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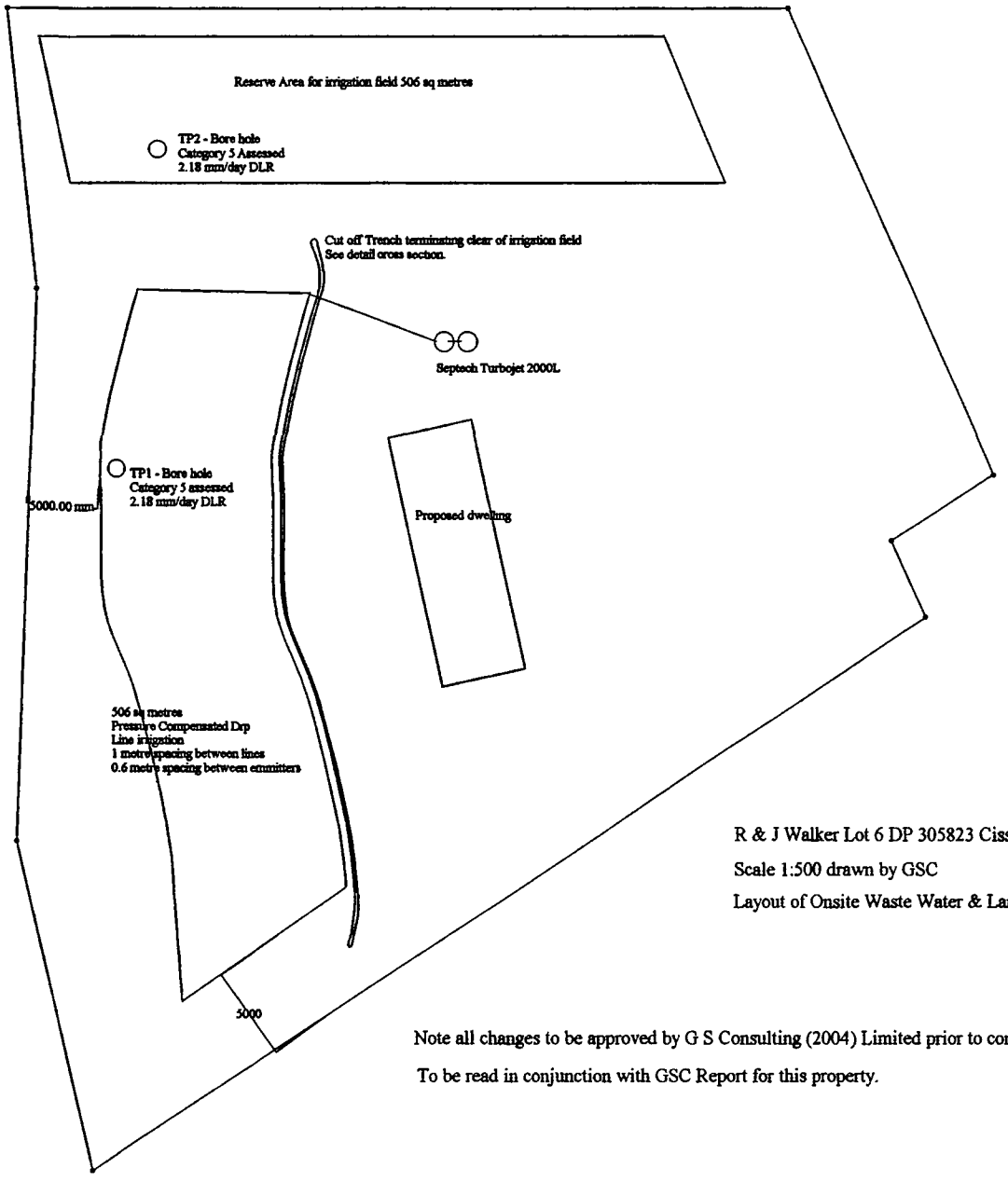
DISTRICT COUNCIL



R & J Walker Lot 6 DP 305823 Cissy Bay

Scale 1:500 drawn by GSC

Layout of Onsite Waste Water & Land Application System

Note all changes to be approved by G S Consulting (2004) Limited prior to construction.

To be read in conjunction with GSC Report for this property.

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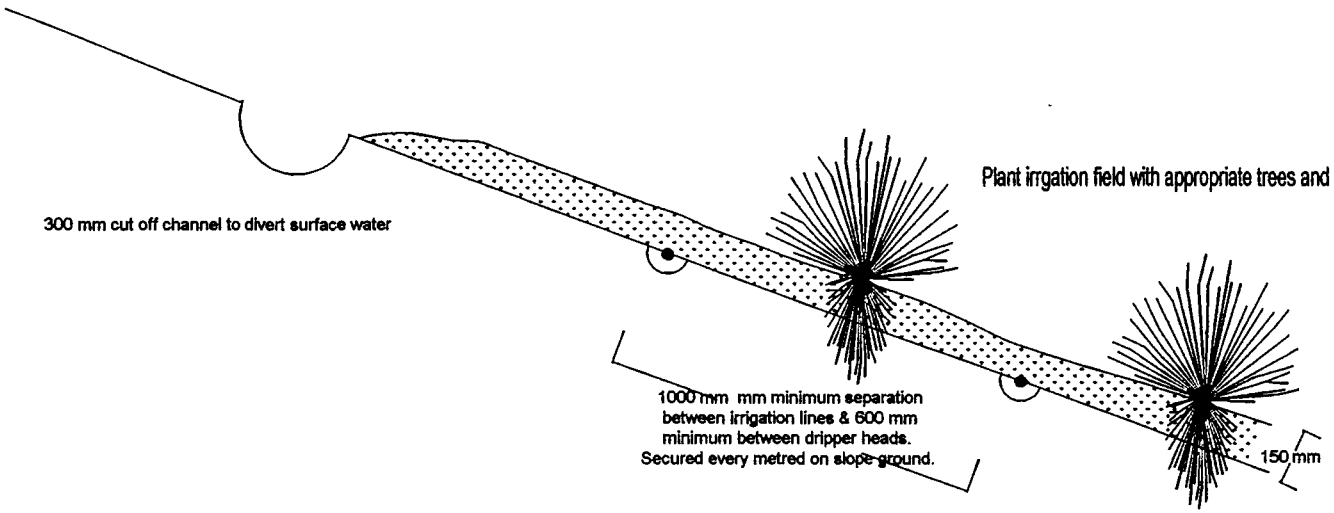

150 mm topsoil, bark or mulch to promote evapo-transpiration. Cover material will compact to 100 mm

100 mm scarified earth with irrigation lines placed onto and secured by pegs.

Detail A - Cross section of irrigation field lines on Sloped land average 20 degrees Scale 1:20 April 2007 G S Consulting Limited

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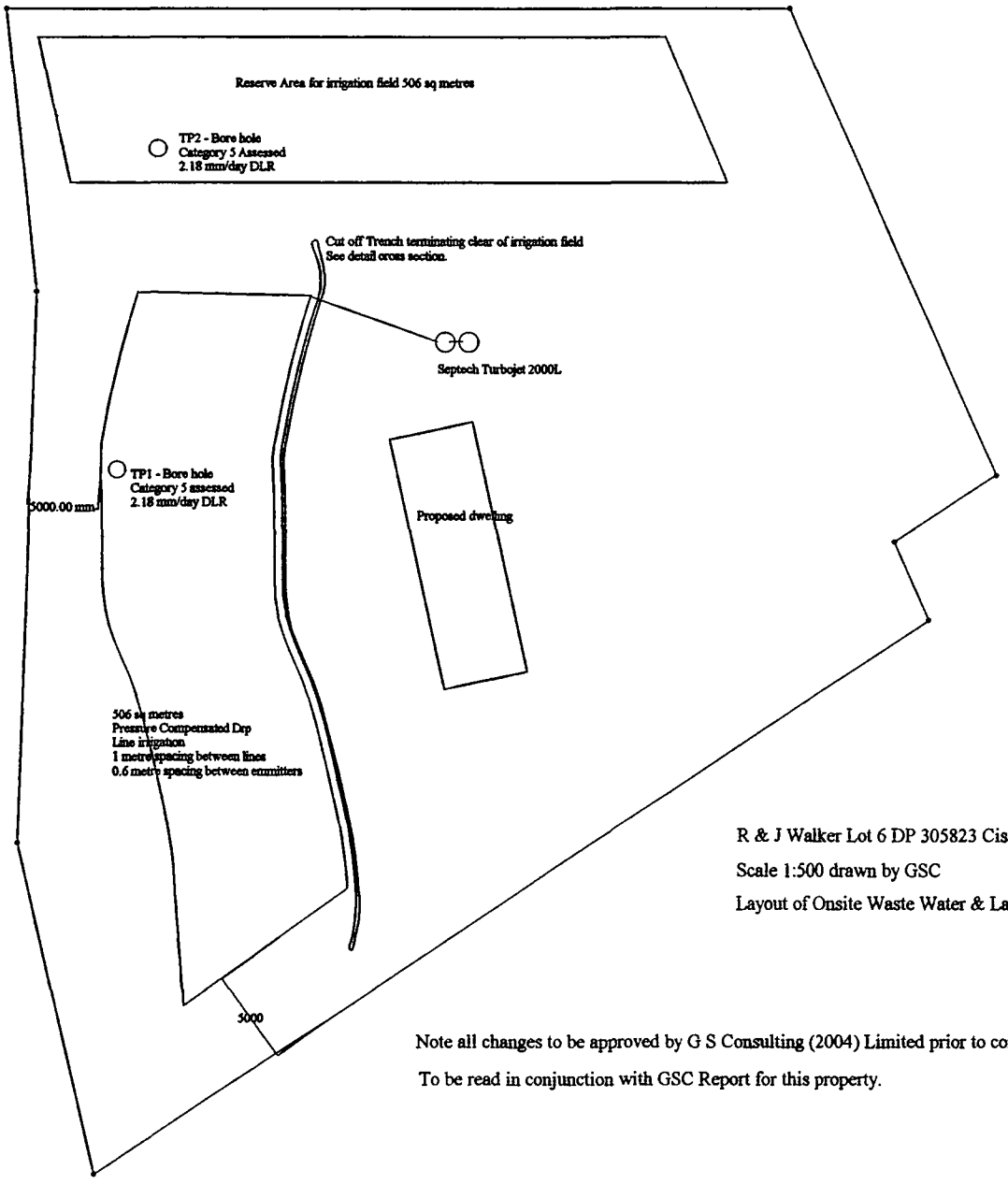

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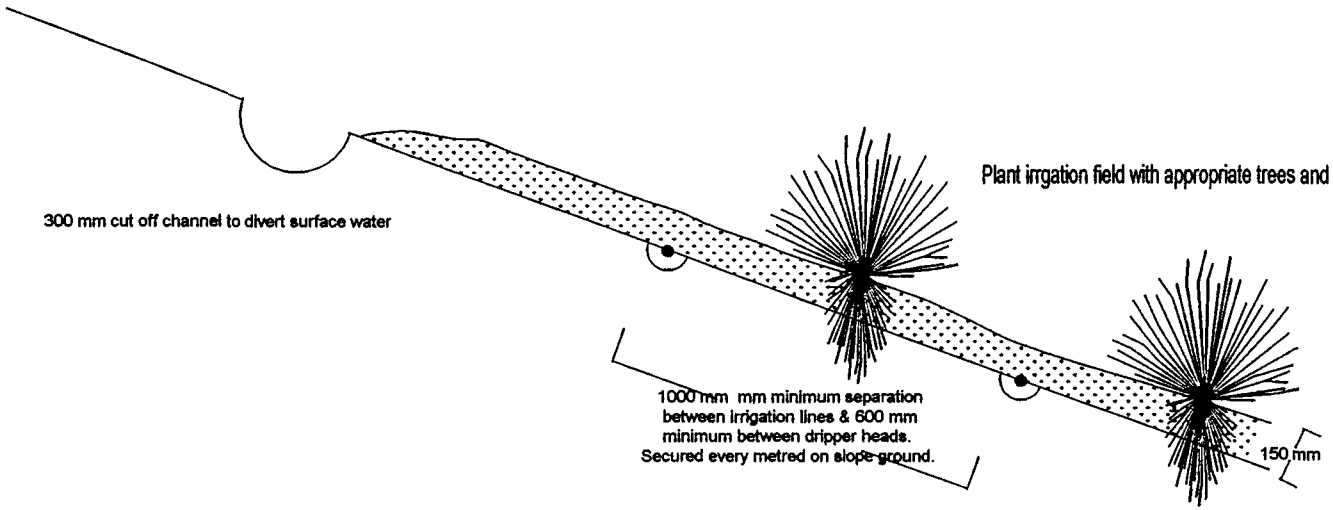

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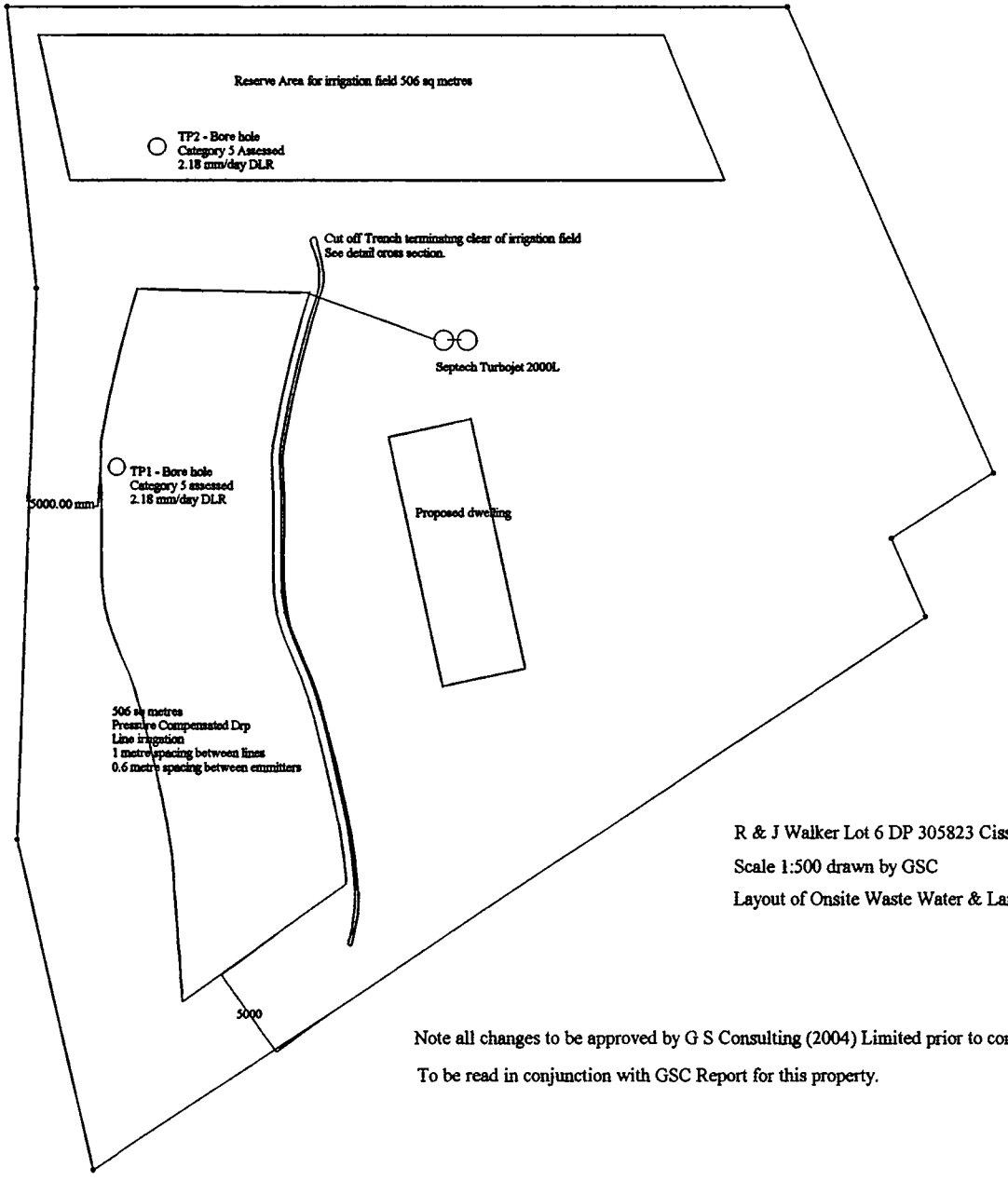

R & J Walker Lot 6 DP 305823 Cissy Bay

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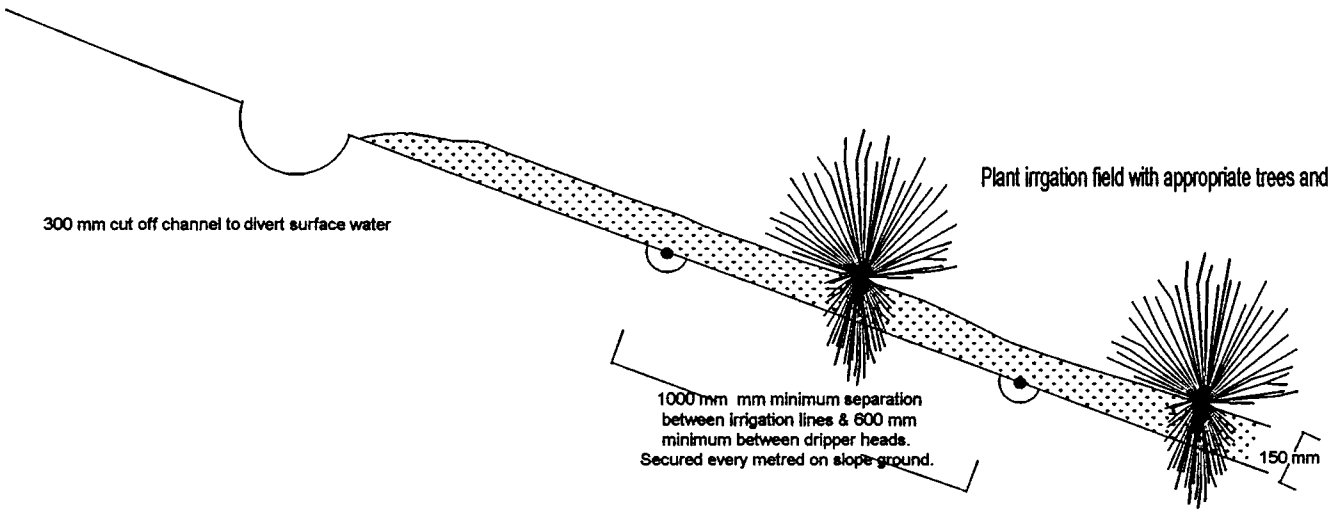

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Detail A - Cross section of irrigation field lines on Sloped land average 20 degrees Scale 1:20 April 2007 G S Consulting Limited

File Reference: Cissy Bay

GSC

GS CONSULTING LIMITED
Plumbing & Drainage System Consultancy

RECEIVED
Jke
27 MAR 2007
MARLBOROUGH
DISTRICT COUNCIL

19 March 2007

Discharge Officer
Marlborough District Council
Blenheim

ONSITE WASTE WATER & LAND APPLICATION SYSTEM REPORT FOR LAND AT Lot 6 DP305823 being Cissy Bay, Marlborough Sounds.

1. Introduction

1.1 G S Consulting Limited has been employed to assess best suitable option for Wastewater & land application for land at Lot 6 DP305823 being Cissy Bay, Marlborough Sounds.

1.2 The project is type is a four bedroom residential dwelling in the Marlborough Sounds.

1.3 The Onsite Wastewater & Land Application system shall comply with AS/NZS 1547:2000 and/or Onsite Waste-water Systems: Design and Management Manual TP58 Third Edition ARC Technical Publication 2004 and the Territorial Authority Resource Management Plan.

2. Design Population and Flow

2.1 The system capacity for this project based on two persons per bedroom.

2.2 Potable water is supplied by reticulation. The volume of wastewater, using the tables in AS/NZS 1547:2000 is 180 litres per person. Water reduction measures for this project are half flush WC and water reduction whitewear.

2.3 The daily design flow allowance for this project is 1440 litres/day.

3. Site/Soil Evaluation

3.1 There is 1100 square metres available for land application. The land application site is located to best utilise the sites ability to use natural soil filtration/treatment and evapo-transpiration capabilities.

3.2 The adjacent waste water and land application systems are primary and secondary treated. The performance of these systems is poor for the primary treated systems and good for the secondary treated systems.

P O Box 771, Nelson
Mobile 027 292 9590
Email gsconsulting@paradise.net.nz

Although the primary treated systems show no obvious signs of failure their proximity to the foreshore means that it is likely that poorly treated effluent reaching the foreshore.

3.3 The rainfall intensity for the area is 90mm. The annual rainfall for the area based on NIWA recordings is 1550mm.

3.4 The land is being used for residential use. The vegetation on the site is grass.

3.5 The average slope of the land is 20°. The predominant slope faces North West/West. The slope is shaped generally waxing divergent. Slope stability has not been assessed by G S Consulting (2004) Limited.

3.6 Surface water runs towards the West boundary. Cut off drains or directional channelling is required. There is no potential for flooding on this property.

3.7 The separation distances to the following features are: natural water resource being seasonal gully creek is 20 metres; closest boundary is 5 metres; groundwater is 1.2 m/estimated; no wells or bores; no embankments or retaining walls below the land application area; buildings is 10 metres; and pasture animals is 50 metres.

3.8 The soil type is light clay being category 5 with a poor indicative drainage type and a design loading rate for drip line irrigation of 2.85 mm/day.

3.9 The key constraints arising from the site and soil evaluation are proximity to gully and poor drainage type.

3.10 The design responses to the key constraints are 100% reserve area and a dosing regime.

4. Assessment of Environmental Effects

4.1 The effects on the environment within the property are increase of Phosphorus and Nitrogen to the soil, however the effects of these levels will be negligible due to the filtering capabilities of the soil and the uptake capabilities of the existing and proposed vegetation.

4.2 The effects on the environment beyond property are nil. The cumulative effects on the environment are nil.

4.3 Note that the design responses to the key restraints on this property will address any effects on the environment.

5. Design for Land Application System

5.1 The land application system selected is a pressure compensated drip line irrigation system. The system will be dose loaded with small volume regular doses of 240 litres six (6) times per day.

5.2 The irrigation field and reserve area is located as per the site plan with separation to boundaries of 5 metres.

5.3 Special design features to address constraints are regular small doses.

5.4 The land application system is calculated at 506 square metres in size, with a reserve area of 506 square metres.

5.5 The factors of safety for this design are 100% reserve area.

6. Design for Pre-treatment System

6.1 The Septech Turbojet treatment unit has been selected to best compliment the pressure compensated drip line irrigation land application system selected.

6.2 Treatment occurs through the following process:

All wastewater is gravity fed into a Primary Sewage tank where the waste undergoes settlement and digestion during a retention period of approximately 48 hours. The settled wastewater then flows into the Turbojet Unit. This unit is divided into two distinct chambers – submerged contact aeration (SCA) tank and Humus Tank.

During regular time clock intervals, water and air is pumped into the SCA tank by means of strategically placed jets. The jets are positioned so as to cause a vigorous and turbulence of the tank contents. Effluent entering the SCA chamber is forced into a spiralling flow pattern.

A biomass develops within the sludge particles tumbling through the bank. This biomass assimilates nutrients and Oxygen from the water leading gradual reduction of impurities as the effluent passes through the tank. (Retention period of approximately 48 hours).

The effluent and sludge particles then flow into the humus tank where the sludge particles settle to the floor of the tank and the effluent flows upwards through a plastic media block on which the biomass develops. (Retention period of approximately 36 hours). This biomass acts as a secondary biological contact interception and removal centre, further reducing the effluent B.O.D. before flowing into the contact sampling pit. Where it is further clarified and chlorinated (if necessary).

Settled humus tank sludge is automatically returned to the inlet of the SCA tank by means of a Vortex lift pump, which in turn is driven by the main SCA circulation pump. Effluent and sludge particles are also recirculated through the primary sewage tank by means of a 12mm diameter by-pass fed line from the Main SCA delivery pump. This has a threefold purpose.

a Excess sludge is returned to the primary sewage tank for storage and digestion.
b Clean effluent is recycled through the plant which tends to suppress the activities of micro-organisms which emit odours.
C By regularly recycling effluent, the circulating biomass in the SCA tank is being fed with sorted organics from the primary sewage tank. This keeps the micro-organisms at maximum population levels and

reduces the problems of treatment plants not being used for extended periods eg: vacations. Consequently, untreated effluent is prevented from being discharged from the unit when persons return suddenly from extended periods of non-use.

6.3 The treatment unit is sized to treat a load of up to 2000 litres/day.

6.4 Waste water treatment plant to be sited within 30 metres of vehicle access for maintenance.

7. **Construction and Installation**

7.1 The Treatment unit shall be installed by a Septech Turbojet approved installer, and as per the installation & commissioning guidelines.

7.2 The treatment unit shall be commissioned by a Septech Turbojet approved installer prior to use by the owner. A copy of the commissioning report shall be forwarded to G S Consulting (2004) Limited for the purpose of operation & maintenance review and for construction review. Producer statement of construction review will be forwarded to the Territorial Authority once G S Consulting (2004) Limited can approve the installation.

8. **Management Procedures**

8.1 Operation and maintenance requirements are detailed in the Septech Turbojet specifications attached.

8.2 Monitoring and inspection requirements unless specified by the Territorial Authority are: regular check irrigation field for surface ponding and smell; and regular check the treatment unit for smell and noise.

9. **Attachments**

A: Appendix A – Site Evaluation and Investigation

B: Loading Certificate

C: Septech Turbojet Operation and Maintenance Guidelines

D: Design calculations

E: GSC Producer Statement

References:

- AS/NZS 1546.1:1998 Onsite Domestic Wastewater Treatment Units Part 1: Septic Tanks
- AS/NZS 1546.3:2001 Onsite Domestic Wastewater Treatment Units Part 3: Aerated Wastewater Treatment Systems
- AS/NZS 1547:2000 Onsite Domestic Wastewater Management
- Onsite Wastewater Systems: Design and Management Manual Third Edition ARC Technical Publication TP58
- USEPA Onsite Wastewater Treatment Systems Manual 2002
- New Zealand Building Code

Gary Stevens
Plumbing & Drainage Consultant
G S Consulting (2004) Limited

ONSITE WASTE WATER & LAND APPLICATION SYSTEM
REPORT DATA

DESK TOP EVALUATION

1.0 SITE INFORMATION

1.1 Location details

Locality: Cissy Bay
Owner: R Walker
email:
Address:
Phone:

Legal Description:
Lot 6 DP 305823

Survey plan details:
Grid reference E N: 2579699.4, 6023995.2
Aerial photo details:
Topographic map No:
Orthophotomap No:
Regional Authority: Marlborough District Council

Site Plan Details Attached:
YES/NO

1.2 Soil type and major soil considerations from soil maps etc

Data source used:

1.3 Geology of site from geological map

1.4 Climate

Annual rainfall: *1550 mm* *Annual evaporation:* *1450 mm*
General comment: (rainfall intensities, seasonal variation, etc)
rainfall intensity 90 mm

Data source used: **NIWA**

1.5 Intended water supply source
Public supply

1.6 Local experience with existing on-site systems
Number of systems in locality: *2 secondary treated 3 primary treated*

Performance (%)		**Reasons/descriptions etc**
Satisfactory	*80%*	*no signs*
Failed		
Problems evident	*20%*	*proximity to natural water resource*

Photograph(s)/video attached: **no**

1.7 Preliminary evaluation of solutions which could be feasible:

1.0 SITE EVALUATOR

1.1 *Consultant:* Gary Stevens
Phone: 027 2929590
E-mail: gsconsulting@paradise.net.nz

1.2 Additional staff involved: none

Name(s):
Designation(s):
Involvement:

Signature: G'Stevens **Date:** 1-Mar-07

2.0 ON-SITE EVALUATION

2.1 Work undertaken

Date: 1/03/2007
Weather (on day & preceding week): dry

Photocopy of desktop study attached: **no**

2.2 Topography

Slope: *20 degree average* *Ground cover:* *grass*

Geology confirm: **yes**

Soil landscape confirmed: **yes**

Drainage patterns: run toward gully

Site Plan Details Attached: **no**

Clearances	***Allowable minimum:***	***Available:***
Boundaries:	5	5
Waterways:	20	20
Stands of trees/shrubs:	5	5
Well, bores:	30	50+
Embankment:	10	20+
Buildings:	5	5

Other (specify) goundwater 1.2 m

Site history (land use): site was pasture land, has had trees felled

2.3 Site exposure

Site aspect: north west - west
Pre-dominant wind direction: south west
Presence of shelter belts: none
Presence of topographical features or structures: none

2.4 Environmental concerns (e.g. native plants intolerant of phosphorus load, high water-table, swamp, waterway etc)

water table estimated at 1.2 metres, need to maintain shallow LA system
existing vegetation ok with increased levels of nutrients.

2.5 Site stability

Has Stability Report been done: **no**

If YES, attach stability report and give details here of:
Author: Designation:
Company/Agency: Date of Report:

2.6 Drainage controls

Depth of seasonal water-table: win 1.2 m sum 3 m EPISODIC
Need for cut-off drains/diversion banks? yes
Need for surface water collector/cut-off drains? yes

2.7 Availability of reserve/setback areas (show details on sketch plan)

Reserve area available for extensions: 506 sq m
% of design area: 100%
Setback distance?(between site development and on-site disposal design and reserve areas)

2.8 Photographs attached: **no**

3.0 SOIL INVESTIGATION

3.1 Soil profile determination

Method: Excavated Test Pit/Bore Hole

3.2 See Field Texture Analysis Attached:

See Soil Aggregate Stability Field Test Results Attached:

3.3 Estimated Soil Category:

Site test	1	2	3
Soil category at effluent dispersal depth	light clay	light clay	not used

Remarks:

3.4	**Recommended DLR,** refer to Clause 4.1.4.2.	2.85 mm/day
	Reasons for DLR recommendations:	estimated ground water need to keep LAS shallow irrigation will be best to achieve this
3.5	**NUTRIENT BALANCE REQUIRED:**	**no**
	RESULT ATTACHED:	**no**
3.6	**WATER BALANCE REQUIRED:**	**no**
	RESULT ATTACHED:	**no**

4.0 GENERAL COMMENTS

4.1 Groundwater quality issues
Results of desktop study have been confirmed/amended on attached photocopy. Remaining matters of concern are listed below.

groundwater quality will be maintained, soils ability to process secondary treated effluent is good

4.2 Type of land-application system considered best suited to site and why

pressure compensated drip line irrigation system

4.3 Overall evaluation of minimum land-application area for the site (comprising, absorption area, space between and surrounding the absorption area elements, set-backs and the reserve area).

506 sq metres, 5m separation to boundaries. I metre spacing of lines, 600 mm spacing on emmitters

4.4 Results of consultation with other interested parties (neighbours, environmental agencies, local environmental groups etc).

MDC requires system designed to soil capabilities.

4.5 Other comments e.g. special precautions which may be needed

a dose loading regime will be a great idea to best use the soils capabilities.

G S CONSULTING (2004) LIMITED

Client name: R Walker Project name: Excavation no: Logged by:

Suburb: Cissy bay Lot number: Map sheet name: Grid reference: E N

Street address: Cissy Bay Surface level: R L

Date of inspection: 1/03/2007

Pit/borehole no: 1

Slope: 18-22 degree Land form element: Ground cover: grass Surface conditic dry Indicative drainage: poor

Surface stones: 5-20 mm Vegetation: Water table depth: 1.2 m

Land surface notes: Parent material: clay

Layer	Lower depth mm	Horizon	Moisture condition*	Colour (moist)	Field texture	Coarse fragments % volume	Structure	Modified Emerson	Soil category	Sample taken (Y/N)	Consistency	Permeability	Other assessment
1	200		dry	brown	CL	20	strong	3	4	n			
2	1200		dry	yellow	LC	20	weak	3	5	n			
3													
4													
5													

Use another form if >5 layers or major horizons. *Describe moisture condition as: dry, moist, very moist, saturated.

Notes/comments/observations: existing cuts show no sign of groundwater down to 3 metres

Overall Soil Category assigned: 5

Soil appears favourable for: drip line irrigation

(List system types) Maximum depth of system: 600 Checked by:

G S CONSULTING (2004) LIMITED

Client name: R Walker Project name: Excavation no: Logged by:

Suburb: Cissy bay Lot number: Map sheet name: Grid reference: E N

Street address: Cissy Bay Surface level: R L

Date of inspection: 1/03/2007

Pit/borehole no: 2

Slope: 20 degree Land form element: Ground cover: grass Surface conditic dry Indicative drainage: poor

Surface stones: 5-20 mm Vegetation: Water table depth: 1.2 m

Land surface notes: Parent material: clay

Layer	Lower depth mm	Horizon	Moisture condition*	Colour (moist)	Field texture	Coarse fragments % volume	Structure	Modified Emerson	Soil category	Sample taken (Y/N)	Consistency	Permeability	Other assessment
1	100		dry	brown	CL	20	strong	3	4	n			
2	1200		dry	yellow	LC	40	weak	3	5	n			
3													
4													
5													

Use another form if >5 layers or major horizons. *Describe moisture condition as: dry, moist, very moist, saturated.

Notes/comments/observations: larger stones and rocks below 600 mm on cut face.

Overall Soil Category assigned: 5

Soil appears favourable for: drip line irrigation

(List system types) Maximum depth of system: 600 Checked by:

GSC Waste Water System Loading Certificate

Tuesday, March 20, 2007

Issued To:	Ron Walker
Location:	Cissy Bay
Legal Description:	Lot 6 DP 305823
Territorial Authority:	Marlborough District Council

Occupancy:	8 persons
Daily Flow Rate:	1440 litres/day
Design Loading Rate:	2.85 mm/day

Waste Water System Type:	Septech Turbojet 2000L
Total Working Volume:	8000 litres
Max Daily Flow Rate:	2000 litres/day
Design Daily Flow Rate:	1440 litres/day

Land Application System Type:	pressure compensated drip line irrigation
Design Loading Rate:	2.85 mm/day
Application Area:	506 sq metres
Application System Length:	506 metres
Reserve Area:	506 sq metres

System Designer:	G S Consulting (2004) Limited
System Installer:	J Burridge
Maintenance Contractor	J Burridge
Maintenance Frequency:	Annual

Specific Notes: dosing regime to be maintained

SEPTECH TURBOJET 2000

CONTENTS

Septech Industries Pty Ltd Australia

TURBOJET 2000

SEWAGE TREATMENT PLANT SPECIFICATION & CONTRACT

Quotation Ref. No:	Date:
Contract Sum:	
The Client:	
Sewage treatment Plant Location:	
Plant operation:	

2.1 Construction

The sewage treatment plant is to be a Septech type Turbojet as described below and as shown and positioned on the drawings. The STP is to be as supplied by Septech Industries Australia Pty Ltd.

2.2 Design Parameters

Domestic Sewage will be collected from the dwelling and flow by gravity to the STP. The STP will serve:

NO TRADE WASTES of toxic or inorganic nature will be treated by this Plant.

Total Maximum Daily Flow to be treated by this plant: -	2000L
Total Maximum Daily Influent Suspended Solids: -	500mg/L
Total Maximum Daily Influent Biochemical Oxygen Demand	625g

Effluent from the STP will be disposed in accordance with the requirements of the Local Authority.

I/We the undersigned, agree to the terms and conditions of the specifications and drawings.

Signature:

HEAD OFFICE – 14 BURGESS ROAD BAYSWATER NORTH, VIC 3153
A.B.N. 51 006 814 508
Ph: (03) 9729 8655 Fax: (03) 9720 5534 www.septech.com.au

Certified Product
Australian Standard
AS/NZS 1546.3
AWTB
Lic No. 2382
AS/NZS 10-ed.1
Septic Tanks & Collection Wells
1st Nov 97/14

2.3 Description of Plant

All wastewater is gravity fed into a Primary Sewage tank where the waste undergoes settlement and digestion during a retention period of approximately 48 hours. The settled wastewater then flows into the Turbojet Unit. This unit is divided into two distinct chambers – submerged contact aeration (SCA) tank and Humus Tank.

During regular time clock intervals, water and air is pumped into the SCA tank by means of strategically placed jets. The jets are positioned so as to cause a vigorous and turbulence of the tank contents. Effluent entering the SCA chamber is forced into a spiralling flow pattern. A biomass develops within the sludge particles tumbling through the tank. This biomass assimilates nutrients and Oxygen from the water leading to gradual reduction of impurities as the effluent passes through the tank. (Retention period of approximately 48 hours). The effluent and sludge particles then flow into the humus tank where the sludge particles settle to the floor of the tank and the effluent flows upwards through a plastic media block on which the biomass develops. (Retention period of approximately 36 hours). This biomass acts as a secondary biological contact interception and removal centre, further reducing the effluent B.O.D. before flowing into the contact sampling pit. Where it is further clarified and chlorinated (if necessary).

Settled humus tank sludge is automatically returned to the inlet of the SCA tank by means of a Vortex lift pump, which in turn is driven by the main SCA circulation pump. Effluent and sludge particles are also recirculated through the primary sewage tank by means of a 12mm diameter by-pass fed line from the Main SCA delivery pump. This has a threefold purpose.

1. Excess sludge is returned to the primary sewage tank for storage and digestion.
2. Clean effluent is recycled through the plant which tends to suppress the activities of micro-organisms which emit odours.
3. By regularly recycling effluent, the circulating biomass in the SCA tank is being fed with stored organics from the primary sewage tank. This keeps the micro-organisms at maximum population levels and reduces the problems of treatment plants not being used for extended periods eg: vacations. Consequently, untreated effluent is prevented from being discharged from the unit when persons return suddenly from extended periods of non-use.

2.4 Pump

240volt – 400 watt submersible pump (Refer to Pump Specifications for further details).

2.5 Pump Operation

The submersible pump shall be operated and monitored by the Septech electronic controller. Pump run time will depend on loading but run in accordance to EPA & Health Department Regulations. After 3 months this may be adjusted (increased or decreased) to obtain optimum treatment results.

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Certified Product
Australian Standard

2.6 Primary Sewage Tank

Provide one – 1.6 diameter x 2.3 long reinforced concrete sewage tank having an effective volume of 3200 litres. Inlet is to be 100mm diameter dropper, outlet of tank is to be 100mm diameter dropper to prevent short circuiting.
** TOP OF TANK MUST BE LEVEL **

2.7 Pumpwell (optional extra)

Only required where depth of sewer invert exceeds 610mm and/or the effluent pipe from the Turbo Jet Unit exceeds receiving means of disposal.
Note: Where a pumpwell is required, an alarm float switch MUST be installed.

2.8 Submerged Contact Aeration Tank

Provide one 1.6m diameter x 1.3m long reinforced concrete SCA tank having and effective volume of 1880 litres and a retention period of 20hours (average)
** TOP OF TANK MUST BE LEVEL **

2.9 Humus Settling Tank

Provide one – 1.6m dia x 1.0m long reinforced concrete Humus Tank having an effective volume of 1320litres. The tank shall meet the following conditions;

a) Maximum surface overflow rate of 1,000 litres per square metre per hour.
b) Minimum detention time of 4 hours at average daily flow
c) Actual detention time of 14 hours.

2.10 Contact Stabilisation Block Media

15m^2 in aeration chamber and 15m^2 in Humus Tank.

2.11 Chlorine Contact Tank

Provide one- 0.9 diameter x 2.0 metre deep reinforced Concrete Contact Tank having a working volume of 499 litres. The tank is to have a minimum detention time of 0.5 hour at peak hourly flow of 667ltrs / hour. The actual contact detention time was calculated to be 45mins @ PHF.
** Tank Must be Installed PLUMB**

2.12 Chlorination Equipment

Disinfection by 76mm x 36mm x 30mm bio-guard chlorine product (STINGY STICKS). The required amount of chlorine product at maximum design flow rates over a 6 month period of treatment for effective disinfection (1mg/L Cl_2) is 811g (6.5 sticks). The Turbojet 2000 Chlorinator holds 1040g (8 sticks) of chlorine product.

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2.13 Freeboard

Total freeboard in the Turbojet 2000 system is 1677L, exceeding EPA & Health Department Standards of 1000L.

2.14 Noise Pollution

Clause 17 of SEPP N-2 prescribes the noise limit for outdoor venues as 65 dB(A) when measured outdoors or 55 dB(A) when measured indoors. After testing Septech's Turbojet 2000 noise emissions from a 1m radius the results concluded to fall below 50 dB(A).

2.15 Materials and Construction

Precast concrete tanks to be built to AS1546.1 Small Septic Tanks.
All access covers to be capable of supporting a live load of 1200kg. On an area of $0.5m^2$.
All metal components shall be of 304 or 316 stainless steel.
All plastic components to be of the grade equivalent of class 12PVC
All electrical motors to comply with AS1359 and AS1360.
All fittings and components will be manufactured of non-corrodible materials.

2.16 Electrical Control Panel & Alarm

Provide one- Septech Electronic Control Panel.
All electrical wiring to the STP location is to be supplied and installed to Australian Standards and to Septech specifications.
Control Panel to be wired as per Septech Installation Specifications.

2.17 Sewer Depth

This specification is based on a maximum sewer depth of 1080mm below ground level at the Treatment Plant.

Installation and Commissioning Notes

Septic Tank access manhole to ground level by means of precast concrete saddles and cover.

1. All compartments are to be left free of debris before commissioning of plant.
2. To avoid flotation = fill all compartments with water at time of installation.
3. TurboJet to be located level, this can be achieved by screening 7mm aggregate level and to the dimensions as shown on drawing – before commissioning unit.
4. Make sure all tank compartments are full of water before commissioning unit.
5. Clear excess excavated soil from around tank and ensure that the top of the concrete is 50mm above natural ground level to prevent entry of soil, debris and ground water.
6. Install 25mm diameter Class 12 PVC or steel protection conduit between Primary Sewage Tank and TurboJet Tank. Feed the 12mm diameter flexible recirculation

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conduit through the protection tube into the inlet of the Primary Sewage Tank, attach flexible conduit to the concrete roof of the tank with galv. Saddle clips. (Maximum distance between Primary Sewage Tank and the SCA tank to be 600mm).

7. Concrete access Saddles on the Turbojet are to be sealed with an approved product. Saddle to be located 50mm (min) above natural ground level. (not including lids).
8. Top of Primary Sewage Tank and SCA tank MUST BE INSTALLED LEVEL.
9. If an effluent pumpwell is to be installed after the STP in order to elevate effluent into an approved means of disposal, an alarm warning system MUST be installed to warn of any flood situation caused through an effluent pump failure.
10. In applications where an effluent pumpwell is required due to depth exceeding 610mm below ground level and the TurboJet outlet is deeper than the receiving outfall drain or other means of disposal, the pumpwell MUST only be installed between the Primary Sewage Tank, with the SCA tank being elevated to a height whereby the effluent can be gravity fed into the receiving means of disposal. Installation of the pumpwell after the STP will automatically render the warranty null and void.

TERMS OF BUSINESS

Payment is required upon delivery of STP to the site. Failure to do so will result in the unit being returned to the factory and a further transport charge required if and when unit is re-delivered to the site. Payment to be made either in the form of bank cheque cash or EFTPOS.

NOTES

a) The STP will be delivered and placed in the excavation provided that there is adequate access (minimum access dimensions: 4m wide x 6m high continuous to the STP area) for the crane truck to manoeuvre alongside the excavation.
b) That the excavation is prepared prior to the delivery of the unit.
c) That the crane truck can travel over a suitable ground surface without any hindrance to its movement (forward or reverse) or whether in the option of the driver that the truck will not become bogged.
d) A time period of 30 minutes uploading is inclusive of quotation sum. Any delay longer than this stated period will result in an extra charge of $85.00 per hour.

WARRANTY

The warranty will be automatically rendered void upon the following:

1. Any of the design parameter of the unit are exceeded.
2. The normal operation of the unit is interfered with by untrained personnel, causing part of parts of the STP to wear out prematurely.
3. Flotation of tanks occurring through de-sludging of tanks during wet weather or high ground water levels around the outside of tanks.

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4. Large amounts of grease, oils or fats to accumulate within the STP consequently leading to stress and/or failure of the mechanical components to occurs.
5. Inadequate de-sludging of the unit as determined by Septech. EPA and Health Department require de-sludging of STP every 3 years.

If STP is installed by Septech, works will be guaranteed for a period of 12 months from delivery date against defects in workmanship, failure of any working part(s) on the proviso that correct weekly maintenance (see owners manual) is conducted

WARNING

Septech WILL NOT warranty any of the mechanical, electrical or pumping components on the STP due to the installation of an effluent pumping station after the STP (by others) and/or any works by others or natural occurrences which cause the plant to flood.

The STP MUST be kept in an operable state at all times during and after the warranty period, otherwise Septech WILL NOT be held responsible for poor effluent quality through owners negligence of the unit.
Note: - This STP is to be commissioned ONLY by the staff or representatives of Septech. Any attempt by other persons to commission this STP without Septech's authority, will render the Warranty on this STP null & void.
Warranty of this TurboJet STP will also null & void if upon inspection of the STP, it is found that the STP has been installed incorrectly according to the drawings and specifications which can lead to parts failure: ie, plant installed out of level or with an effluent pumping station.

REFERENCES:

Engineer Computation Conducted by

Matthew Diston
Bachelor Engineering – Environmental

Use of Reclaimed Waters
– Best Practise Environmental Management Series Publication 464.2 March 2003 EPA

Septic Tanks Code of Practise
– Best Practise Environmental Management Series Publication 891 March 2003 EPA

Code of Practise for Small Treatment Plants
– Best Practise Environmental Management Series Publication 500 June 1997 EPA

Public Health Engineering – Design in Metric WASTEWATER TREATMENT
- Ronald E. Bartlett 1971

Code of Practise – Septic Tanks. On-Site Domestic Wastewater Management.
– Best Practise Environmental Management Series Publication 451 March 1996 EPA

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Turbojet 2000 Design Data Sheet

	Calculated Design Data	
Hydraulic Loading	2000 L/Day	
Organic Loading	675 g BOD / Day	
Peak to average flow ratio	8 from graph	
Turbojet 2000 Tank Dimensions		
Primary S.T.P. Tank		
Total Length of Primary STP	2275 mm	2.28 m
Dia Primary S.T.P.	1660 mm	1.66 m
Air Space in Primary STP (above water level)	300 mm	0.3 m
Primary S.T.P. Volume		3.45 m^3
Aerator + Humus Tank		
Total Length of Primary STP	2275 mm	2.28 m
Dia Primary S.T.P.	1660 mm	1.66 m
Wall thickness	80 mm	0.08 m
Inlet & Outlet Wall Thickness	100 mm	0.1 m
Air Space in Primary STP (above water level)	300 mm	0.3 m
Aerator Volume	1275 mm	1.93 m^3
Humus Volume	1000 mm	1.52 m^3
Total Volume		3.45 m^3
Contact Tank		
Total height of Clarifer	2000 mm	2.00 m
Diameter of Clarifier	920 mm	0.92 m
Water Height in Clarifer	1100 mm	1.10 m
Total Volume		0.50 m^3

Turbojet 2000 E.P.A. Requirement Calculations

	EPA & Health Department Requirement	Supplied
Primary Sewage Tank		
Peak Hourlly Flow	667 L/hr	
Primary Sewage Tank	2025 L	3448 L
Retention Time	12 hr	41 hrs
Freeboard volume	333 L	572 L
Turbojet		
BOD Loading after Primary (25% reduction)	506 g BOD remaining	
Aeration Tank Volume	2.03 m^3	3.45 m^3
Air requirement Disolved Oxygen	>2.0 mg/l	4 - 9 mg/l*
Retention Time in Turbojet	4.0 hrs	41.4 hrs
Freeboard volume	333 L	572 L
Contact Tank		
Surface Area @ 1000L/m^2/hr	0.7 m^2	0.7 m^2
Volume of clarifiers @ 0.5hr PHF	333 L	499 L (total)
Retention Time	30.0 mins	44.9 minutes
Freeboard volume of Contact Tank	333 L	532 L
Total Freeboard volume	1000 L	1677 L
Chlorine tablet dispensing requirements over 6 month period	811 g (6 months)	1040 g
Maximum daily BOD reduction to be removed	675 grams	
Primary Sewage Tank	25% reduction =	506 grams remaining
Turbojet + Humus Tank	90% reduction =	51 grams remaining
Contact Tank	25% reduction =	38 grams remaining
Estimated BOD concentration left in effluent	19.0 mg/L	
Maximum daily SS reduction to be removed	500 mg SS / L	
Primary Sewage Tanks	80% reduction =	100 mg SS / L remaining
Turbojet + Humus Tank	20% reduction =	80 mg SS / L remaining
Contact Tank	80% reduction =	16 mg SS / L remaining
Estimated SS concentration left in effluent	16.0 mg/L	
*** Results obtained under QAS testing 1546.3 - Moss Vale NSW**		

Dimensions of **Septech Turbojet 2000** Chlorinator Computations

Diameter:	920mm
Depth:	2000mm
Wall Thickness:	80mm
Water Level Height:	1100mm

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Appendix A

Usable Volume of Chlorinator: (L x W x WLH)

$= (920 - 2 \times 80)^2 / 4 \times \pi \times 1100$

$= \dfrac{499010577 mm^3 \mid 1\ m^3 \mid 1000\ L}{\qquad\qquad\ \mid 1 \times 10^9 mm^3 \mid 1\ m^3}$

= 499L

Chlorine Dissipation Time @ PHF (667L/hr)

$= \dfrac{499L \mid 60mins}{667L/hr \mid 1hr}$

= 44.9mins

Chlorine Dosing Requirement: (6 month period)

Max Hydraulic Loading:	2000L/day
Optimum Cl_2 Concentration:	1.0mg/L
Stingy Stick Cl_2 Concentration:	0.9kg Cl_2 / kg
Kill rate Safety Factor	2

$= \dfrac{2000\ L}{Day} \mid \dfrac{1.0\ mg}{L} \mid \dfrac{365\ Days}{2} \mid \dfrac{1\ kg}{0.9kg\ Cl_2} \mid \dfrac{1\ g}{1000\ mg} \mid 2$

= 811g Cl_2 Tablets

Engineer Computation Conducted by

Matthew Diston
Bachelor Engineering – Environmental

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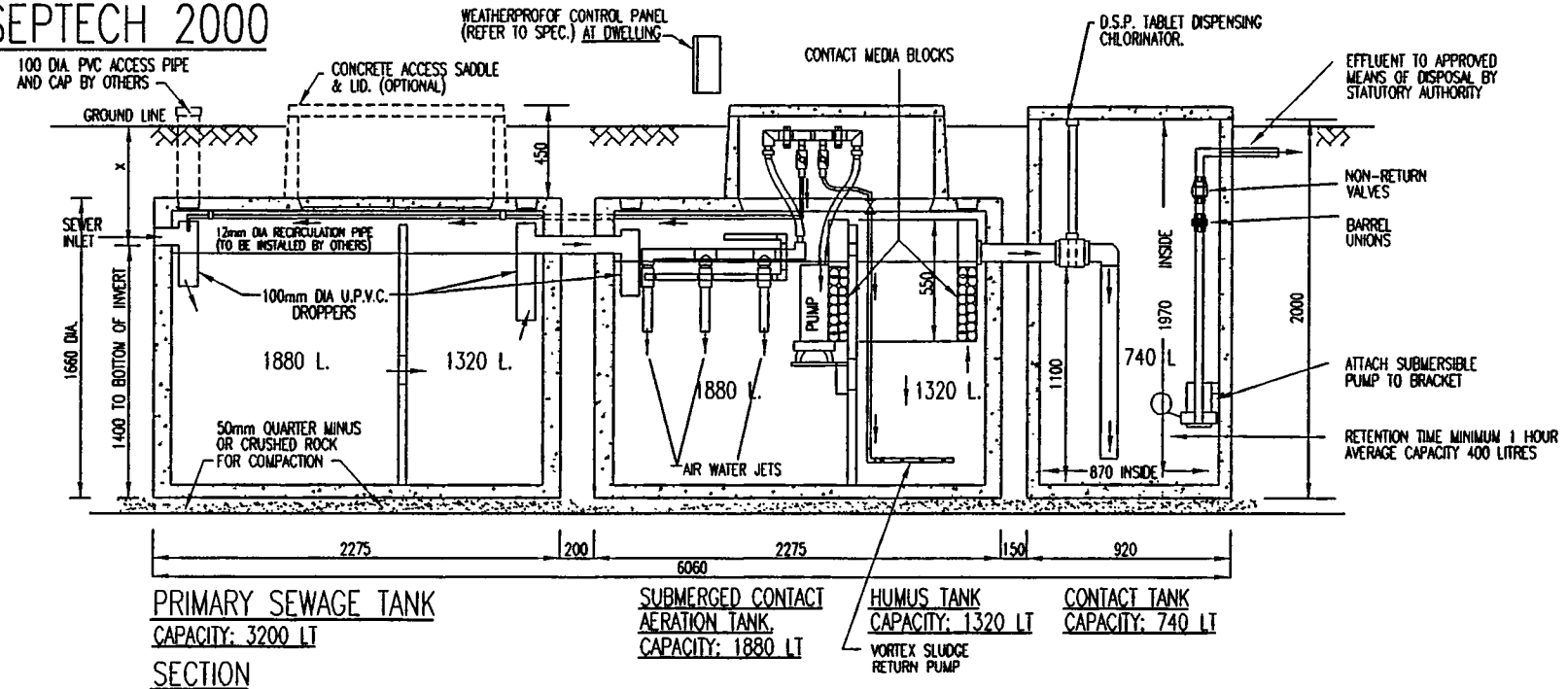
A.S.1546.3-1998

SEPTECH 2000



PRIMARY SEWAGE TANK
CAPACITY: 3200 LT

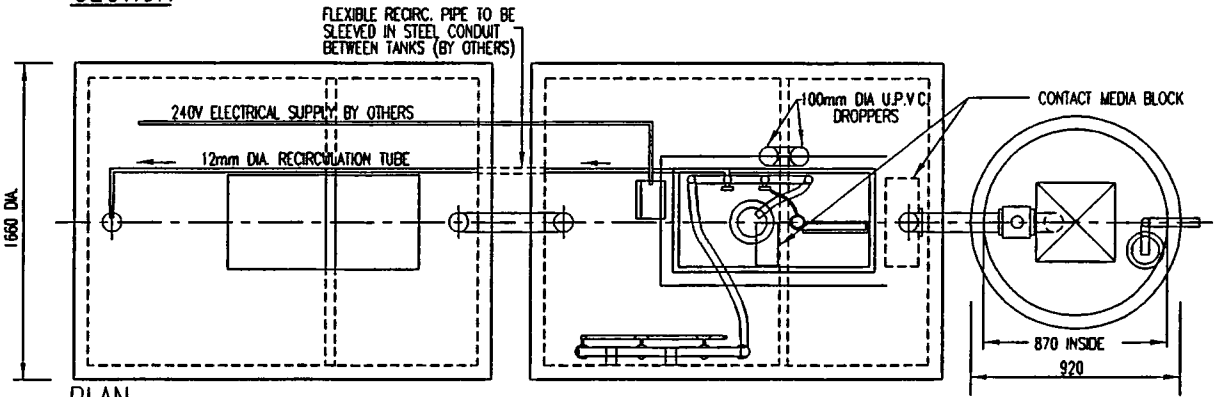
SUBMERGED CONTACT AERATION TANK.
CAPACITY: 1880 LT

HUMUS TANK
CAPACITY: 1320 LT

CONTACT TANK
CAPACITY: 740 LT

VORTEX SLUDGE RETURN PUMP

SECTION



PLAN

SCALE: NOT TO SCALE

NOTES

1. REFER TO SPECIFICATIONS FOR FURTHER DETAILS OF S.T.P.
2. TOP OF PRIMARY SEWAGE & S.C.A. TANKS TO BE INSTALLED LEVEL
3. "X" - SEWAGE INVERT TO BE DETERMINED BY PLUMBER
4. "Z" - EFFLUENT DRAIN TO BE 180mm LOWER THAN SEWER INVERT
5. CONCRETE TANKS TO BE MANUFACTURED TO A.S.1546.3
6. PATENT NO. 45342/89 APPLIES INFRINGEMENT WILL RESULT IN LEGAL ACTION
7. MADE TO AUSTRALIAN STANDARD SPECIFACTION LIC. NO 714
8. COMBINED WORKING CAPACITY OF 7470 LITRES
9. PROVIDE MIN. 50mm FALL FROM OUTLET OF EACH TANK

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TITLE

STANDARD INSTALLATION ASSEMBLY
TURBOJET 2000 DOMESTIC
SEWAGE TREATMENT PLANT
PLANT TO TREAT - 2000 LITRES PER DAY (MAX.)
500 GRAMS PER DAY B.O.D. (MAX)

ICON SEPTECH

DESIGNED	
CHECKED	
APPROVED	
DWG. No.	TURBO 2000

TURBOJET 2000

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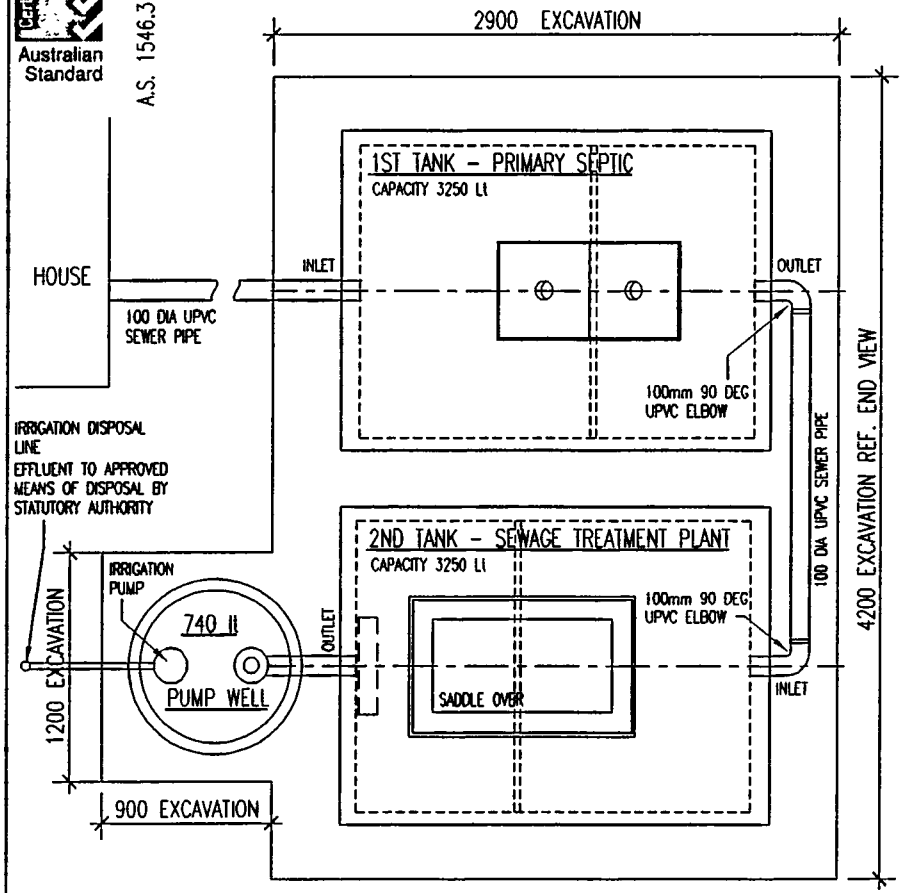
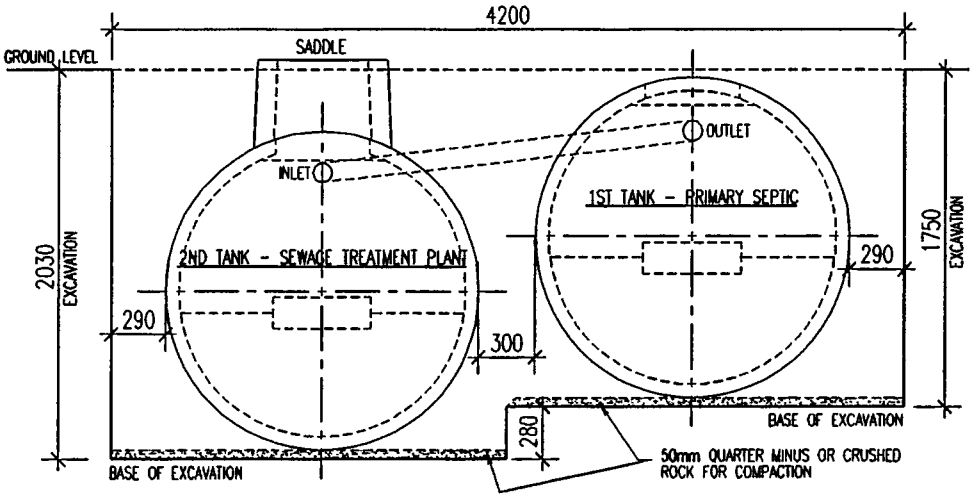
Australian Standard
A.S. 1546.3 LIC. 2392



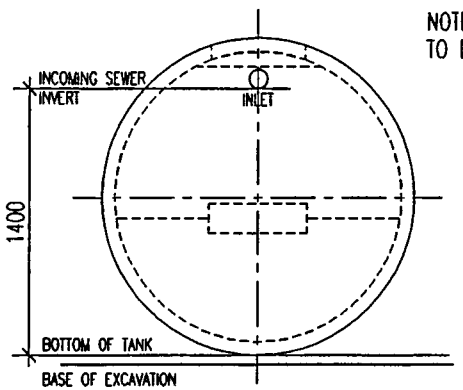
PLAN VIEW 1 = 25



END VIEW 1 = 25

NOTE :- THESE DEPTHS GIVEN DEPENDS ON SEWER DEPTH

NOTE :- ALL SADDLES, PIPES AND CONDUITS TO BE SEALED WITH APPROVED METHOD



INLET VIEW - 1ST TANK 1 = 25

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TITLE

STANDARD SITE INSTALLATION DRAWING TURBOJET DOMESTIC SEWAGE TREATMENT PLANT

ICON SEPTECH

DESIGNED	
CHECKED	
APPROVED	
DWG. No.	TURBO 2000 (A)

Typical Domestic Wastewater Flow Design Allowances with Reticulated Community or a Bore-water Supply

Source	*litres/person/day*	*Number of Persons*	*Total FD Allowance*
Households with standard fixtures (including auto w/m)	180	8	1440
Households with standard water reduction fixtures	145		0
Households with full water reduction facilities	110		0
Households with extra wastewater producing facilities	220		0
Households (*black water only*)	60		0
Households (*grey water only*)	120		0
Motels/Hotels			
⇒ Guests, resident staff	180		0
⇒ Non resident staff	40		0
⇒ Reception rooms	30		0
⇒ Bar trade per customer	25		0
⇒ Restaurant per diner	30		0
Community Halls			
⇒ Banqueting	30		0
⇒ Meetings	15		0
Restaurants per diner			
⇒ Dinner	30		0
⇒ Lunch	25		0
Tea rooms per customer			
⇒ Without restrooms	15		0
⇒ With restrooms	25		0
School pupils plus staff	40		0
Rural factories, shopping centres	50		0
Camping grounds			
⇒ Fully serviced	130		0
⇒ Recreation areas	65		0

Total Flow Design Allowance **1440**

Using Soil Category/Design Loading Rate (DLR) values to determine the size of the select Land Application System

Soil Category	Soil Texture	Structure	Indicative Permeability (*K* sat) (m/d) *(note 5)*	DLR trenches and beds *(note 1,2)*			DLR *(note 16)*	DLR	Design Irrigation Rate (DIR) (mm/wk) *(note 15)*	Indicative drainage class *(note 8)*
				Primary Treated Effluent		Second *(note 4)*	ETA/ETS Beds/trenches (mm/d) *(note 11)*	Mounds (basal area) (mm/d) *(note 13)*		
				Conservative Rate (mm/d) *(note 3&6)*	Maximum Rate (mm/d) *(note 3&7)*	(mm/d)				
1	Gravels and sands	Structureless (Massive)	>3.0	20 *(note 9)*	35	50	*(note 12)*	32	35	Rapidly drained
2	Sandy loams	Weakly structured	>3.0	20	35	50	*(note 12)*	24	35	Well drained
		Massive	1.4-3.0	15	25	50		24	35	
3	Loams	High/moderately structured	1.5-3.0	15	25	50	*(note 12)*	24	28	Moderately well drained
		Weakly structured or massive	0.5-1.5	10	15	30		16	28	
4	Clay loams	High/mod structured	0.5-1.5	10	10	30	12	16	25	Imperfectly drained
		Weakly structured	0.12-0.5	6	10	20	12	8	25	
		Massive	0.06-0.12	4	5	10	5	*(note 14)*	25	
5	Light clays	Strongly structured	0.12-0.5	5	8	12	8	8	20	Poorly drained
		Mod structured	0.06-0.12	*(note 10)*	5	10	5	*(note 14)*	20	
		Wk structured or massive	<0.06	*(note 10)*	*(note 10)*	8	5	*(note 14)*	**20**	
6	Medium – heavy clays	Strongly structured	0.06-0.5	*(note 10)*	*(note 10)*	*(note 10)*	5	*(note 14)*	15	Very poorly drained
		Mod structured	<0.06	*(note 10)*	*(note 10)*	*(note 10)*	5	*(note 14)*	15	
		Wk structured or massive	<0.06	*(note 10)*	*(note 10)*	*(note 10)*	5	*(note 14)*	15	

Design Area Sizing

Trench and Bed dimensions shall be determined from the relationship:

$$L = \frac{Q}{DLR \times W}$$

Where

	Insert here!
Q = design daily flow in l/day	1440
DLR = Design Loding Rate in mm/d	2.85
W = Width in metres	10

L = 50.53 metres

Total Irrigation Area 505.26 sq m

Producer Statement – Design

19 march 2007

Producer Statement - Design number RW-01 has been issued by ***Gary Wipere Rei Stevens*** of **GS Consulting (2004) Limited** to Ron Walker to be supplied to Marlborough District Council in respect of the following project:

Project Description	Onsite waste water & land application system
Street Address	Cissy Bay
Legal Description	Lot 6 DP 305823

GS Consulting Limited has been engaged by Ron Walker to provide design services in respect of the requirements of AS/NZS 1547:2000 for work only as specified.

The design has also been prepared in accordance with Verification Method and Acceptable Solutions of the New Zealand Building Code.

The work is described on G S Consulting (2004) Limited Report on Waste Water & Land Application System and drawings and the specification and other documents according to which the building is proposed to be constructed.

As an independent design professional covered by a current policy of professional Indemnity Insurance to a minimum value of $1,000,000 **I believe on reasonable grounds** that subject to:

(i) The site verification of the following design assumptions [refer inspection schedule where required], and

(ii) All proprietary products meeting the performance specification requirements, the drawings, specifications, and other documents according to which the building is proposed to be constructed comply with the relevant provisions of the building code.

Gary Stevens
Plumbing & Drainage Consultant

Inspection Schedule

This inspection schedule must accompany Producer Statement of Design number RW-01 issued by G S Consulting (2004) Limited.

The following inspections are required to verify the proposed work has been completed as described on drawings the specification and other documents according to which the building is proposed to be constructed.

1. Inspect installation of septech turbojet 2000
2. Inspect installation of pressure compensated drip line irrigation system
3. Check operation & maintenance schedule is appropriate for this system