ABACUS DESIGN

ARCHITECTS PROJECT MANAGERS ENGINEERS

GEO-TECHNICAL REPORT
FOR
HILLS DWELLING

PENZANCE BAY
TENNYSON INLET

LOT 1 DP 4820

SEPTEMBER 2005

TABLE OF CONTENTS

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NEW ZEALAND

Prepared by:
Bronwen Frazer

Reviewed by:
Richard Evans .....

Approved for issue by:
Richard Evans .....

SYNOPSIS

1.1 SCOPE

Mr. Hills has commissioned Abacus Design to inspect the property described as Lot 1 DP 4820 and provide an opinion as to the suitability of the site for a domestic dwelling, identify the development impact of the proposal and recommend mitigation measures to ensure impact is minimized.

1.2 SUMMARY

A site investigation was conducted in June 2005. The site is located in Penzance Bay, Tennyson Inlet. The Hills wish to construct a new 3 bedroom dwelling on the property. The new dwelling shall be situated in the western portion of the lot. A suitable building site exists and development of the site for residential occupation can be safely achieved through site management aimed at minimizing instability due to disturbance.

The site can be adequately serviced in terms of the requirements of the Marlborough Sounds Resource Management Plan.

1.3 RECOMMENDATIONS

Recommendations are detailed in the report but are summarized as follows:

- Dwelling to be positioned as shown on site plan. Foundations to be pole or pile foundations excavated to a minimum depth of 1.2m for poles and 0.75m for piles. An engineer shall inspect the foundations prior to pour or placement of poles.
- Minor excavation may be required to form a suitable building platform, excavation should be minimized with all cut slopes battered or retained. Resource Consent will be required if the volume to be excavated exceeds the permitted 20 cubic meters.
- All storm water runoff to be collected in a piped system and have controlled discharge to the storm water drain on Archers Road
- Domestic effluent from the site shall be disposed of via a 3500L septic tank and shallow bed disposal field as detailed in the report, disposal rates shall not exceed 10mm per day.
- All other recommendations not summarized above but detailed in the report.

1.4 CONDITIONS

This report has been prepared for the indicated building site based on interpretations of the test results.

REPORT

2.1 BACKGROUND

Mr. Hills advised that a 3 bedroom dwelling is proposed for the site. The site is zoned Sounds Residential in the Marlborough Sounds Resource Management Planning Maps. It is possible to gain access to the site via Archers Road.

2.2 SITE DESCRIPTION

The site is located in Penzance Bay, Tennyson Inlet.

The site is 816 square meters and slopes gently to the north east. The majority of the site is vegetated with occasion native plants and rough mown lawn. The site generally slopes to the north east with an inclination of approximately 7 degrees. The proposed building site is located in the western portion of the lot. A stream is located on the north eastern side of Archers Road 28 meters from the north east boundary of the property. A site plan is attached for reference.

2.3 GEOTECHNICAL INVESTIGATION

A walkover investigation was conducted on the site. Penetrometer tests were conducted in the vicinity of the proposed dwelling site to determine the subsoil conditions and aerial photographs of the site were inspected. Three subsurface inspection bores were investigated in the vicinity of the proposed building site. The site and the surrounding area were closely inspected to determine the stability of the area. The under lying rock in the area is described as Pelorus Series Greywacke and Argelite. No out crops of bedrock were observed on site. There were no signs of recent or ongoing movement on the building site or surrounding area. A suitable effluent disposal site was identified and three subsurface soil investigations were carried out. Results from all of the above investigations are attached in the appendix.

2.4 GEOTECHNICAL ASSESSMENT

No evidence of significant soil creep or disturbance was noted on site. The site features a gentle north east inclination and is considered stable. We believe there is no risk to life and potential for only minor financial loss as a result of instability. Overall there is a Low risk of future instability. The site is not included in any Natural Hazard Zone in Council Planning Maps.

Penetrometer tests indicated that the subsoil material is deep medium dense clay with an average allowable bearing capacity in excess of 100 kPa at the proposed foundation levels of 0.75m -1.2m.

A summary table is indicated below and the results are attached for reference.

Location	T1	T2
0-0.25m	75kPa	70kPa
0.25m-0.5m	90kPa	110kPa
0.5m-0.75m	130kPa	180kPa
0.75m-1.0m	200kPa	250kPa
1.0m-1.25m	-	210kPa

Inspection of the site showed no signs of recent disturbance. The topography and subsoil investigations indicate that the risk of instability is low. It is possible for development of the site to proceed with precautionary measures employed to ensure that the stability of the site is not disturbed. These measures and other comments follow.

2.5 DEVELOPMENT IMPACT AND MITIGATION MEASURES

Access

The site is accessible by road via Archers Road, an entrance way has been formed to the site from Archers Road.

Foundations

Minor excavation may be required to form a suitable building platform for the new dwelling. Excavation should be minimized with all cut slopes battered or retained, resource consent will be required if the volume of excavated material exceed the permitted 20 cubic meters. The building site and subsoil conditions allow foundations to be pole or pile foundations. Pole foundations shall be excavated to a depth of 1.2m and piles to a depth of 0.75m. An engineer shall inspect the foundations prior to placement of poles or piles. At all times the contractor shall ensure that the site is well drained and that all collected runoff is discharged to the proposed storm water system on the site with adequate sediment controls. Foundations should be kept dry and no uncontrolled runoff shall be allowed to flow over the edge of the plat form.

Effluent Disposal

It is recommended that the disposal system for the new dwelling should be designed to the current requirements of NZS 1547, Onsite Domestic Wastewater Management. No seepage tests were conducted on the site however the soil could be classified as a clay loam, Category 4 soil (NZS 1547). A new 4000L septic tank and shallow bed disposal field shall be installed. Effluent disposal design has been calculated based on daily flow rate of 1080 litres per day for a three bedroom dwelling or population equivalent of 6 people. The category 4 soil DLR is 10mm day, Therefore 108 square meters of disposal area is required. Three 12m x 3m shallow beds shall be situated as shown on the attached site plan.

The proposed disposal site is situated a distance of 30m from the stream which is situated on the north eastern side of Archers Road. The water table is situated in excess of 0.6m from the proposed disposal level. The shallow beds shall be laid level following the contours of the slope. A weir box shall be installed to ensure even distribution of fluid to each bed. It is also recommended that the bed be planted over with grasses and shrubs to assist in evapo-transpiration. A detailed site and soil evaluation report and design is attached.

Stormwater

All storm water collected on the site shall be conveyed to the existing storm water drain on Archers Road. The discharge point shall be protected from erosion through use of rock protection or other suitable protection. Runoff can be conveyed in a flexible smooth bore 100mm pipe fixed to galvanised rods driven into the ground. It is imperative that surface water runoff should not be allowed to pond on the site or run uncontrolled over the surface of the site. Soakaways shall not be permitted.

During construction of the dwelling, precautions shall be taken to ensure that excavations and foundations do not collect water. Excavations should be completed as fast a possible and, should work be suspended, then the excavation shall be covered to ensure no water is collected. Upon fitting the roof, contractors shall ensure that gutter/spouting down pipes are fitted when spouting is completed so as to ensure collected runoff is directed away from the dwelling site. This can be a temporary measure such as novaflow pipe but is imperative to ensure the stability of the site.

Services

Water shall be provided via a community scheme and will be held in storage tanks situated as shown on the site plan. Water tanks shall be sited on platforms excavated into the ground. Tank overflows and scour valves shall be connected to the piped storm water system. Power and telephone connection is available from Archers Road.

APPENDIX

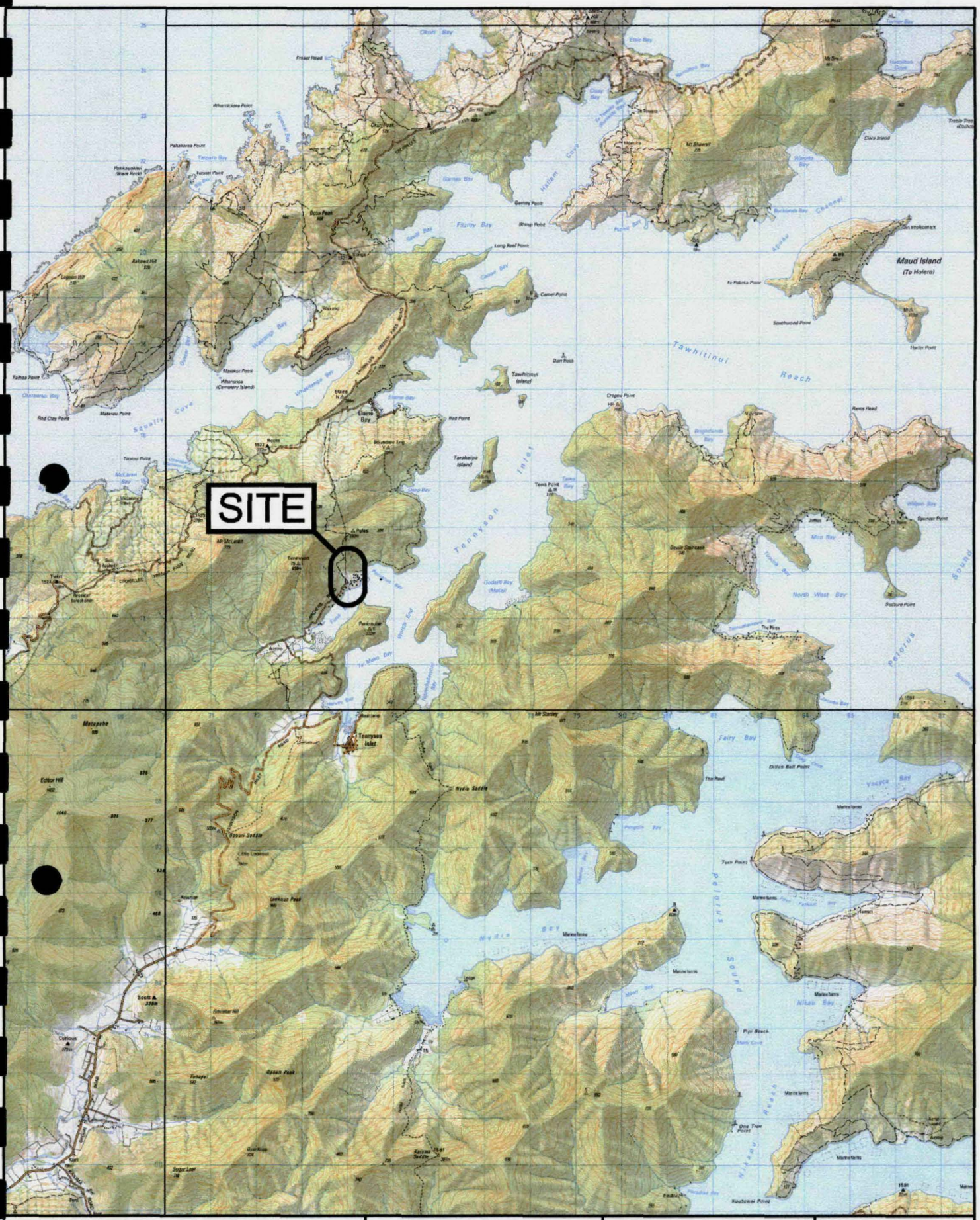
Location Plan

Site Plan

Test Results

Effluent Details

Stability Opinion



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PROJECT
HILL REPORT

DRAWING
LOCATION PLAN

DATE
03/08/05

SCALE
NTS

DWG NO.
SJ633-fig1

AMENDMENT
01

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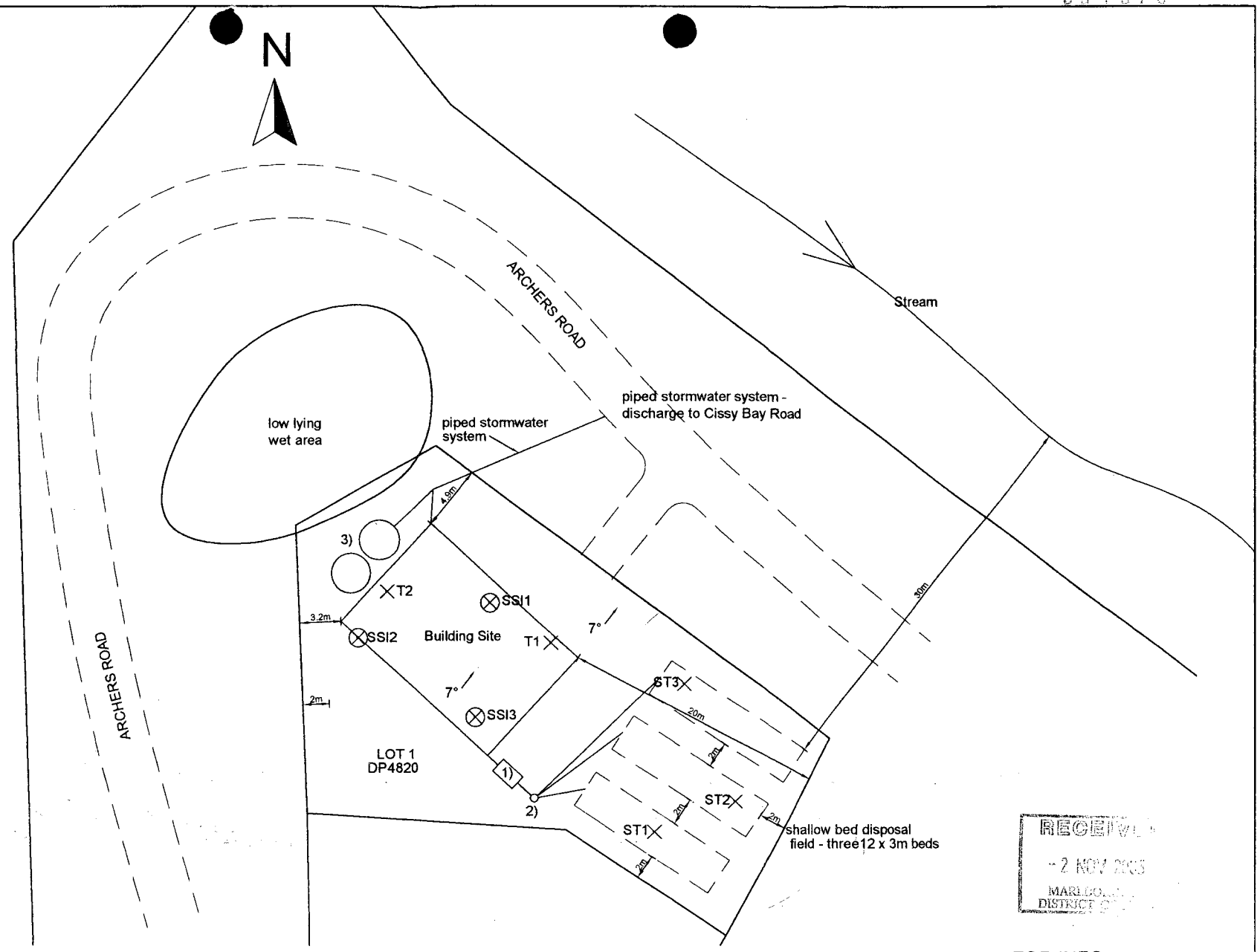

NOTES:

T1 = penetrometer test site 1
T2 = penetrometer test site 2

SSI1 = subsurface inspection site 1
SSI2 = subsurface inspection site 2
SSI3 = subsurface inspection site 3

ST1 = Soil test site 1
ST2 = Soil test site 2
ST3 = Soil test site 3

1) 4000L septic tank with pump chamber

2) weir box

3) Water tanks - overflow to be connected to storm water system

Site plan should be read with report

FOR INFO

02 28/10/05 FOR INFO
01 19/07/05 FOR INFO
AMENDMENT DATE DETAILS

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CLIENT
MURRAY HILL

PROJECT
HILL REPORT
PENZANCE BAY
DRAWING
SITE PLAN

DATE 19/07/05
AMENDMENT 02
A3

DWG NO. SJ633-FIG2
SCALE 1:300 (A3)
CAD FILE REF: SJ633-F2

ABACUS DESIGN

ARCHITECTS PROJECT MANAGERS ENGINEERS

Site and Soil Evaluation Report

1.0 SITE INFOMATION

1.1 Location details:

Owner: M & J Hills

Location: Penzance Bay

Address: Tennyson Inlet

1.2 Site Description:

The site is located in Penzance Bay, Tennyson Inlet.
The site is located adjacent to Archers Road. The site is 816 square meters and slopes gently to the north east. The majority of the site is vegetated with occasion native plants. The site generally slopes to the north east with an inclination of approximately 7 degrees. The proposed building site is located in the western portion of the lot. A stream is located on the north eastern side of Archers Road 28 meters from the north east boundary of the property. A site plan is attached for reference.

1.3 Climate:

Annual rainfall (mm): Unknown

Annual Evaporation (mm): Unknown

1.4 Intended water supply:

Community Scheme

1.5 Existing on-site systems:

No Existing on site system

1.6 Site Evaluator:

Name: Bronwen Frazer

Company/agency: Abacus Design

Address: PO Box 309
Blenheim

Phone: 5778857

Fax: 5779966

2.0 ON-SITE EVALUATION

2.1 Work Undertaken:

Details: Site visit & effluent design

Date: June 2005

Weather (on day and preceding week): dry during visit

Photo Attached: NO

2.2 Topography:

Slope: approximately 7 degrees

Drainage Patterns: gully in center of site, runoff from the portion of hillside above the lot is collected in a small stream, which is located to the west of the site.

Ground Cover: rough mown grass and occasional native trees.

Boundaries: noted

Waterways: no waterways located on the site or within 30m of the proposed effluent disposal area. Creek located on opposite side of Archers Road in excess of 30 meters from the disposal field.

Well/Bores: none

Buildings: proposed three bedroom dwelling

Other:

Site History (land Use): Vacant

Site Plan Attached: YES

2.3 Site Exposure:

Site Aspect: north east

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

Proximity to low lying area and stream should be noted

2.5 Site Stability:

Is expert assessment necessary: no

2.6 Drainage Controls:

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

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

Need for surface water collector/cut off drains: Cut off drain above field

2.7 Set back Distances:

min 2.0m from boundaries

Set back distance: 30m from any water body

Reserve area:

3.0 SOIL INVESTIGATION

3.1 Soil profile determination

Method: Test pit - Auger Hole

A range of soil properties have been assessed in accordance with the procedures outlined in Appendix 4.1D of NZS1547:2000

3.2 Reporting

Test Site 1

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	100mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	-	Moist	Light Yellowish Brown	Clay Loam	<20		Clay Loam, imperfectly drained Moderately plastic, smooth to manipulate. 45mm ribbon length. Numerous schist fragments.

Test Site 2

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	100mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	-	Moist	Light Yellowish Brown	Clay Loam	<20		Clay Loam, imperfectly drained Moderately plastic, smooth to manipulate. 45mm ribbon length. Numerous schist fragments.

Test Site 3

Layer	Lower Depth	Moisture content	Colour (moist)	Field Texture	Coarse Fragments %	Structure	Other
1	80mm	Moist	Brown	Loam	<2	Moderate	Topsoil
2	-	Moist	Light Yellowish Brown	Clay Loam	<20		Clay Loam, imperfectly drained Moderately plastic, smooth to manipulate. 45mm ribbon length.

3.3 Estimated Soil Category:

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

The estimated soil category has been determined based on Table 4.1.1 NZS 1547:2000 The assignment of soil category 4 is based on the texture and structure of the soil as described in 3.2 above and observations made during the site visit.

3.4 Recommended DLR / DIR

DLR: 10mm/day
Reason: Values based on soil category

3.5 General Comments

We recommend the use of a septic tank and shallow bed disposal field

4.0 DESIGN

4.1 Soil Category found on site: 4

4.2 Number of Bedrooms: 3 bedrooms

4.3 Average Daily Flow Rate (Q) (Litres): 1080L

Design Occupancy: 6 people (2 people per bedroom)
Flow Allowance: 180L per person per day.

4.4 Septic tank Capacity (Litres): minimum 4000L

4.4 Treatment Quality:
4.5

Faecal Colliforms:<10^3/100mls

BOD_5:<100g/m^3

Suspended Solids:<60g/m^3

4.5 Loading Rate (DLR): 10mm

4.6 Bed spacing (m): 2.0m

Note: Beds to be laid level and follow the contour

5.0 CALCULATIONS

$$A = \frac{1080L}{10mm/day}$$

Disposal Area = 108 square meters

6.0 Assessment of other possible systems:

Secondary treatment of effluent is a possible alternative, however as the slope of the site is gentle and no water bodies are situated within 30m of the proposed disposal field the environmental risks of the proposed system are sufficiently low. Aerated secondary treatment plant systems are not recommended due to the intermittent loading and poor performance of these systems under such conditions.

7.0 Best Practical Option

The best practical option for management of domestic wastewater is through the use of a septic tank and shallow bed disposal field (as detailed in section 4.0 above). It is recommended that the surface of the shallow bed be planted with shrubs and grasses suited to absorbing and transpiring moisture. It is my opinion that this system is the best method for preventing or minimizing any adverse effects on the environment.

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Maintenance Schedule for Septic Tank and Effluent Disposal Field

1.1 Owner detail:

Owner: M & J Hills

Location: Penzance Bay

Notes: Owners and occupiers are legally responsible to keep their on-site system in good working order. Records and servicing and maintenance should be retained by the owner with a copy forwarded to the council by the servicing agency as soon as possible following completion of inspections or in the case of remedial works being required, on the completion of those remedial works. Abacus Design must inspect and certify the installation to ensure the system has been installed according to the design. This certification must be provided to council prior to commissioning of the system.

1.2 System Detail:

Capacity: 4000L standard septic tank with effluent filter.

Disposal Field: Shallow bed disposal

(See geo-technical report dated October 2005 for details of system)

1.3 Use of System:

The Attached pamphlet 'Looking after Your Septic Tank Helpful Tips' issued by the Marlborough District Council contains advice on the use of your septic tank.

1.4 Maintenance of Septic Tank:

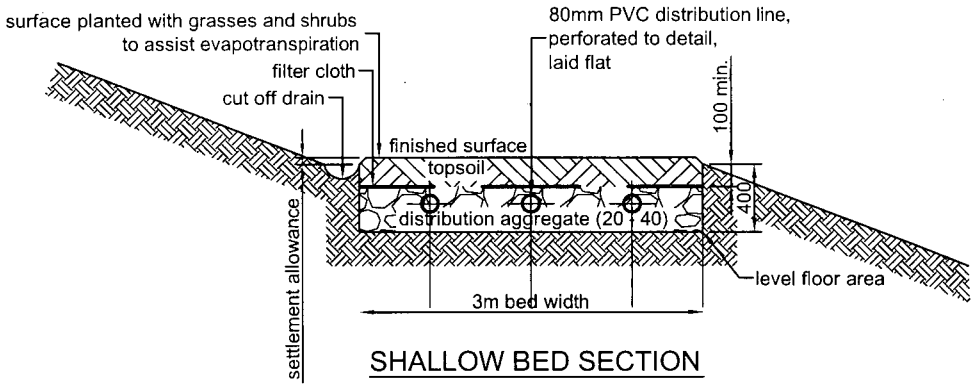
The owner shall arrange for the following Maintenance:

- The septic tank is required to be desluged regularly (3-5 years) or when sludge and scum occupy 2/3 of the volume of the tank (or first stage of a two-stage tank). At the time of desludging all components of the system shall be checked and maintained as detailed below.
- The vent of the septic tank shall be checked and shall remain exposed.
- Effluent filters shall be inspected and cleaned annually or more frequently if required.

1.5 Maintenance of disposal field:

- The weir box shall be checked annually or more frequently if required to insure satisfactory operation and that outlet pipes are clear.
- The surface water diversion drain upslope of the disposal field shall be kept clean to reducer absorption of rainwater into the disposal field.
- The disposal field shall be inspected for any signs of failure (wet soggy areas, sewerage smell, drains and toilets running slowly). Should the field be found to be operating inadequately the best practical option shall be employed to rectify the problem.
- Land application areas must be clearly identified on the ground surface to allow for future maintenance.

NOTE: Manufactures Instructions for maintaining and cleaning of Effluent Filters shall be followed at all times.



SHALLOW BED SECTION

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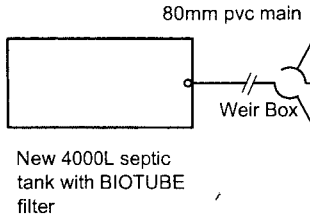

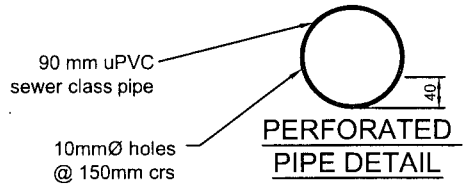

PERFORATED PIPE DETAIL

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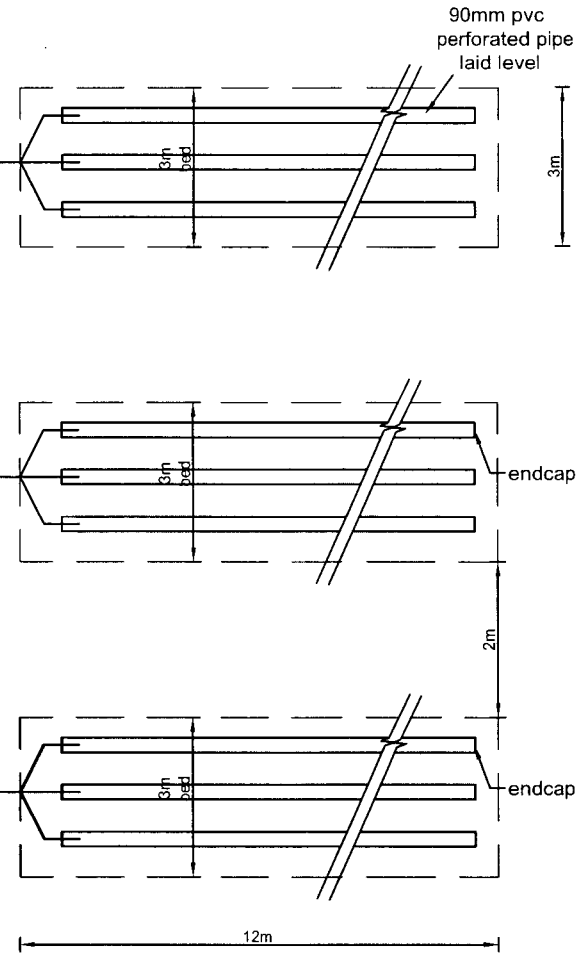
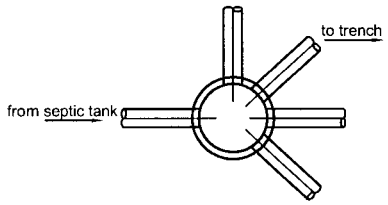
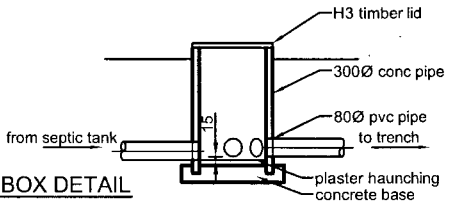
SHALLOW BED LAYOUT

Schematic - Not To Scale







WEIR BOX DETAIL

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01 20/07/05 FOR INFO		
AMENDMENT	DATE	DETAILS

ISSUE
FOR INFO

ABACUS DESIGN

PROJECT
HILL REPORT

DRAWING
EFFLUENT DISPOSAL
SHALLOW BED DETAIL

DATE 20/07/05
SCALE NTS

DWG NO. SJ633-Fig3
AMENDMENT 01
CAD FILE REF: SJ633-F3

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NEW ZEALAND

Subsoil profile determination

Method: Auger Hole

The subsoil profile has been assessed and described in accordance with NZ Geotechnical Society guidelines for field description of soils and rocks for engineering purposes.

Reporting

Test Site 1

Layer	Lower Depth	Description
1	75mm	**TOP SOIL**
2	-	**CLAY with sub-angular fragments of weathered schist, occasion cobble sized fragments. moist, medium plasticity, firm consistency, Light yellowish brown in colour. Homogenous CLAY with no visible bedding.**

Test Site 2

Layer	Lower Depth	Description
1	100mm	TOP SOIL
2	-	CLAY with sub-angular fragments of weathered schist, occasion cobble sized fragments moist, medium plasticity, firm consistency, Light yellowish Brown in colour. Homogenous CLAY with no visible bedding.

Test Site 3

Layer	Lower Depth	Description
1	100mm	TOP SOIL
2	-	CLAY with sub-angular fragments of weathered schist, occasion cobble sized fragments moist, medium plasticity, firm consistency, Light yellowish Brown in colour. Homogenous CLAY with no visible bedding.

ABACUS DESIGN

ARCHITECTS PROJECT MANAGERS ENGINEERS

Marlborough District Council
Stability Opinion

Description of Work:

Hill Dwelling Site, Penzance Bay, Tennyson Inlet, Lot 1 DP4820

I Richard Evans hereby confirm that I am experienced in the field of soils engineering and more particularly land and foundation stability and am formally recognised by the Marlborough District Council. I am familiar with and understand the purpose of the Marlborough District Council's geo-technical reporting standards. This professional opinion is furnished to the Marlborough District Council with respect to the proposed building site.

Site investigations have been carried out under my direction and are described in our site investigation report dated October 2005. A site investigation report formatted as required has been submitted.

This opinion is based on the assumption that the data obtained from these investigations is representative of the area under consideration.

In my professional opinion and having regard to current soils engineering practices and acceptable engineering principles as applied to the specifics of the site which I have investigated to the extent that acceptable engineering practices require. A suitable building site is located on the site as shown on the attached plans.

Particular requirements are:

- Dwelling to be positioned as shown on site plan. Foundations to be pole or pile foundations excavated to a depth of 1.2m for pole foundations and 0.75m for pile foundations. An engineer shall inspect the foundations prior to pour or placement of poles
- All excavations should be minimised with all cut slopes battered or retained.
- Best practice standards shall be employed during construction including storm water management as detailed in the report.
- All surface runoff water shall be collected and piped to the storm water drain on Archers Road as described in the report, water storage tanks to have overflow/scour connected to piped system.
- Domestic effluent from the site shall be disposed of via a new 4000L septic tank and shallow bed disposal field as detailed in the report, disposal rates shall not exceed 10mm per day.
- Other conditions as detailed in the Engineering report shall be constructed in accordance with the drawings.

This opinion is not to be construed as a guarantee and does not extend to areas outside the investigated area.

Richard Evans
CP eng, MIPENZ

Date 2-11-05

051076

NOTES:

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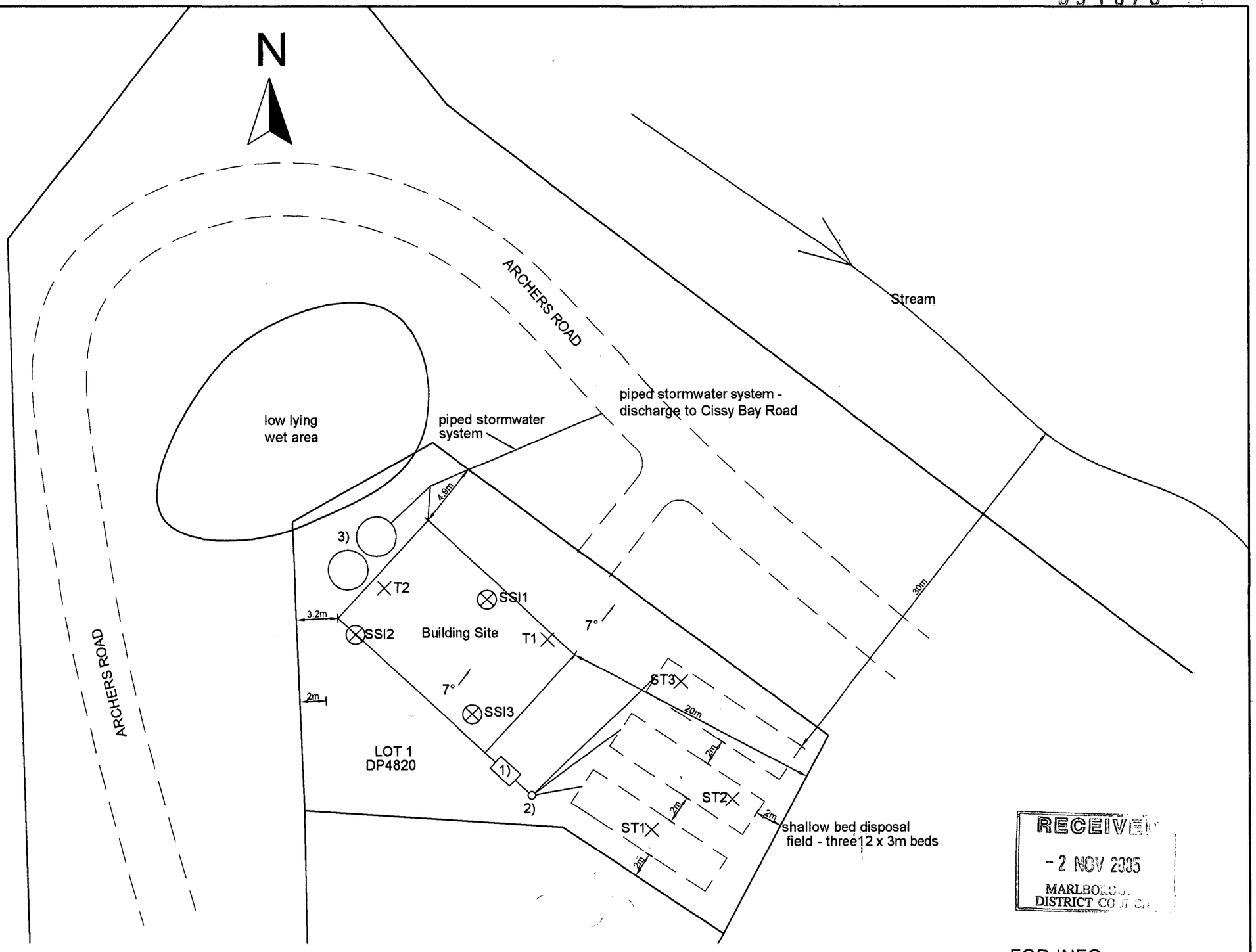
1) 4000L septic tank with pump chamber

2) weir box

3) Water tanks - overflow to be connected to storm water system

Site plan should be read with report



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02 28/10/05 FOR INFO 01 19/07/05 FOR INFO AMENDMENT DATE DETAILS	AMENDMENT DATE DETAILS	CONSULTANTS ABACUS DESIGN abacusdesign@xtra.co.nz - TEL 03 577 8857 - FAX 03 577 9966 - PO BOX 309 - 141 HIGH STREET - BLENHEIM - NEW ZEALAND	CLIENT MURRAY HILL	PROJECT HILL REPORT PENZANCE BAY DRAWING SITE PLAN	DATE 19/07/05 AMENDMENT 02 DWG NO. SJ633-FIG2 SCALE 1:300 (A3) CAD FILE REF: SJ633-F2	A3