

Engineering Report

Proposed Wastewater System

Horseshoe Bay
Pelorus Sound

for

Rex Brooke-Taylor

Jan Dimmendaal
Chartered Engineer
Smart Associates Ltd
14 September 2006

Project B2003-843

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1. Introduction

- 1.1 Rex Brooke-Taylor has recently (December 2005) installed a new on-site wastewater system to service his two bedroom holiday home in Horseshoe Bay, Pelorus Sound. The system was installed under consent number BC051571.
- 1.2 It is proposed to now increase the number of bedrooms to three, requiring a review of the wastewater system design.
- 1.3 The purpose of this report is to review the 2005 design in view of the increased design flow resulting from the additional bedroom.
- 1.3 The section legal description is Lot 1 DP 5737

2. Site Investigations

- 2.1 The site investigation identified that a suitable wastewater disposal area exists northeast of the existing bach on the property. Based on the soil assessment carried out, an average drainage category of 4 has been adopted.
- 2.2 Three test pits were dug at the site in the proposed effluent disposal area and their locations are shown on the site plan. The representative soil properties are:

AG 1

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.10	Ah	Topsoil	Dark brown	Loamy humus	None	Very Loose	V.Soft	V.Strong	Moist	2
0.15	B sharp	Residual	Dark brown	Clay loam	None	Loose	Soft	Strong	Moist	3
0.95	C	Residual	Yellow brown	Light clay	None	Med. Dense	Firm	Moderate	Moist	4

AG 2

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.10	Ah	Topsoil	Dark brown	Loamy humus	None	Very Loose	V.Soft	V.Strong	Moist	2
0.20	B sharp	Residual	Dark brown	Clay loam	None	Loose	Soft	Strong	Moist	3
0.50	C	Residual	Pale brown	Light clay	None	Med. Dense	Firm	Moderate	Moist	4

AG 3 (Pit dug 0.2m then auger)

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
			Colour	Field Texture	% + 2mm Fragments	Compactness	Consistency	Structure	Moisture condition	
0.20	Ah	Topsoil	Dark brown	Loamy humus	None	Very Loose	V.Soft	V.Strong	Moist	2
0.25	B sharp	Residual	Dark brown	Clay loam	None	Loose	Soft	Strong	Moist	3
1000	C	Residual	Pale brown	Light clay	None	Med. Dense	Firm	Moderate	Moist	4

- 2.3 The land application area has slopes in the range 15° to 20° and is covered in regenerating native bush with some mature trees.

3. **Assessment of Effects on the Environment – Additional Bedroom**

3.1 Effects

The system as installed in December 2005 has a total of 80m of 600mm wide trench and is based on a design flow of 720 litres/day. The addition of a further 40m of trench to manage a design flow of 1,080 litres/day (6 persons at 180 litres/day) is not practical due to site constraints, and is likely to damage the newly installed system. The earthworks required will also entail further disruption to the environment.

3.2 Mitigation Measures.

In place of the increased size land application area that would be required to manage the increased loading it is proposed that the existing system be re-designed based on the installation of **full water reduction fixtures** as defined in AS/NZS 1547: 2000, Appendix 4.2D, Note 3. The full water reduction fixtures will keep the loading within the capacity of the existing system.

4. **Revised Design**

- 4.1 Using the wastewater flow design allowance of 110 litres/person/day the total design flow for the proposed 3 bedroom dwelling (permanent occupancy of 6 people as per MDC Guidelines for new on-site wastewater management systems) is 660 litres/day. This flow is less than the 720 litres/day that the existing system was designed for.

- 4.2 The length of 600mm wide effluent trench required for the revised design flow of 660 litres/day is 73m (refer wastewater design sheet Appendix B). As there is no mains power available at the site the wastewater system includes gravity fed trenches with a maximum individual length of 20m. Effluent from the septic tank flows into two small chambers consisting of 400mm diameter uPVC vertical pipe. Separate 90mm diameter uPVC header pipes discharging at the same level in each chamber are then connected to the trenches.

- 4.3 A typical trench detail is attached (Appendix C).

- 4.4 The location of the proposed effluent disposal trenches is indicated on the site plan (Appendix A). The location of these effluent disposal trenches is **more than 30 metres** from the Sounds Foreshore.

- 4.5 The existing system has been inspected and certification forwarded to Council.

5. Recommendation

It is recommended that a **Section 127 change of condition of the current discharge consent** be granted on the basis that full water reduction fixtures are installed in the dwelling so that the design flow (for the proposed three bedroom house) is within the capacity of the existing, newly installed system.

6. Limitations

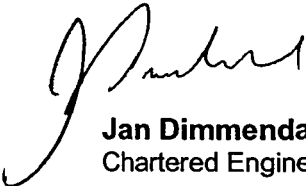
This report is valid for two years from the date of issue and covers the design of a wastewater treatment and disposal system for Rex Brooke-Taylor at Horseshoe Bay, Pelorus Sound.

Any other areas are outside the scope of this report.

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

7. References

1. NZS 1547:2000 On-site Domestic Wastewater Management
2. NZS 1546.3:1998 On-site Domestic wastewater Treatment Units (Part1: Septic Tanks).
3. Smart Associates Ltd, Engineering Report, Proposed Wastewater System, Horseshoe Bay, August 2005.

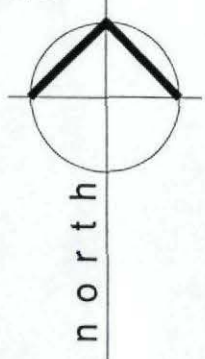


Jan Dimmendaal
Chartered Engineer

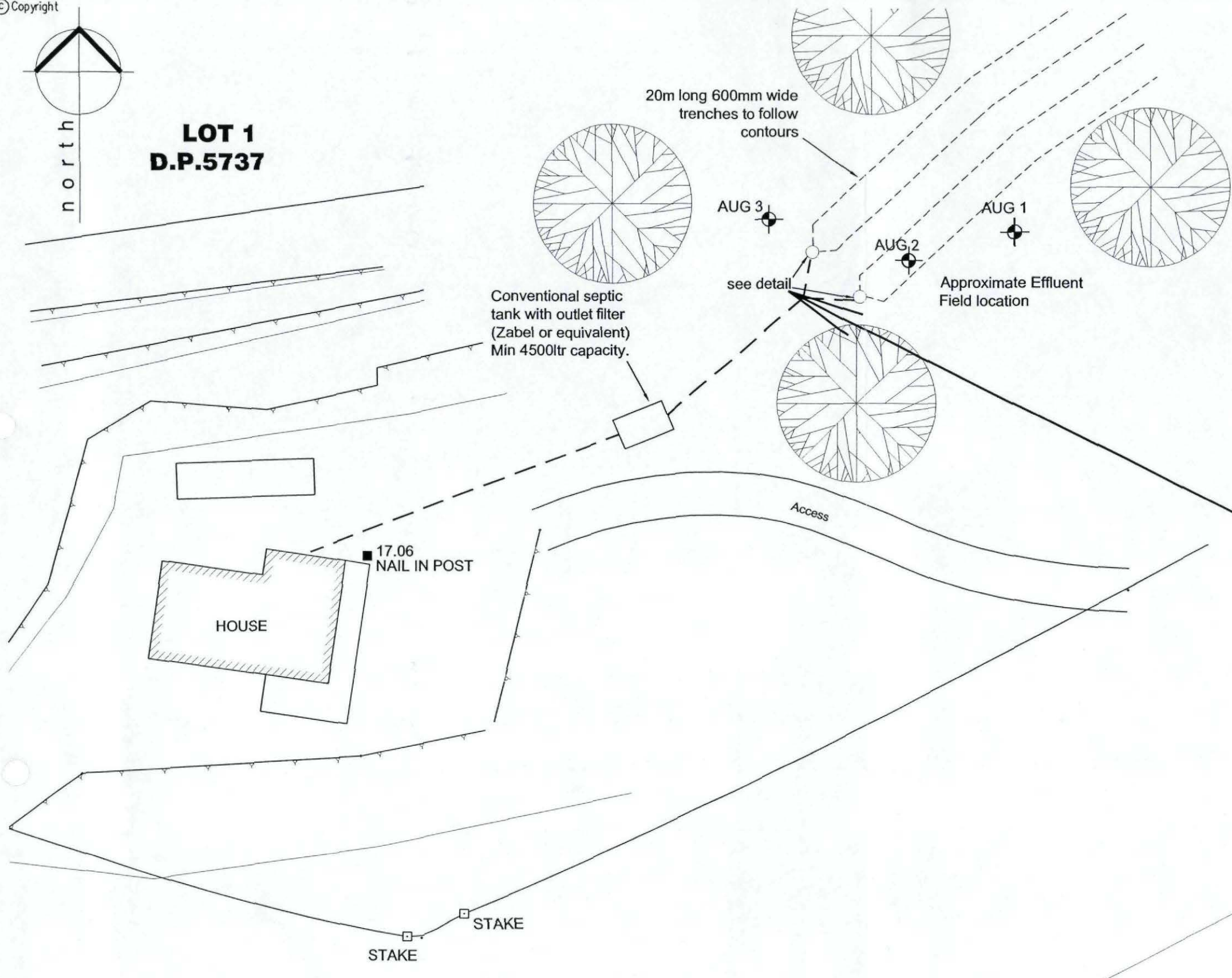
14 September 2006

Appendix A

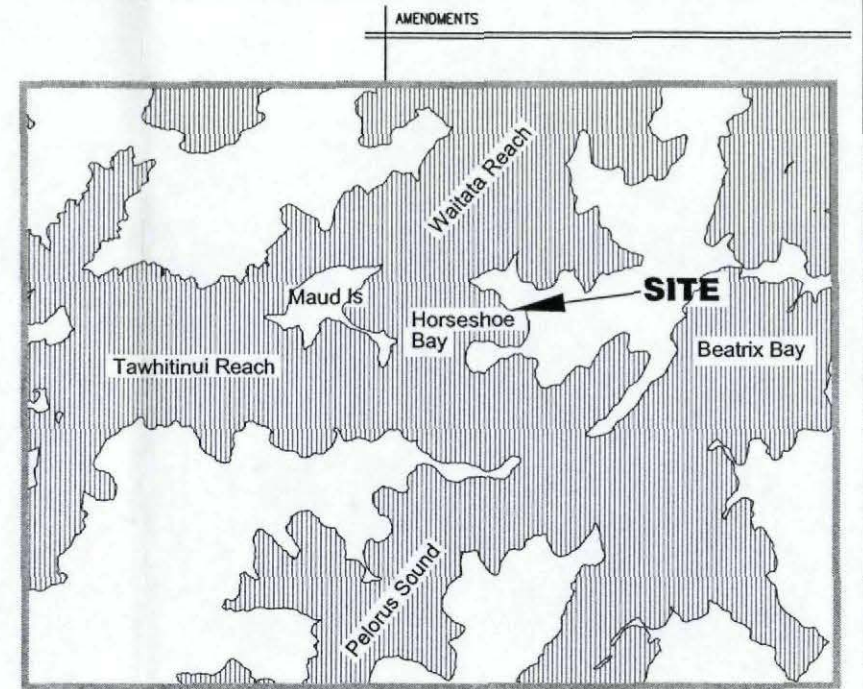
Location Plan and Site Plan



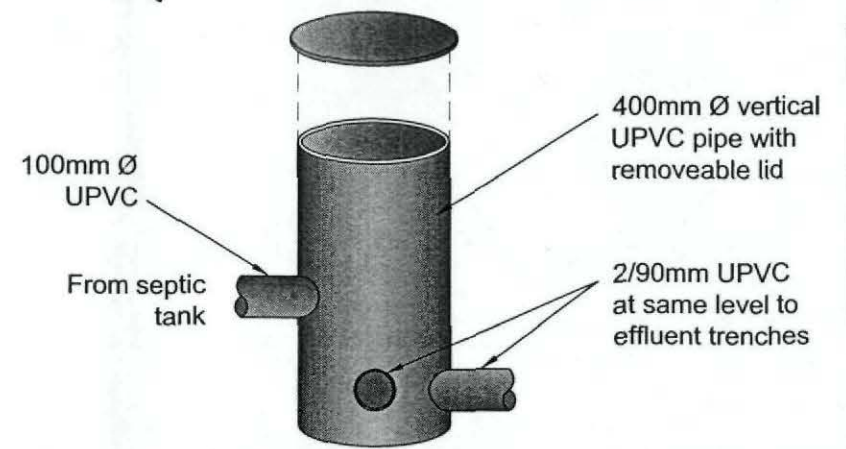
**LOT 1
D.P.5737**



1 SITE LAYOUT
Scale 1:250



2 LOCALITY PLAN
Scale 1:250

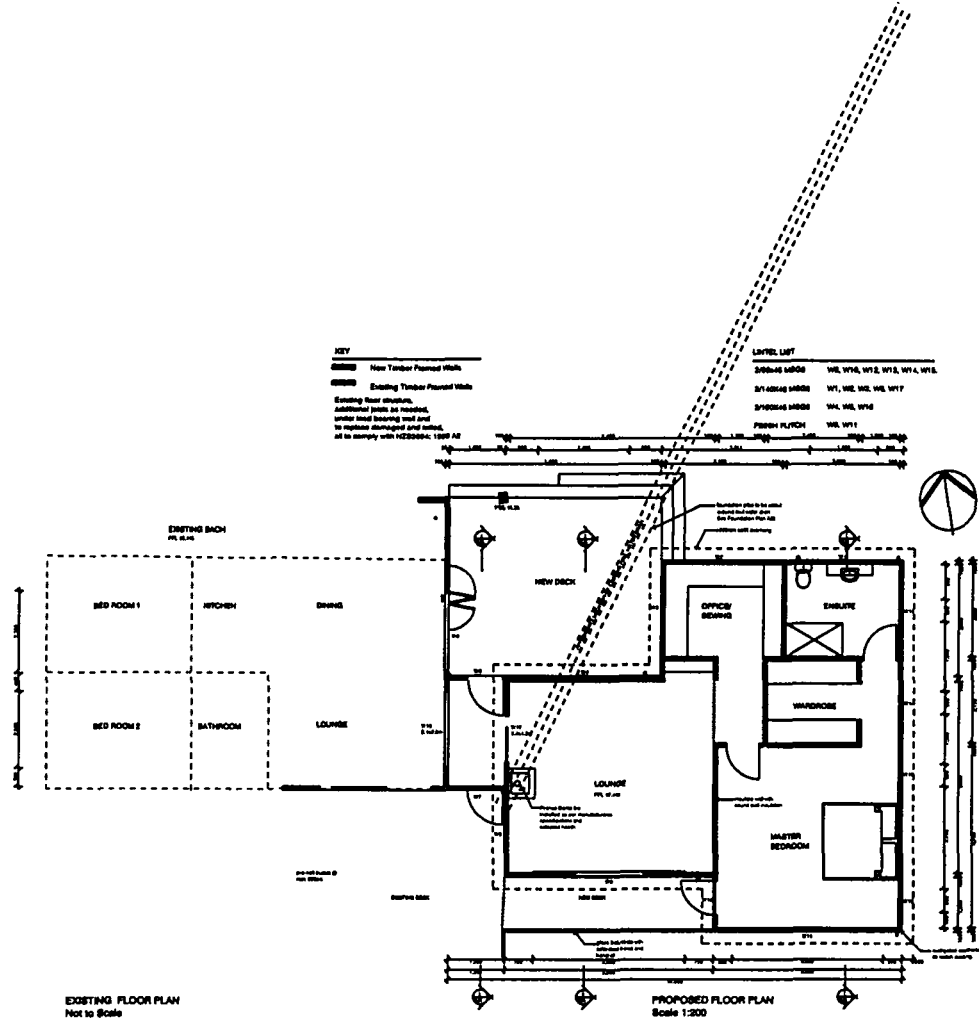


3 DETAIL
Scale 1:20

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

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JOB TITLE: PROPOSED WASTEWATER SYSTEM HORSESHOE BAY For REX BROOK TAYLOR		DRAWING TITLE: SITE LAYOUT		DATE: 12/09/06	DRAWING No: 001
PROJECT No. B2003-843		DESIGNED: JD	DRAWN: KRS/MGP	SCALE: As Shown	REVISION: /
		CHECKED:			



NOTES

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

**FLOOR PLAN
PROPOSED EXTENSION**

DRAWN jd	CHECKED mp	SCALE (As)	AS SHOWN	DATE DATE	DRAWING No.
COMPUTER FILE: drawing\				REVISION /	.

Appendix B

Wastewater Design Sheet

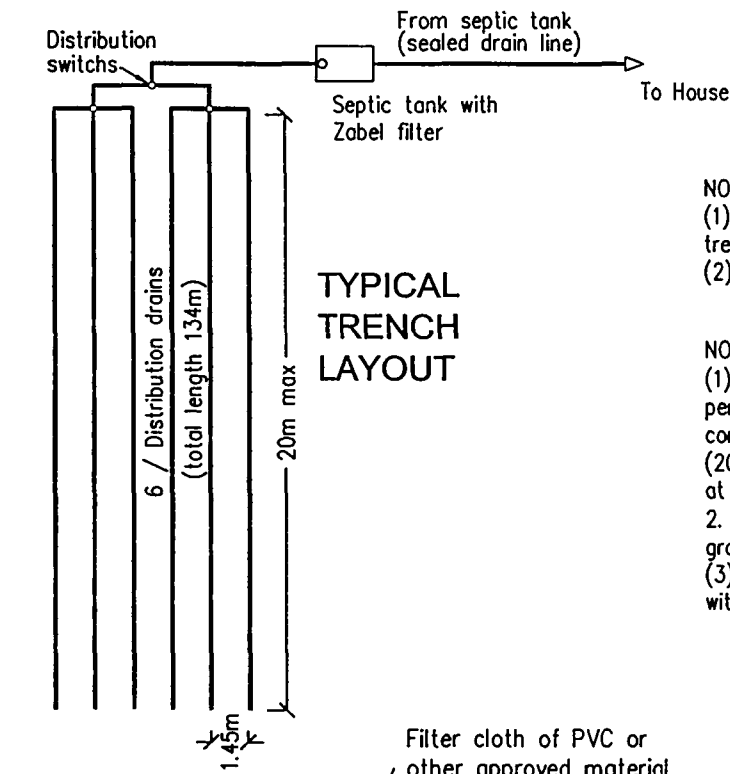
SOIL PERMEABILITY ASSESSMENT / EFFLUENT DESIGN SHEET
 To AS/NZS 1547:2000

3.0 Evaluation - Brooke-Taylor Horseshoe Bay, Pelorus Sound		Project No: B03-843
Intended water Supply:		
<i>Public Supply Rain water (roof collection)</i>	<i>Bore/Well/Dam</i>	
Local experience with existing on-site systems:		
Septic Tank or similar (Primary treatment):	Textile Media or similar (Secondary treatment):	
<i>OK when installed properly with a correctly sized drainage area and maintained.</i>	<i>Produce high quality effluent and is suitable for intermittent loading. A lesser length of trench required</i>	
Recommendation for this site: <i>Conventional septic tank, minimum capacity 4500litres fitted with Zabel (or equivalent) outlet filter and gravity trench disposal (maximum individual trench length 20m)</i>		
DRAINAGE CONTROLS:		
Need for surface water collector / cut-off drains?		
AVAILABILITY OR RESERVE / SETBACK AREAS		
Reserve area available for extensions, % of design area:	<i>100%</i>	
Setback distance? (between development and disposal system):	<i>Min. as required by Resource Management Act</i>	
Ksat, (m/day):	ESTIMATED SOIL CATEGORY:	<i>Category 4 - Imperfectly drained high/moderate structured loam</i>
Design for System		
RECOMMEN	D.L.R.	<i>15</i> mm/day
(NOTE: Where DIR is 10mm/week or less, ETA/ETS trenches to Fig 4.5A7 NZS1547:2000 should be specified to enable the utilisation of such soils)		
6 Permanent People At 110L/person/day:	<i>660</i>	L/day from Appendix 4.2D AS/NZS 1547:2000 (ref:note 3)
DESIGN DAILY FLOW:	<i>660</i>	L/day
Septic tank size (min):	<i>4500</i>	(Table 4.3A1)
AREA REQUIRED:	<i>44.0</i>	m ²
LENGTH REQUIRED:	<i>73.3</i>	m for Septic Tank system (Primary Treatment) with 600mm wide trenches
RESERVE AREA REQUIRED:	<i>100%</i>	of specified drainage area
RECOMMENDATION :		
<i>Conventional septic tank, minimum capacity 4500litres fitted with Zabel (or equivalent) outlet filter and gravity trench disposal (maximum individual trench length 20m). Total minimum length of trench 73m. Full water reduction fixtures to be installed in dwelling</i>		

Appendix C

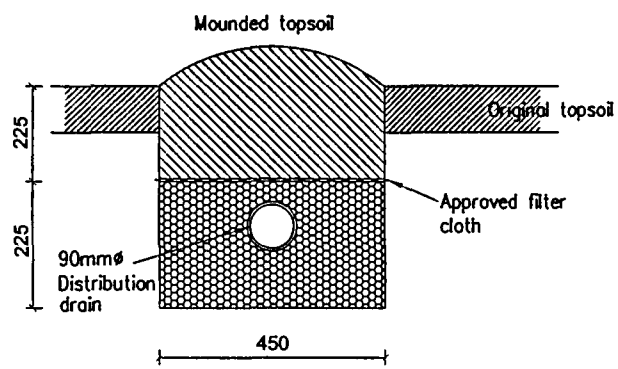
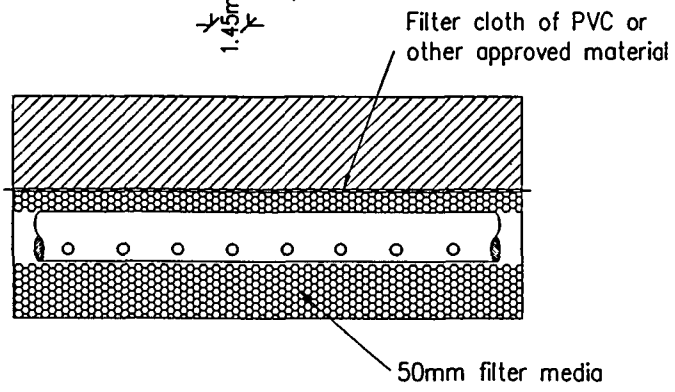
Typical Trench Detail

ALL DIMENSIONS TO BE CHECKED ON SITE. DO NOT SCALE OFF DRAWING. ANY DISCREPANCIES TO BE REPORTED.



NOTE - TRENCHES
 (1) Design length split into three trenches to enable alternation of loading
 (2) Trench spacing 1m. minimum between edges

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



SEPTIC TANK

SUGGESTED OPERATION & MAINTENANCE

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

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

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

3. Septic tanks need to be pumped (septage removed when the scum layer comes down to within 75mm of the bottom of the outlet tee or when sludge and scum have accumulated to the extent that the clear space (between scum and sludge) has a volume less than 1000 litres. Septage removal may need to be done as often as every three years but no longer than five years.

BIO or ZABEL FILTER (FITTED TO OVERFLOW PIPE)

1. The septic tank should be pumped prior to removal of the filter to prevent any solids from escaping to the trenches when cartridge is removed for cleaning.
2. The Zabel filter shall be cleaned (removed & hosed down) at the same time as normal septic tank servicing (3 - 5 years).
3. Remove disc cartridge and rinse off with a garden hose, being careful to rinse all septage material back into the tank. It is not necessary that the discs be cleaned 'spotless'. The biomass growing on the filter aids in the pre-treatment process and should be left in the discs.

PROJECT		REX BROOK TAYLOR HORSESHOE BAY	
PROJECT No.		B2003-843	
TITLE		DRAINAGE FIELD SPECIFICATION	DRAWING No. S01
DRAWN	KRS	CHECKED	SCALE NTS
COMPUTER FILE: MASTER\2003\BROOK		DATE	11/03
		REVISION	

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Engineering Report

Proposed Wastewater System

**Horseshoe Bay
Pelorus Sound**

for

Rex Brooke-Taylor

Jan Dimmendaal
Chartered Engineer
Smart Associates Ltd
19 August 2005

Project B2003-843

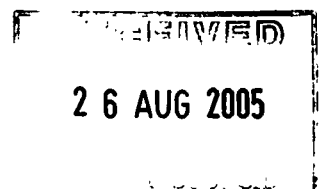


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- 1. *Introduction***

- 2. *Design - Wastewater Treatment and Disposal***

- 3. *Recommendations***

- 4. *Limitations***

- 5. *References***

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- A Location Plan and Site Plan**
- B Wastewater Design Sheet**
- C Typical Trench Detail**
- D Photos**

26 AUG 2005

1. Introduction

- 1.1 Rex Brooke-Taylor is proposing to upgrade the wastewater treatment and disposal system servicing his 2 bedroom bach in Horseshoe Bay, Pelorus Sound.
- 1.2 The existing wastewater system consists of a conventional septic tank discharging to gravity fed trenches located close to the foreshore.
- 1.3 The section legal description is Lot 1 DP 5737

2. Design - Wastewater Treatment and Disposal

- 2.1 The site investigation identified that a suitable wastewater disposal area exists northeast of the existing bach on the property. Based on the soil assessment carried out, an average drainage category of 4 has been adopted.
- 2.2 Three test pits were located at the site in the proposed effluent disposal area and their locations are shown on the site plan. The representative soil properties are:

AG 1

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
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0.10	Ah	Topsoil	Dark brown	Loamy humus	None	Very Loose	V.Soft	V.Strong	Moist	2
0.15	B sharp	Residual	Dark brown	Clay loam	None	Loose	Soft	Strong	Moist	3
0.95	C	Residual	Yellow brown	Light clay	None	Med. Dense	Firm	Moderate	Moist	4

AG 2

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
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0.10	Ah	Topsoil	Dark brown	Loamy humus	None	Very Loose	V.Soft	V.Strong	Moist	2
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0.50	C	Residual	Pale brown	Light clay	None	Med. Dense	Firm	Moderate	Moist	4

AG 3 (Pit dug 0.2m then auger)

(m)	Horizon or Layer and boundary	Genesis	Description							Drainage Category
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0.25	B sharp	Residual	Dark brown	Clay loam	None	Loose	Soft	Strong	Moist	3
1000	C	Residual	Pale brown	Light clay	None	Med. Dense	Firm	Moderate	Moist	4

- 2.3 The proposed land application area has slopes in the range 15° to 20° and is covered in regenerating native bush with some mature trees.
- 2.4 The wastewater flow design allowance of 180 l/person/day has been used in the design of the system. The design is based on the 2 bedroom dwelling having a permanent occupancy of 4 people (as per MDC Guidelines for new on-site wastewater management systems). This allowance is in accordance with appendix 4.2D of AS/NZS 1547:2000 and is based on a stream supply water source for the dwelling. A minimum wastewater storage capacity of 4500 litres is required.
- 2.5 The length of 600mm wide effluent trench required is 80m (refer wastewater design sheet Appendix B). As there is no mains power available at the site the proposed wastewater system will include gravity fed trenches with a maximum individual length of 20m. Effluent from the proposed septic tank will flow into a small chamber consisting of a 400mm diameter uPVC vertical pipe. Separate 90mm diameter uPVC header pipes discharging at the same level in the chamber are then connected to the midpoint of each of the 4 trenches.
- 2.6 A typical trench detail is attached (Appendix C).
- 2.7 The recommended location of the proposed effluent disposal trenches is indicated on the site plan (Appendix A). The location of these proposed effluent disposal trenches is more than 30 metres from the Sounds Foreshore Reserve.
- 2.8 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.
- 2.9 The septic tank system will require regular (yearly) maintenance of filter. Desludging is also required at regular intervals dependent upon the usage of the system.
- 2.10 Access to the system from the foreshore for maintenance will be available via the house access.

3. Recommendation

It is recommended that the existing wastewater system be replaced by a new system consisting of a conventional septic tank with outlet filter and minimum capacity 4500 litres, discharging by gravity into 600mm wide effluent trenches with a total length of 80 m. The trenches are to have an individual maximum length of 20m and are to be installed level following the ground contours.

4. Limitations

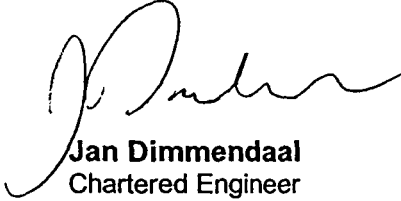
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5. References

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2. NZS 1546.3:1998 On-site Domestic wastewater Treatment Units (Part1: Septic Tanks).



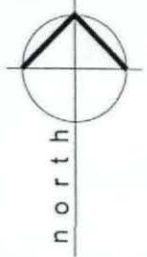
Jan Dimmendaal
Chartered Engineer

19 August 2005

Appendix A

Location Plan and Site Plan

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**LOT 1
D.P.5737**

20m long 6 wide trenches follow contours

Junction at approximate mid length of each trench

Conventional septic tank with outlet filter (Zabel or equivalent) Min 4500ltr capacity.

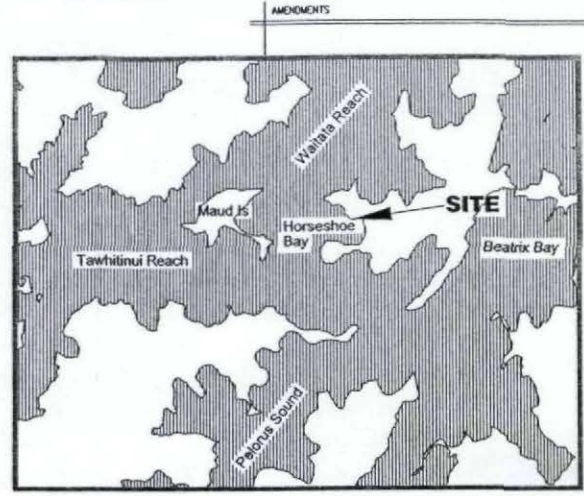
AUG 3

AUG 2

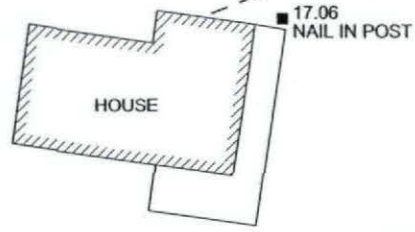
AUG 1

see detail

Approximate Effluent Field location



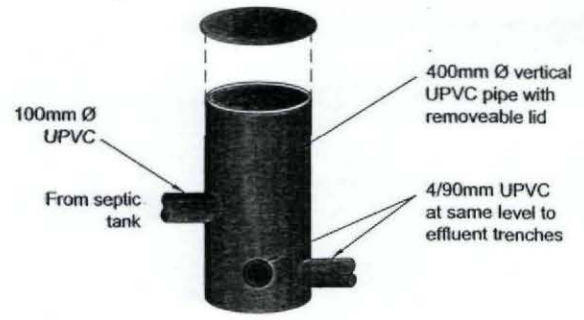
2 LOCALITY PLAN
nts



HOUSE

17.06 NAIL IN POST

Access



3 DETAIL
Scale 1:20

STAKE
STAKE

1 SITE LAYOUT
Scale 1:250

Horseshoe Bay

26 AUG 2005
 PLANNING
 DATE: 26 AUG 2005

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NOTES
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JOB TITLE: PROPOSED WASTEWATER SYSTEM HORSESHOE BAY For REX BROOK TAYLOR		DRAWING TITLE: PROPOSED SITE LAYOUT		DATE: 18/08/05	DRAWING No.: 001
PROJECT No. B2003-843		DESIGNED: JD	DRAWN: KRS/MGP	CHECKED:	REVISION: /

Appendix B

Wastewater Design Sheets

26 AUG 2005

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

3.0 Evaluation - Brooke-Taylor Horseshoe Bay, Pelorus Sound		Sheet No:
Intended water Supply:	<i>Public Supply Rain water (roof collection)</i>	<i>Bore Well/Dam</i>
Local experience with existing on-site systems:		
Septic Tank or similar (Primary treatment):	Textile Media or similar (Secondary treatment):	
<i>OK when installed properly with a correctly sized drainage area and maintained.</i>	<i>Produce high quality effluent and is suitable for intermittent loading. A lesser length of trench required</i>	
Recommendation for this site:	<i>Conventional septic tank, minimum capacity 4500litres fitted with Zabel (or equivalent) outlet filter and gravity trench disposal (maximum individual trench length 20m)</i>	
DRAINAGE CONTROLS:		
Need for surface water collector / cut-off drains?		
AVAILABILITY OR RESERVE / SETBACK AREAS		
Reserve area available for extensions, % of design area:	<i>100%</i>	
Setback distance? (between development and disposal system):	<i>Min. as required by Resource Management Act</i>	
Ksat, (m/day):	ESTIMATED SOIL CATEGORY:	<i>Category 4 - Imperfectly drained high/moderate structured loam</i>
4.0 Design for System		
RECOMMEND	D.L.R.	<i>15</i> mm/day
(NOTE: Where DIR is 10mm/week or less, ETA/ETS trenches to Fig 4.5A7 NZS1547:2000 should be specified to enable the utilisation of such soils)		
4 Permanent People At 180L/person/day:	<i>720</i>	L/day from Appendix 4.2D AS/NZS 1547:2000
DESIGN DAILY FLOW:	<i>720</i>	L/day
Septic tank size (min):	<i>4500</i>	(Table 4.3A1)
AREA REQUIRED:	<i>48.0</i>	m ²
LENGTH REQUIRED:	<i>80.0</i>	m for Septic Tank system (Primary Treatment) with 600mm wide trenches
RESERVE AREA REQUIRED:	<i>100%</i>	of specified drainage area
RECOMMENDATION :		
<i>Conventional septic tank, minimum capacity 4500litres fitted with Zabel (or equivalent) outlet filter and gravity trench disposal (maximum individual trench length 20m). Total minimum length of trench 80m</i>		

26 AUG 2005

26 AUG 2005

Appendix C

Typical Trench Detail

26 AUG 2005

Appendix D

Site Photos

26 AUG 2005

26 AUG 2005

Rex Brooke-Taylor
Horseshoe Bay, Pelorus Sound
Proposed Wastewater System

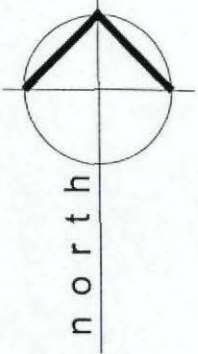
B03-843



Typical bush cover on property, specifically in proposed effluent disposa area

26 AUG 2005
DISTRICT COUNCIL

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**LOT 1
D.P.5737**

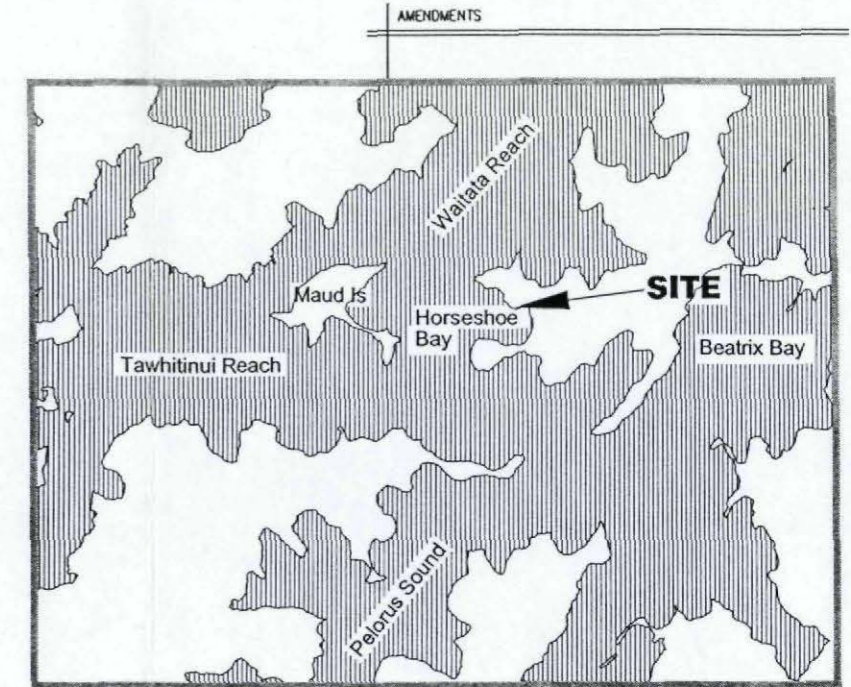
20m long 600mm wide
trenches to follow
contours

Junction at
approximate
mid length of
each trench

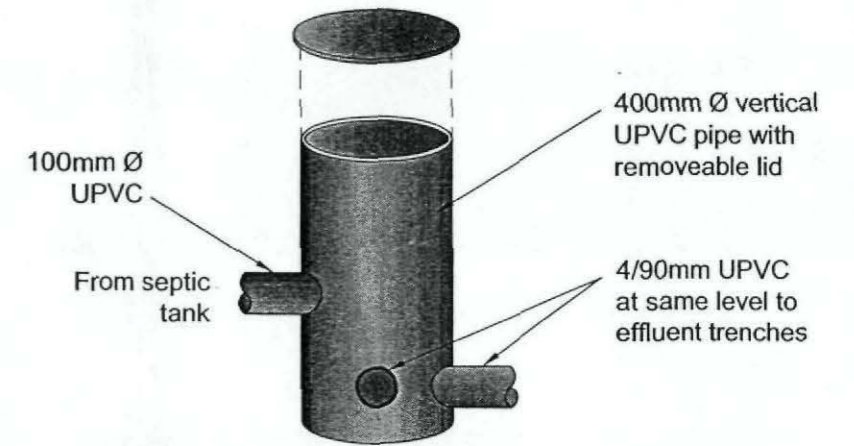
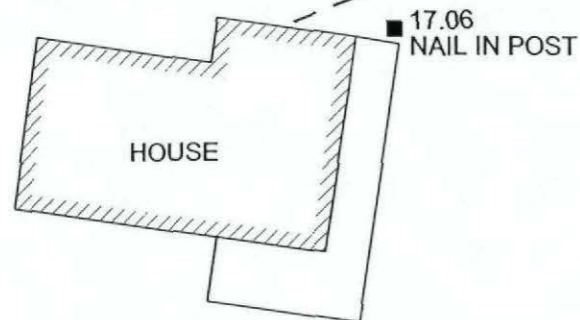
Conventional septic
tank with outlet filter
(Zabel or equivalent)
Min 4500ltr capacity.

see detail

Approximate Effluent
Field location



2 LOCALITY PLAN
nts



3 DETAIL
Scale 1:20

1 SITE LAYOUT
Scale 1:250

Horseshoe
Bay

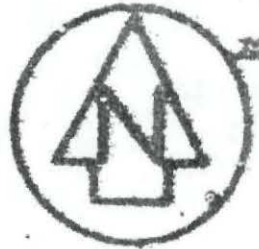


NOTES

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

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JOB TITLE: PROPOSED WASTEWATER SYSTEM HORSESHOE BAY For REX BROOK TAYLOR		DRAWING TITLE: PROPOSED SITE LAYOUT		DATE: 18/08/05	DRAWING No: 001
PROJECT No. B2003-843		DESIGNED: JD	DRAWN: KRS/MGP	SCALE: As Shown	
		CHECKED:	REVISION: /		

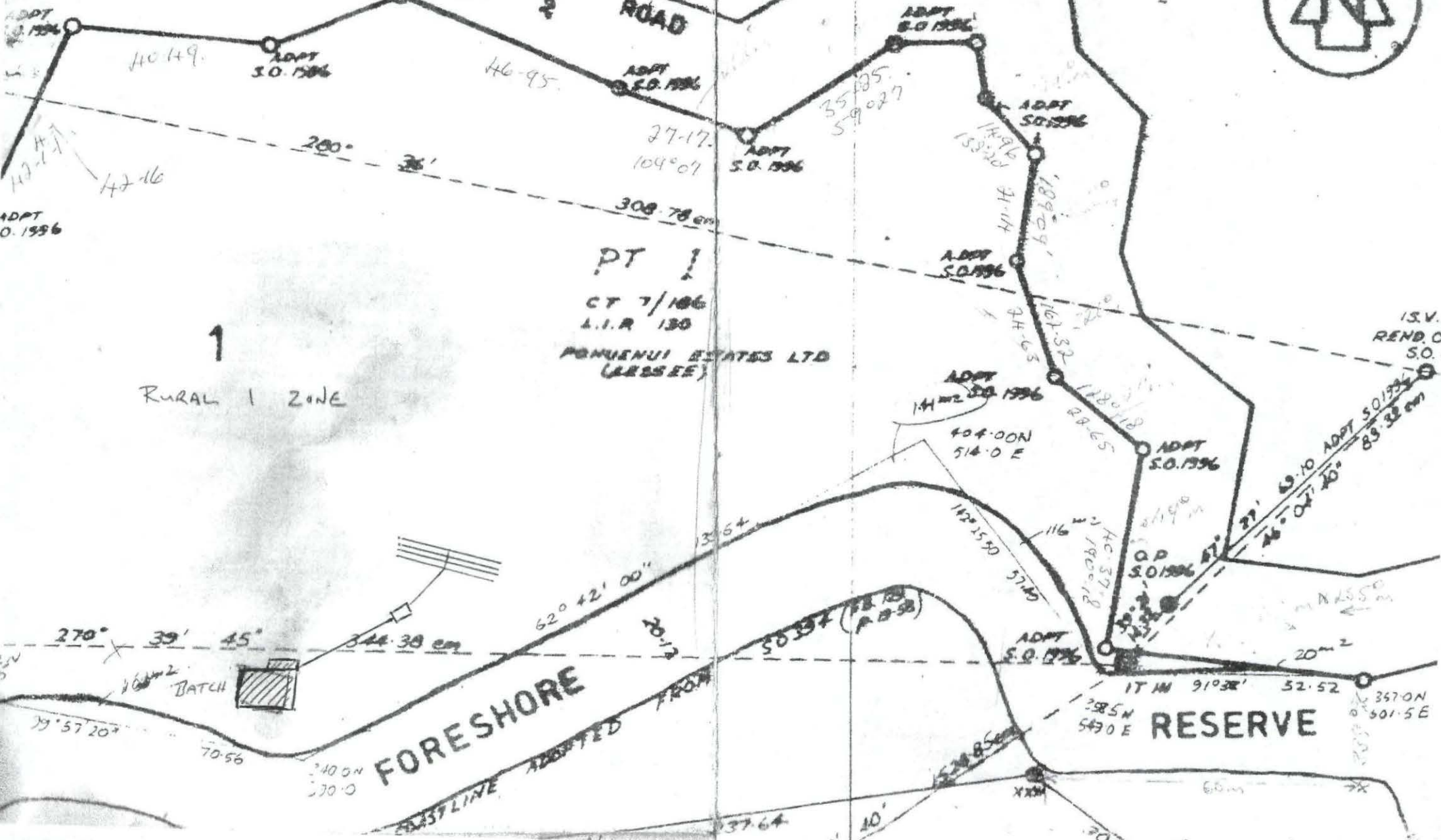


LEGAL

ROAD

FORESHORE

RESERVE



PT 1

CT 7/106
L.I.R. 130

POMUENUI ESTATES LTD
(LESSEE)

RURAL 1 ZONE

IS.V.
REND. O.
S.O. 1

SCALE 1:1000