SCALE (A3) As Shown
	COMPUTER FILE: COMP_FILE		DATE 25.07.07 REVISION /

Appendix 2 – Geotechnical Report

Geotechnical Report

A SYNOPSIS

1. Scope of Investigation

1.1 A geotechnical site investigation was requested by the client in order to address the geotechnical considerations relating to the proposed building to be constructed at Lot 2 DP 347730, Miro Bay, North West Bay, Pelorus Sound. This report addresses the geological and geotechnical conditions relating to the subject site, and in adjacent areas where such areas are considered relevant, in order to provide an assessment of the land stability and foundation conditions as they relate to the proposed residential development.

1.2 The plans and sections presented with this report are for geotechnical purposes only.

1.3 The site assessment was carried out on the 18th July 2007 by Mr Dave Dravitzki of this office.

1.4 This report has been prepared in terms of the Marlborough District Council Requirements for the Provision of Geotechnical Reports, File C270-12, dated January 2005.

2. Summary and Conclusions

2.1 The subsurface conditions underlying the location of the proposed development at the site have been investigated by means of a single hand augered borehole and two scala penetrometer tests.

2.2 The proposed building development is located on ancient landslide debris and colluvial deposits.

2.3 The landslide deposits are generally considered to have stabilised over the extent of the proposed building development with no signs of active or recent slope instability identified at the site.

2.4 It is considered that the slopes at the subject site are generally stable with satisfactory foundation conditions for the proposed building to be constructed at the site at the location shown on the attached site plan, provided that the various recommendations made in this report are adopted.

2.4 The Development Risk is assessed as LOW (geotechnical risk matrix).

3. Recommendations

3.1 It is recommended that all foundations be designed and constructed in accordance with NZS 3604: 1999 with a minimum founding depth of 1.0m below cleared ground level. Structural items outside the scope of NZS 3604:1999 for the construction of any proposed dwelling on the site must be designed by a Chartered Professional Engineer.

3.2 The existing vegetation at the site should be protected from felling as far as practicable to prevent uncovered soils from being subject to slope erosion and surface water scour. Vegetation and root systems aids the prevention of local soil slumps.

3.3 It is recommended that appropriate scour protection be provided to the discharge outlet of any proposed stormwater system so as to minimise against potential erosion and scour.

3.4 It is recommended that, unless the stability of any developmental earthworks (i.e. constructed for an access driveway, building platform or landscaping) is considered in detail by a chartered professional engineer, fill end slopes and cut batter slopes should not exceed a maximum slope angle of 1:3 and a maximum vertical height of one metre.

B. REPORT

1 Site Description

1.1 Introduction

This report presents the details of a geotechnical investigation undertaken for the proposed residential dwelling for W & A McCulloch at Lot 2, DP 347730, Miro Bay, North West Bay, Pelorus Sound.

The subject site is zoned as 'Sounds Residential' and is not identified as being on unstable ground according to the Marlborough District Council Sounds Resource Management Plan.

1.2 Geological Setting

The New Zealand Geological Map (Begg and Johnston 2000) indicates that the site is underlain by Pleistocene to Holocene age landslide deposits within Marlborough Schist bedrock of Permian age (Caples Group, textural sub-zone IIA). Observation of exposures along the foreshore and the results of the borehole investigation generally confirms the stratigraphy as indicated on the geological map.

No active faults are indicated in the vicinity of the subject site. The greater Marlborough Region is however located within an active seismic zone and it should be anticipated that a minimum ground shaking condition equivalent to a Modified Mercalli Intensity of VII to VIII would be experienced during the design life of any proposed dwelling, and it is recommended that any proposed building be appropriately designed to mitigate against the adverse affects of such potential ground shaking.

1.3 Topography and Vegetation

The subject site is located on the eastern side of Miro Bay within North West Bay, Pelorus Sound, and comprises the secondary row of residential properties back from the foreshore. The site generally slopes moderately at 20°-22° to the southwest towards the foreshore, and is generally vegetated in moderately dense regenerating bush.

The existing vegetation at the site should be protected from felling as far as practicable to prevent uncovered soils from being subject to slope erosion and surface water scour. Vegetation and root systems aids the prevention of local soil slumps. zone

1.4 Recent and Historic Instability

No evidence of active or recent slope instability was identified at the site at the time investigation reported herein. Although the site slopes contained some surface slope wash debris, no signs of significant active soil creep was identified on the slopes in the vicinity of the proposed development.

Observation of the soil exposures along the foreshore identified that the soils comprise colluvial landslide debris within an orange-brown clayey silt matrix.

The landslide deposits are generally considered to have stabilised over the extent of the proposed building development.

It is therefore considered that the slopes affecting the proposed dwelling are stable, and that the proposed development at the site is unlikely to be adversely affected by potential slope instability, providing that the various recommendations of this report are adhered to.

2 Geotechnical Investigations

The geotechnical conditions relating to the proposed dwelling have been determined by a single hand augered borehole, numbered AG1, and two scala penetrometer tests, numbered P1 and P2. The borehole log and penetrometer test results are attached to this report (Appendix 3). The locations of AG1 and P1 and P2 are shown on the appended site plan.

3 Geotechnical Assessment

3.1 Foundation Conditions

The borehole log for AG1 indicates that the subsoils underlying the location of the proposed dwelling generally comprise orange-brown clayey silt and clay loam colluvial soils of a very stiff (medium dense) consistency.

The scala penetrometer test results indicate that subsoils generally have a minimum soil bearing resistance of 100 kPa. It is expected that the borehole and scala test results were terminated on boulders within the colluvium, and not on schist bedrock materials.

On the basis of the foregoing, it is considered that the site is suitable for the proposed residential building construction on conventional shallow foundations designed and constructed in accordance with NZS 3604:1999. A minimum founding depth of 1.0m below cleared ground level is recommended for the proposed piled foundations to allow for the steepness of the topography.

Structural items outside the scope of NZS 3604:1999 for the construction of any proposed dwelling on the site must be designed by a Chartered Professional Engineer.

The investigation reported herein has only appraised the slopes affecting the building platform for the proposed dwelling, including the immediate backslope. No detailed assessment of the stability of the slopes away from the proposed building platform has been undertaken.

It is recommended that, unless the stability of any developmental earthworks (i.e. constructed for an access driveway, building platform or landscaping) is considered in detail by a chartered professional engineer, fill end slopes and cut batter slopes should not exceed a maximum slope angle of 1:3 and a maximum vertical height of one metre.

3.2 Land Application Area (Wastewater)

An assessment of the location of the Land Application Areas for the on-site wastewater disposal systems for the subdivision was carried out, the details of which are presented in the Engineering Report associated with this Geotechnical Report.

It is not expected that the application of low-rate drip irrigation will have any significant adverse affect on the stability of the site.

3.3 Access

Access to the building site is available via the existing track and right of way to the foreshore.

3.4 Stormwater disposal

Natural drainage is well developed towards the southwest with moderate to strong natural drainage vectors which should be able to accommodate an appropriately designed dispersed stormwater discharge for all stormwater from roofed and paved areas that is not retained for domestic use.

It is recommended that appropriate scour protection be provided to the discharge outlet of any proposed stormwater system so as to minimise against potential erosion and scour.

3.5 Development Impact

The development risk is assessed as LOW (geotechnical risk matrix).

4 Control Measures

4.1 It is recommended that all foundations be designed and constructed in accordance with NZS 3604: 1999 with a minimum founding depth of 1.0m below cleared ground level. Structural items outside the scope of NZS 3604:1999 for the construction of any proposed dwelling on the site must be designed by a Chartered Professional Engineer.

4.2 The existing vegetation at the site should be protected from felling as far as practicable to prevent uncovered soils from being subject to slope erosion and surface water scour. Vegetation and root systems aids the prevention of local soil slumps.

4.3 It is recommended that appropriate scour protection be provided to the discharge outlet of any proposed stormwater system so as to minimise against potential erosion and scour.

4.4 It is recommended that, unless the stability of any developmental earthworks (i.e. constructed for an access driveway, building platform or landscaping) is considered in detail by a chartered professional engineer, fill end slopes and cut batter slopes should not exceed a maximum slope angle of 1:3 and a maximum vertical height of one metre.

5 Management Plans

There are no geotechnical issues associated with the proposed development that require the implementation of any MDC management plan additional to those already in force.

6 Limitations

This report is valid for two years from the date of issue and relates to the geotechnical conditions underlying the proposed house site at the subject site. 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.

The conclusions and recommendations reported herein have been prepared with respect to the proposed development at the site, and should not be taken out of context from the proposed development discussed herein or the remainder of this report.

7 References

1. Begg, J.G. and Johnston, M.R. (compilers) 2000. New Zealand Geological Map 10: Geology of the Wellington area, 1:250,000.

Dave Dravitzki, *Engineering Geologist*
B.Sc, M.Sc
27 July 2007

Appendix 3 – Hand Auger Logs & Penetrometer Test Results

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HAND AUGER BOREHOLE LOG

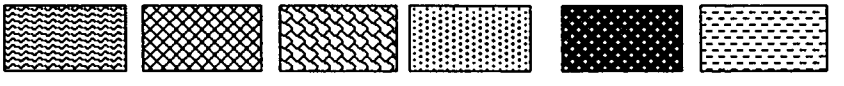
Client:	W & A McCulloch	**Date:**	18.07.07
Project:	Proposed Dwelling	**Logged by:**	D. Dravitzki
Site:	Lot 2 DP 347730 Miro Bay	**Project No:**	0403
		Site No:	**AG1**

Horizon	Description	Depth (m)	Graphic Log	Comments
A	Silt loam, brown, loose, soft, 2% gravel	0.1		Topsoil
B	Clayey silt loam, orange mottled yellow brown, medium dense, very stiff, 5% gravels, slightly plastic, moist	0.3		Colluvial
C	Clay loam, orange-brown, medium dense, very stiff, slightly plastic, moist	0.7		
C-R	Sandy loam, orange-brown, very stiff, medium dense, 10% gravels, non plastic, dry	0.8		
	Borehole Terminated			

Notes: 1. Groundwater not encountered on 18.07.07

Symbols: Main Soil Type: Organic, Fill, Gravel, Sand, Silt, Clay

Graphic:



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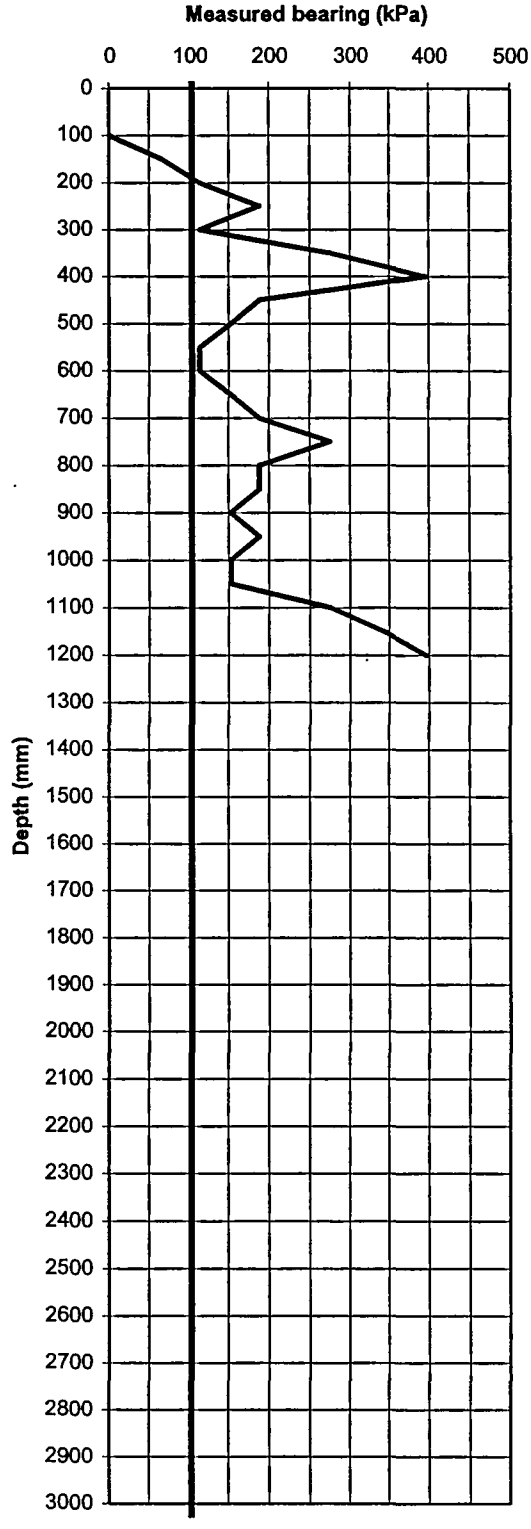
PENETROMETER TEST RESULTS

Client: W & A McCulloch
Project: Proposed Dwelling
Site: Lot 2 DP 347730
Miro Bay

Date: 18.07.07
Investigator: D. Dravitzki
Project No: 0403
Site No: P1

Notes:

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
	0	0	100
1	50	66	150
2	25	113	200
4	13	188	250
2	25	113	300
6	8	275	350
10	5	396	400
4	13	188	450
3	17	153	500
2	25	113	550
2	25	113	600
3	17	153	650
4	13	188	700
6	8	275	750
4	13	188	800
4	13	188	850
3	17	153	900
4	13	188	950
3	17	153	1000
3	17	153	1050
6	8	275	1100
9	6	344	1150
11	5	396	1200



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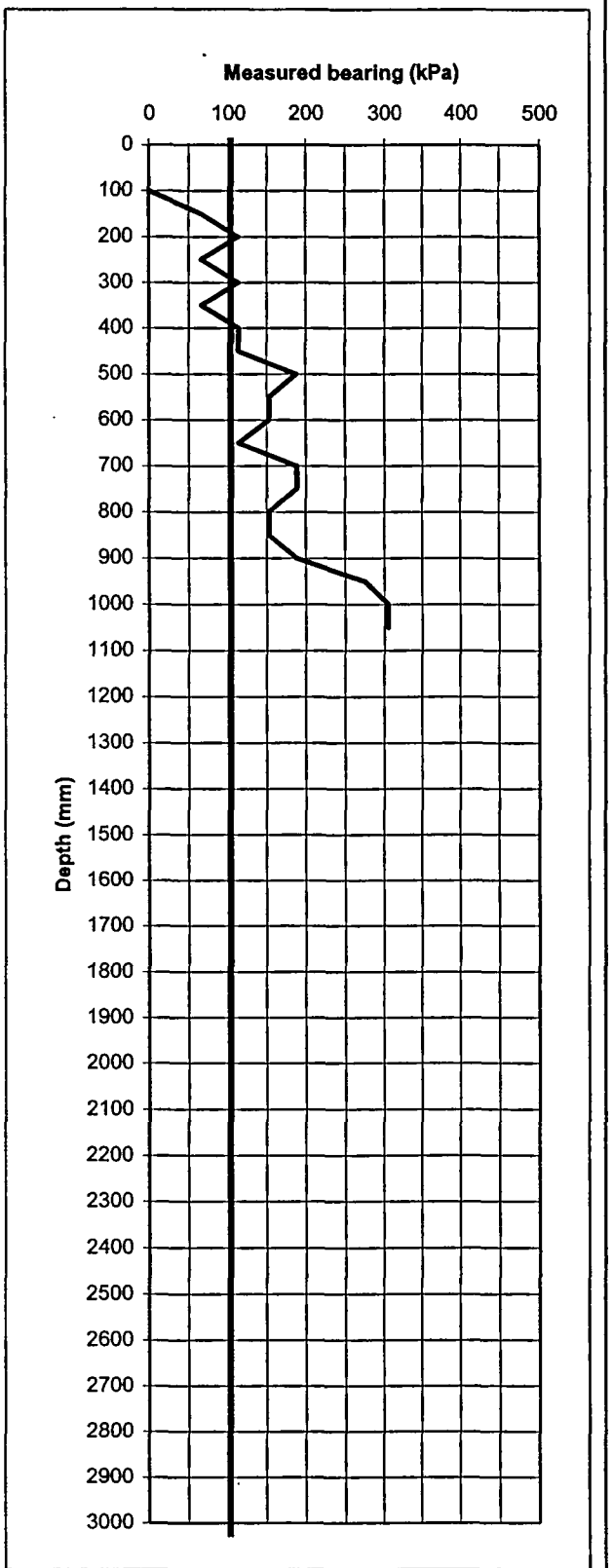
PENETROMETER TEST RESULTS

Client: W & A McCulloch
Project: Proposed Dwelling
Site: Lot 2 DP 347730
Miro Bay

Date: 18.07.07
Investigator: D. Dravitzki
Project No: 0403
Site No: P2

Notes:

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
	0	**0**	100
1	50	**66**	150
2	25	**113**	200
1	50	**66**	250
2	25	**113**	300
1	50	**66**	350
2	25	**113**	400
2	25	**113**	450
4	13	**188**	500
3	17	**153**	550
3	17	**153**	600
2	25	**113**	650
4	13	**188**	700
4	13	**188**	750
3	17	**153**	800
3	17	**153**	850
4	13	**188**	900
6	8	**275**	950
7	7	**305**	1000
7	7	**305**	1050



Appendix 4 – Wastewater Design Sheets

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WASTEWATER SYSTEM DESIGN SHEET

To AS/NZS 1547:2000

Client: McCulloch, Miro Bay **File No: 0403**

Intended water Supply:

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

Local experience with existing on-site systems:

Septic Tank or similar (Primary treatment): Secondary treatment:

~~OK when installed properly with a correctly sized level drainage area and maintained.~~ *Produce high quality effluent suitable for irrigation.*

Recommendation for this site: *Secondary treatment system utilising irigation system effluent disposal (Biolytix System)*

DRAINAGE CONTROLS:

Need for surface water collector / cut-off drains?

AVAILABILITY OR RESERVE / SETBACK AREAS

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

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

Ksat, (m/day): ESTIMATED SOIL CATEGORY: *Category 4 - Moderately well - imperfectly drained loam*

Design

RECOMMENDED D.I.R. *25.0* mm/week

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

6 Permanent People At 180 L/person/day: *1080* L/day from Appendix 4.2D AS/NZS 1547:2000

DESIGN WEEKLY FLOW: *7560* L/week

Septic tank size (min): *4000* (Table 4.3A1)

AREA REQUIRED: *302.4* m²

LENGTH REQUIRED: *317.3* m . **(Refer Irrigation System Calculation sheet)**

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

RECOMMENDATION :

Biolytix Secondary treatment with dripper line irrigation.
Min 4000 litre capacity treatment and irrigation lines to be a minimum total length of 317m using 1.6 l/hr emitters Lines to be laid at 1.0m spacing to follow contours (when possible), at 150mm below ground level. Installation of the irrigation system to be in accordance with the product Installer Guide. Detailed design of the irrigation system is to be responsibility of the installer.

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Irrigation System Calculation

Project Title: W & A McCulloch — Date: 25.07.07

File Ref: 0403 — Operator: D. Dravitzki

Acceptable daily loading rate (mm/day)	3.6
Daily influent (l/day)	1080
Emitter type	Raam 17
Emitter flow rate (l/h)	1.6
Emitter Spacing (m)	1
Dripline Spacing (m)	1
Distance from Treatment system to Irrigation Field (m)	5
Field Size (m^2)	300
Field length assuming square area	17
Number of lines	18
Total Dripline Length (m)	317
Total flow Rate Required (l/h)	508

Pump Duty

Flow (l/h)	508
Head (m)	12

Head-Loss Table		
Item	**Head loss (m)**	**Comments**
Emitter	5	Minimum pressure required
Lateral	0	Head loss insignificant
Submain	1	Using Netafim Raam 17 as a submain
Main	0.06	Using 25mm LDPE x main length
Water meter	0	For a 15mm Multijet Turbine Water Meter
Filter	3	For a Semi blocked filter
Tank Depth	2	
Elevation	0	
Sub Total	11.06	
Total	12	including 10%

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

Appendix 5 – Biolytix System Specifications

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 (The Judge's Award) Winner (The People's Choice)

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

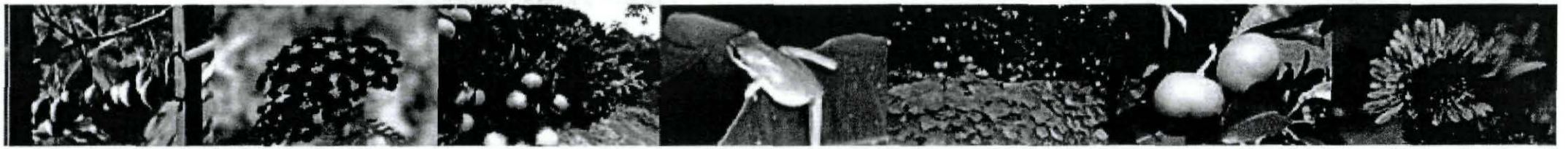
BIOLYTIX

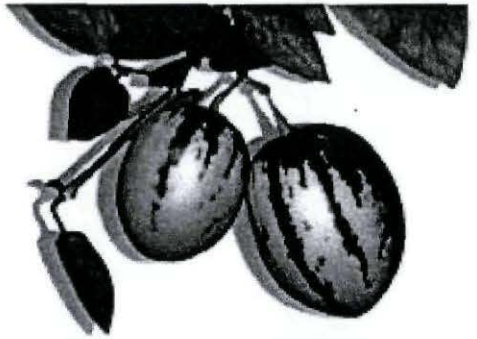
Waste Treatment Systems

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 ....

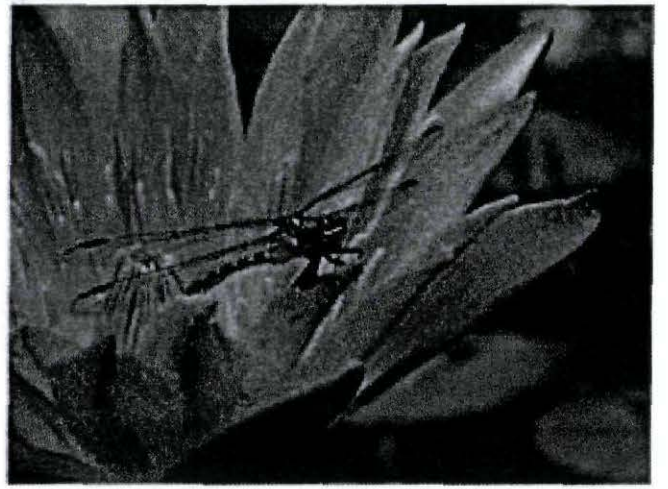
Global Winner of an Environmental Technology Award at the World Expo, Japan 2005.





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

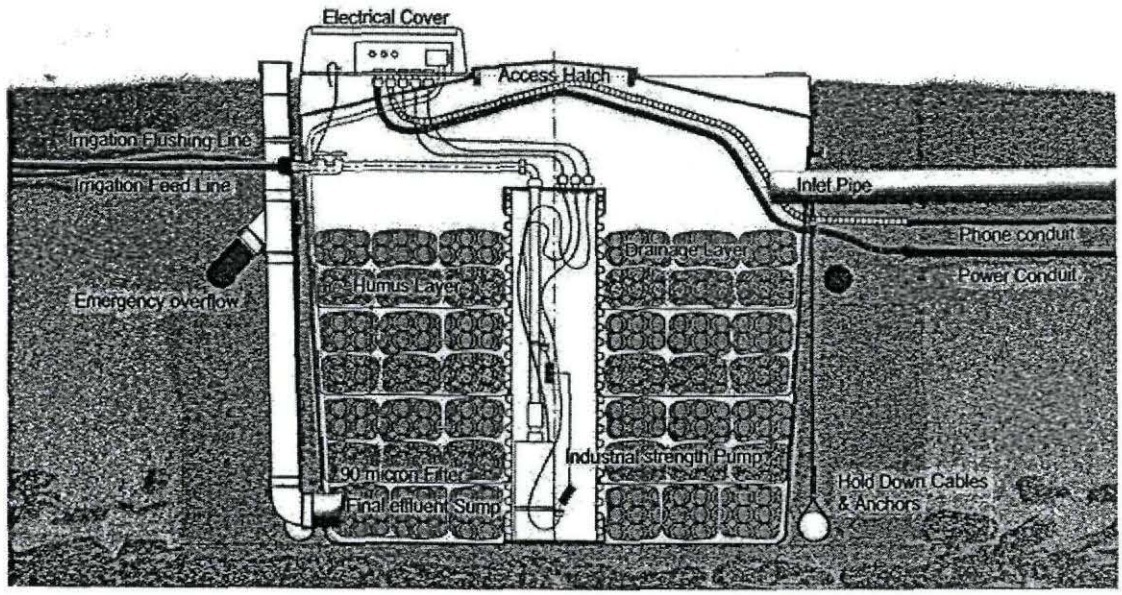
Characteristic	Results	Maximum	Average
BOD_5	100%<20 mg/L 90%<11.6 mg/L	14 mg/L	8.8 mg/L
Suspended solids	All < 30 mg/L 90%<8.9 mg/L	14 mg/L	5.4 mg/L
Dissolved Oxygen	100%>2.0	Minimum 2.2 mg/L	4.26 mg/L

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

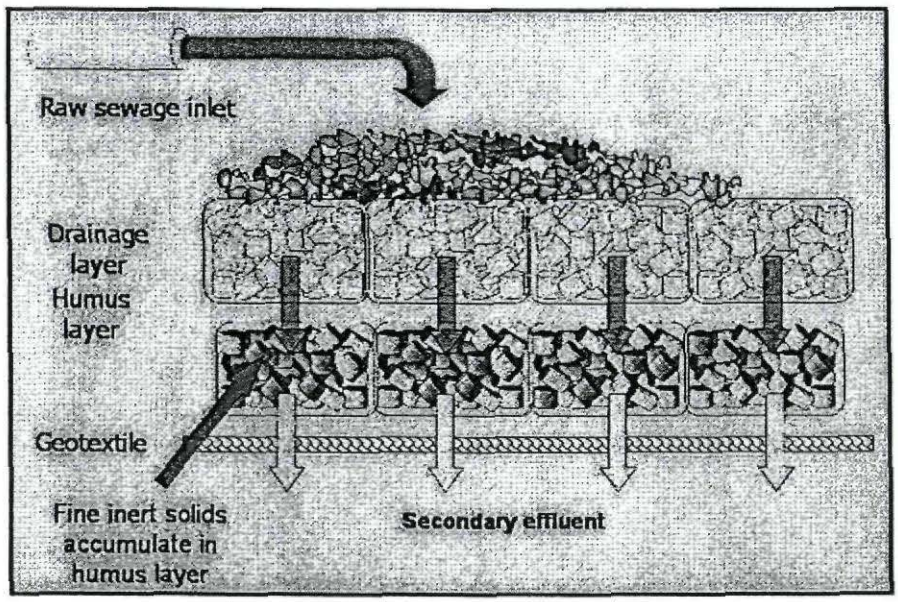
The following have been provided by Dean Cameron, Managing Director, Biolytix Technologies, Maleny, Queensland



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.

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.