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ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTS LTD

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05 March 2014

Marlborough District Council
PO Box 443
Blenheim 7240

Re: Wastewater System Design Amendment for:
Sargeant Relocate – 90 Lindens Road, Koromiko
MDC Building Consent Number: 130569
Our Ref: 3766

Dear Sir/ Madam,

We have been asked to look at the use of an alternative wastewater management system for the above address. Our current design currently details a primary treatment unit and mounded land application area. Our client has informed us that they would like to look at the use of a secondary treatment unit. We have reviewed the site investigation and our design and have found that an alternative system involving a secondary treatment unit and land application via raised subsurface drip line application is also acceptable when average site topography, soil conditions and groundwater levels are taken into account.

A suitable site for the new land application system exists where the original proposal and site testing was completed, south-west of the relocated dwelling.

As with the original design the wastewater loading for the site has been placed at 1200L (6 person at 200L/person/day). A 3000L minimum secondary treatment unit achieving the following treatment levels is to be used:

BOD after 5 days (average) < 20 g/m^3
Suspended solids (average) < 30 g/m^3

The Oasis Clearwater 2000 is the intended system to be used and it has been tested and meets the above standard.

A site plan outlining the area concerned is contained in drawing 3667-G10 in Appendix A.

The total area of drip line required for any new wastewater system is 343m^2 (refer wastewater design sheet in Appendix B). The irrigation system design requires 1.6 litre/hr emitters at 0.6m spacing with lines laid at 1.0m intervals.

Table R1 of AS/NZS 1547:2012 requires a minimum vertical setback distance to groundwater of 600mm for the land application of effluent.

From the December 2012 site investigation mottling was found within the soil profile indicating that the groundwater level is often located up to a depth of 0.4m below the ground surface. A follow up vist on September 12, 2013, found evidence of minor surface ponding in isolated areas of the proposed land application. It is recommended that a minimum of 600mm of topsoil be mounded with a fall of 1:100 at its surface to ensure water will not collect. To provide adequate treatment, it is recommended that the irrigation lines be placed 150mm below the mounded surface within the topsoil profile. This will provide adequate separation between land application and groundwater and any surface water that may collect in high rainfall events.

Irrigation lines should not be located within 2m of any boundary. The installation of the irrigation system is to be in accordance with the product installer guide supplied by the manufacturer.

The proposed land application area achieves a minimum 30m setback from the Tuamarina River bank and 35m from the existing mounded land application system servicing the main house.

Prior to the proposed system becoming operational the system installer must certify that the system has been constructed according to the design. This certification must then be forwarded to Council.

As the design satisfies G13/VM4 of the NZ Building Code, a PS1 and monitoring schedule for the wastewater installation at the site is not required. Vehicle access to the system for maintenance will be available.

The Marlborough District Council requires that the owner of any advanced wastewater treatment system enters into and retains a maintenance contract with the supplier of the system, or with a recognised maintenance contractor, for maintenance to be carried out at yearly intervals.

Records of the maintenance are required to be forwarded to the Council as soon as practicable following the completion of the inspection or, in the case of remedial works being required, on completion of those remedial works.

Please do not hesitate to contact the undersigned should you have any questions.

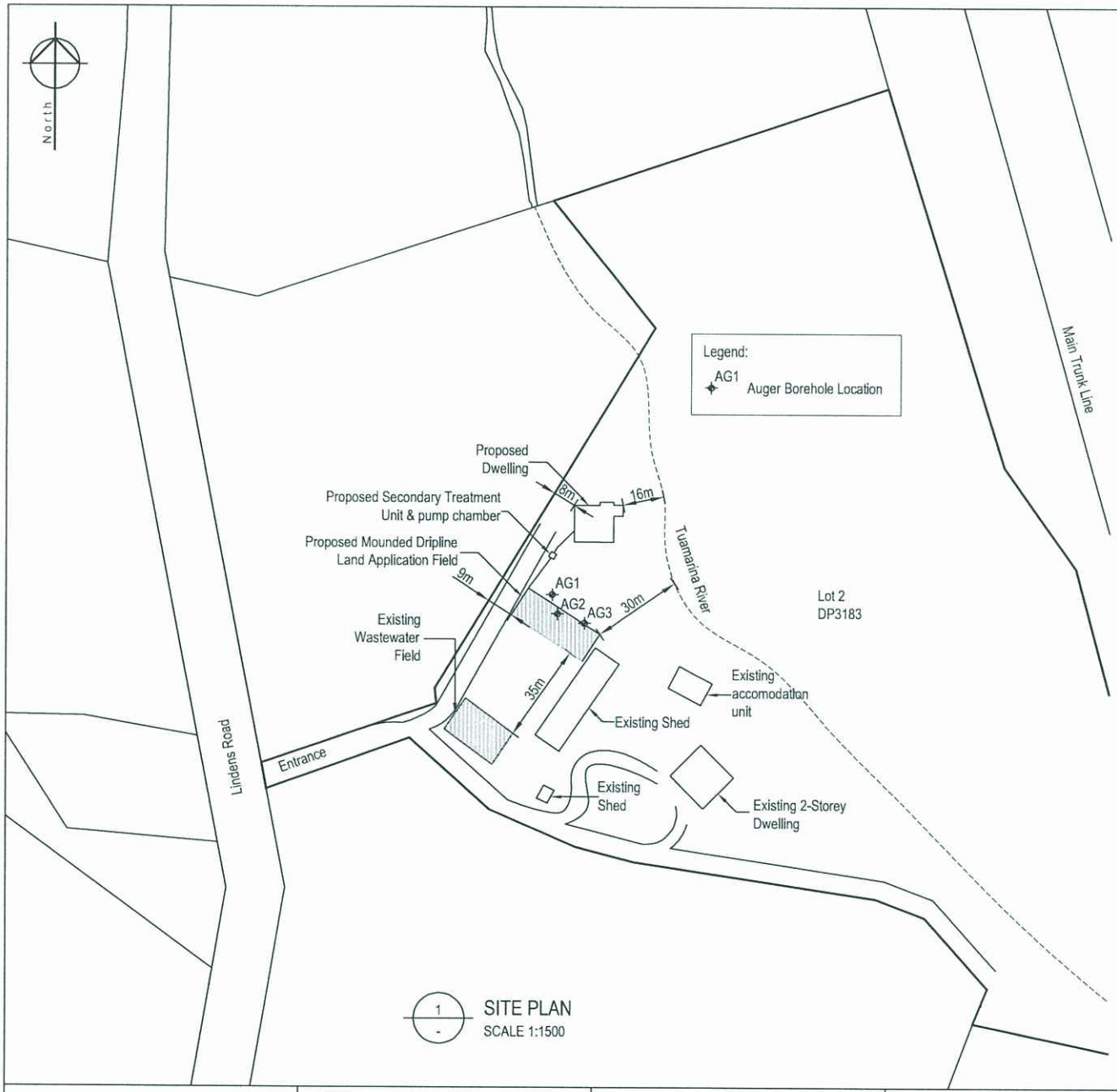
Yours Faithfully,

SMART ALLIANCES LTD

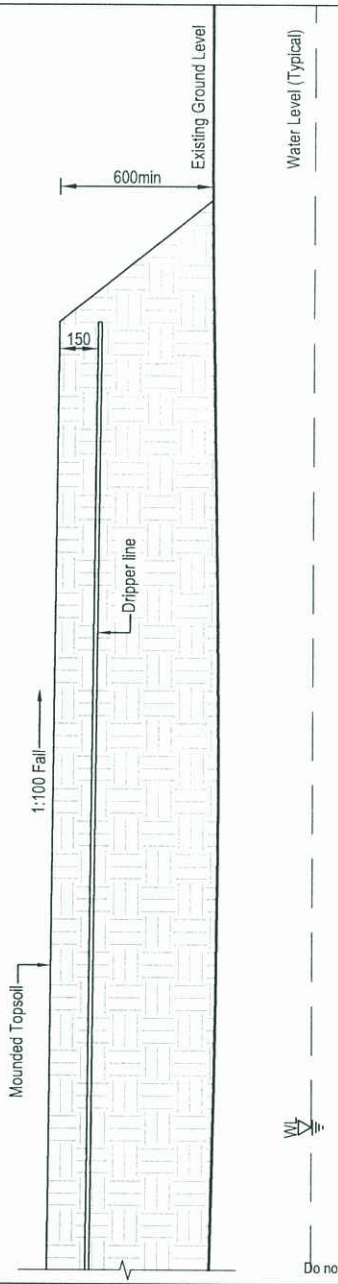
Jeremy Harnett
Environmental Scientist

05 March 2014

Appendix A: Site Plan and Wastewater Detail: 3766- G10



1 / - SITE PLAN
SCALE 1:1500



2 / - TYPICAL MOUNDED LAND APPLICATION
Scale 1:20

Do not scale from this drawing

REV	DATE	DETAILS
02	15-03-14	WASTEWATER AMENDMENT
01	10-01-13	REPORT

REV	DATE	DETAILS

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CLIENT
PENE SERGEANT

ISSUE
WASTEWATER AMENDMENT

PROJECT
SERGEANT RELOCATE
90 LINDENS ROAD, KOROMIKO

DRAWING
SITE PLAN
WASTEWATER DETAIL

DATE	SCALE (A3)
05-03-2014	AS SHOWN
DRAWN	REVISION
JH	01
APPROVED	DWG NO.
RE	3766-G10

CAD FILE REF: P:/3766-G10

Appendix B: Wastewater Irrigation Design Sheet

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Project:	Sergeant Relocate		
Client:	Pene Sergeant		
Ref:	3766	Eng:	JH
Date:	05/03/2014	Sheet:	1 of 1

WASTEWATER SYSTEM DESIGN SHEET

To AS/NZS 1547:2012 & MDC Guidelines for New Onsite Wastewater Management Systems

Number of Proposed Bedrooms: 3

Intended water Suppl Bore or Well Supply

Soil Category Determined on Site Category 4

DRAINAGE CONTROLS:
Need for surface water collector / cut-off drains? *No*

AVAILABILITY OR RESERVE / SETBACK AREAS
Reserve area available for extensions, % of design area: *100%*
Setback distance? (between development and disposal system):

DESIGN
Daily Loading Rate: ***3.5*** mm/day

Occupancy: **6** *Persons*

L/person/day: ***200*** L/p/d **1200** L/day from Table M1 in AS/NZS1547:2012

DESIGN DAILY FLOW: **1200** L/day

AREA REQUIRED: **343** m^2

LENGTH REQUIRED: **361** m

RESERVE AREA REQUIRED: *100%* of specified

Irrigation Design

Acceptable daily loading rate (mm/day)	**3.5**
Daily influent (l/day)	**1200**
Emitter type	**Raam 17**
Emitter flow rate (l/h)	**1.6**
Emitter Spacing (m)	**0.6**
Dripline Spacing (m)	**1**
Distance from Treatment system to Irrigation Field (m)	**10**
Field Size (m^2)	**343**
Field length assuming square area	**19**
Number of lines	**20**
Total Dripline Length (m)	**361**

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P.Sarjeant

Relocated Dwelling, 90 Lindens road

- On-site Wastewater Management Report

10 January 2013 Our ref: 3766

Pene Sarjeant
Three (3) Bedroom House
90 Lindens Road,
Koromiko

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4 Wastewater Assessment 4

5 Assessment of Environmental Effects 5

6 Conclusion 6

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Appendix B – Wastewater Details, Calculations and Logs
Appendix C – Wairau/Awatere RMP checklist
Appendix D – Site Photographs

Issue No.	1	2	3	4	5	6
Date	08.01.13					
Prepared By	JH					
Approved By	RE					

1 Executive Summary

Smart Alliances Ltd have carried out an engineering appraisal of the on-site wastewater management criteria for the proposed relocated dwelling for Pene Sarjeant (the client) at 90 Lindens Road, Koromiko.

There is sufficient area to treat and dispose of the wastewater created from the new dwelling.

The wastewater management system for the proposed dwelling should comprise a primary treatment unit (septic tank) fitted with a filter at the outlet and a pump in a dosing chamber. The wastewater should be distributed into a mounded land application field.

The new application area should be a mound totalling a minimum of 170m^2 area at the base.

Installation is to be in accordance with the requirements and recommendations of AS/NZS 1547:2012.

The recommendations listed above should not be taken in isolation and must be read in conjunction with the remainder of this report and the context of the proposed residential development at the site.

2 Introduction

The client proposes to relocate a three bedroom dwelling to their property located at 90 Lindens Road, Koromiko. There is currently two other dwellings on the property serviced by an existing septic tank and wastewater land application field.

The purpose of this report is to present the results of site investigations carried out in relation to the on-site wastewater treatment and land application for the new dwelling. The site investigations were carried out on 19 December 2012.

3 Location & Site Description

The property is located between Lindens Road and the main railway line within an area of rural residential properties. The site is located on a relatively flat alluvial surface generally pasture vegetated and grazed. The Tuamarina River meanders through the property from its north-west to south-eastern boundary.

The south-western part of the property has been developed with a house and associated auxiliary buildings, and contains significant areas of landscaping.

The legal description of the property Lot 2 DP 3183, and the land area is 4.7196 ha.

Locations of all the main features of the property are shown on the site plan attached in Appendix A.

The geological map for the area (Begg and Johnston 2000) indicates that the site is underlain by alluvial floodplain gravel deposits of Holocene age. The results of the subsurface investigation reported herein generally confirms the stratigraphy shown on the map.

4 Wastewater Assessment

The site investigation has identified that the property is suitable for wastewater disposal by primary treatment (septic tank), dose loaded (pump) coupled with a mounded land application field.

The site investigation has identified that the existing onsite wastewater system is working satisfactorily and that this type of system is suitable for the site conditions encountered.

Three hand augured boreholes, numbered AG1 to AG3, were put down at the site in the proposed land application area. Their locations are shown on the site plan provided in Appendix A.

Based on the soil assessment carried out, an average drainage category of 4 has been adopted, which represents the limiting soil drainage layer within the profiles. With this considered, a maximum design loading rate of 16mm/day is considered appropriate (Table N1-Recommended Mound Design Loading Rates in AS/NZS 1547:2012). Logs of the representative soil properties are provided in Appendix B.

Although groundwater was not encountered within the subsurface investigation reported herein, the presence of mottling within the soil profile indicates that the groundwater level is often located up to a depth of 0.4m below the ground surface.

By selecting a mounded land application field wastewater distribution is not affected by an elevated water table, and allows for improved wastewater treatment.

The site is exposed to both wind and sun.

An assessment of the best practical option has determined that primary treatment (septic tank) coupled a dose loaded (pump chamber) and shallow bed land application is appropriate for the site conditions and constraints.

The primary treatment system is expected to achieve the following treatment levels:

BOD after 5 days (average) < 150 g/m^3
Suspended solids (average) < 80 g/m^3
Faecal Coliforms (average) < 100,000 cfu/100ml

The Wisconsin Mound System designed is considered a secondary treatment system. Treatment through the Mound System will significantly reduce BOD, Suspended Solid, and Faecal Coliform levels before it enters the native soil underneath. The following reductions are expected:

BOD after 5 days (average) < 20 g/m^3
Suspended solids (average) < 30 g/m^3
Faecal Coliforms (average) < 10,000 cfu/100ml

A wastewater design sheet is provided in Appendix B with the design calculation based on the following criteria for the proposed development:

- 6 person occupancy
- Loading of 1200 litres/day (6 persons @ 200L/person for households with standard fixtures)
- Soil category 4
- Design loading rate of 16mm/day

Based on the criteria above, the minimum total area of the application field is 170m^2 at the base.

We therefore recommend the application field consists of a mound 21.2m long and 8.2m wide at the base. Details of the application mound are shown in Appendix A.

The proposed design has been assessed against the conditions outlined in sections 30.1.8.1 and 30.1.8.2 of the Wairau/Awatere Resource Management Plan and from this has provided a standard applicable to a permitted activity. A checklist comparing the proposed system to these conditions is provided in Appendix C.

5 Assessment of Environmental Effects

An onsite wastewater system is required as there is no reticulation in the area.

Because of the following reasons we do not envisage the wastewater becoming an environmental risk:

- Split field – alternate loading, rest period
- Mound (raised) bed
- Filtration / treatment through raised mound
- Large property size

The proposed wastewater treatment system that will treat the wastewater from the new dwelling generally complies with AS/NZS 1547:2012 and the Marlborough District Council Guidelines.

The filter installed at the outlet of the septic tank will improve the BOD_5 and SS and lessen the risk of soil clogging.

The risk from the wastewater system contaminating drinking water is negligible. Set back distances are favourable, soil classification has been conservative and a large disposal area has been designed.

The disposal area has been designed as a mound to mitigate this risk. A mound is specifically designed to accommodate wastewater where there is a high ground water table or high limiting layer such as rock. Mounds prove advantageous in these conditions as they increase the separation distance between the point of application and the soil and groundwater. They also provide additional benefits in effluent quality treatment and increased evaporation and transpiration (by being raised above ground level).

The relatively flat land and separation distance between the field and the Tuamarina River is favourable for the environmental buffering capacity of land to treat the wastewater to a suitable standard to avoid risk to public health.

The effect of a failed system will primarily affect the applicant's property. There is a favourable setback distance between the field and the river (35m at its shortest point). In the event of a failed system wastewater is likely to accumulate within this area. Infiltration into the topsoil layers and the environmental buffering capacity of the land will ensure surface water within the river is protected.

The effects will be easily identifiable, inhibit the applicant's use of the land and be generally unpleasant. The owner will want to address the failure and repair / install a new wastewater system.

The property is large and a reserve area is available to relocate the field should the field fail. The land application field is sited on elevated ground and not within any ground depressions that are prone to flooding.

A separation distance of 41m to the existing field is provided to allow sufficient land area for effluent treatment within both systems.

Regular maintenance and inspection by the owner will ensure the onsite wastewater system is operating to a suitable standard as provided by AS/NZS 1547:2012 and the Marlborough District Council Guidelines.

6 Conclusion

There is sufficient area to treat and dispose of the wastewater created from the proposed three bedroom house.

The wastewater management system for the proposed dwelling should comprise a primary treatment unit (septic tank) fitted with a filter at the outlet and a pump in a dosing chamber. The wastewater should be distributed into a mounded land application field.

The application area should be a minimum of 170m^2 area at the base.

Installation is to be in accordance with the requirements and recommendations of AS/NZS 1547:2012.

7 Limitations

This report is valid for five years from the date of issue and covers the onsite wastewater treatment for a three (3) bedroom dwelling on 90 Lindens Road, Koromiko for Pene Sarjeant. 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.

8 References

1. NZS 1547:2012 On-site Domestic Wastewater Management.

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

3. Marlborough District Council Guidelines for New On-site Wastewater Management Systems, July 2005.

4. Liping Pang (ESR Christchurch). *Microbial removal rates in subsurface media estimated from published studies of field experiments and large intact soil cores.* J.of Environmental Quality. Vol 38. July-Aug 2009. pp 1531-1559.

5. Crites, R.W. and Tchobanoglous. Small and Decentralised Wastewater Management Systems. WCB/McGraw-Hill, 02/04/1998

SMART ALLIANCES LTD

Jeremy Harnett
Environmental Scientist
BRS, BEnvMgmt (Hons)

10 January 2013

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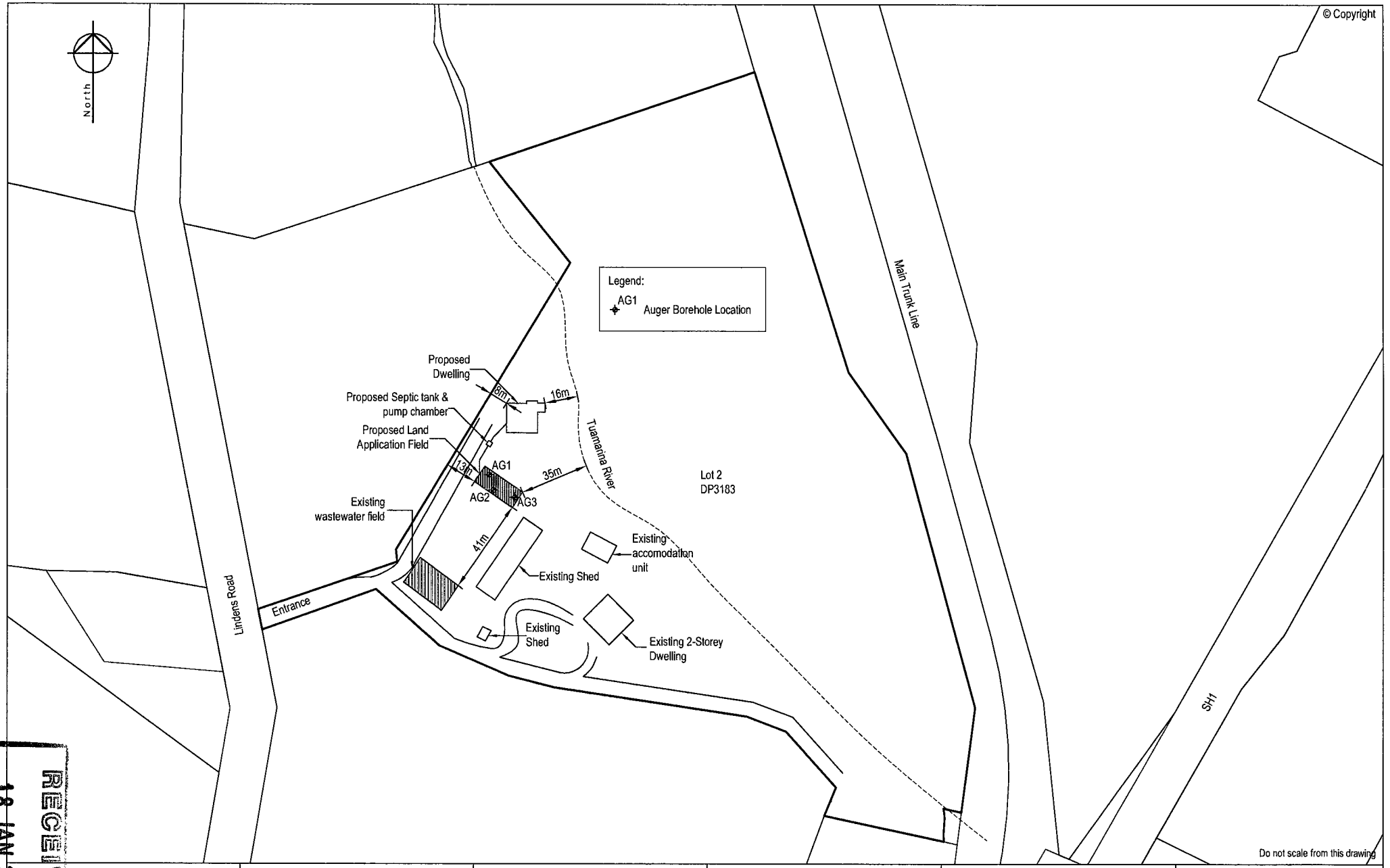
Appendix A - Drawings

- **Site Plan Drawing**
- **Mound detail**



REV	DATE	DETAILS
01	10-01-13	REPORT

REV	DATE	DETAILS

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CLIENT
PENE SARJEANT

ISSUE
REPORT

PROJECT
SARJEANT RELOCATE
90 LINDENS ROAD, KOROMIKO

DRAWING
SITE PLAN

DATE
10-01-2013

SCALE (A3)
AS SHOWN

DRAWN
JH

REVISION
01

APPROVED
RE

DWG NO.
3766-G10

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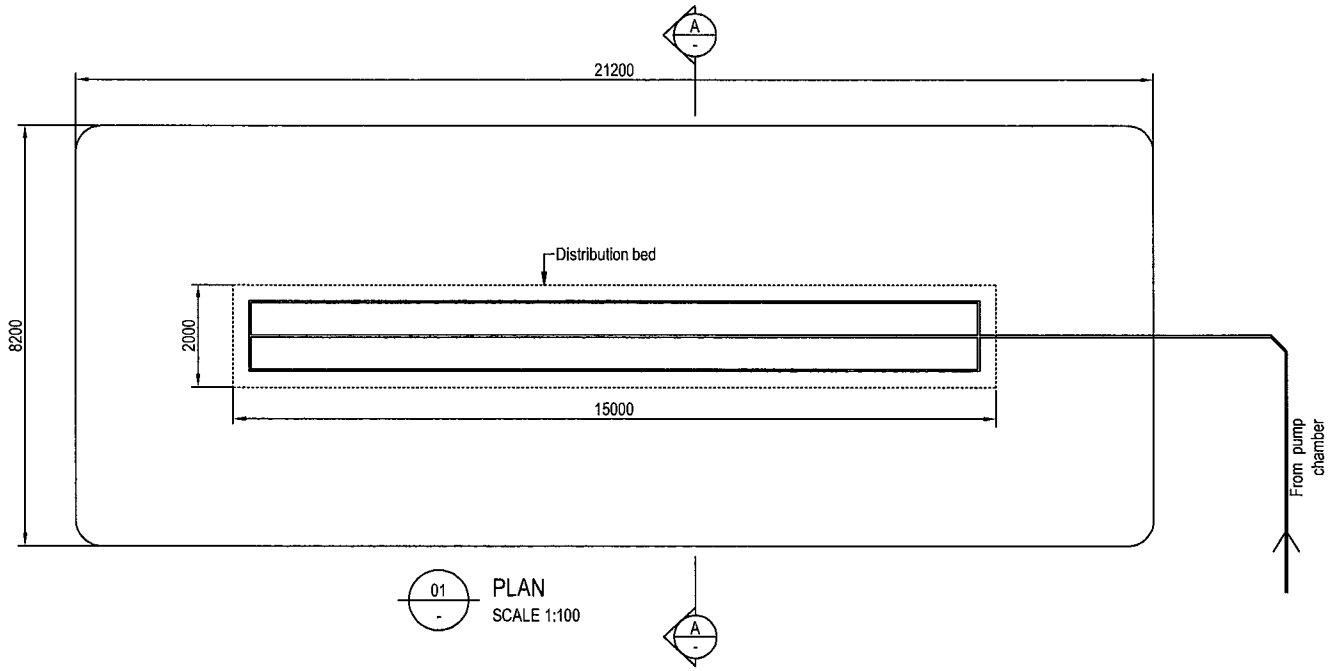

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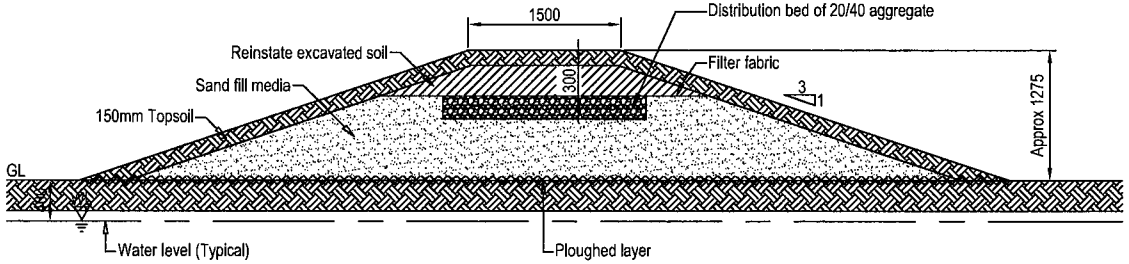

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01	10-01-13	REPORT

REV	DATE	DETAILS

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CLIENT: PENE SARJEANT

ISSUE: **REPORT**

PROJECT: SARJEANT RELOCATE
90 LINDENS ROAD, KOROMIKO

DRAWING: MOUND DETAIL

DATE: 10-01-2013
SCALE (A3): AS SHOWN
DRAWN: JH
REVISION: **01**
APPROVED: RE
DWG NO.: **3766-G11**

CAD FILE REF: P:/3766-G11

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Appendix B – Wastewater Details, Calculations and Logs

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Project:	SARGEANT RELOCATE		
Client:	PENE SARGEANT		
Ref:	3766	Eng:	JH
Date:	08/01/13	Page:	1 of 1

3 PERSON DWELLING TO BE RELOCATED TO PROPERTY.

AREA PRONE TO A PERIODICALLY HIGH WATER TABLE AS INDICATED BY SUBSURFACE MOTTLING.

SITE SUITED TO MOUND DESIGN.

CALCULATIONS

6 PERSONS GENERATING 200L / PERSON / DAY

$\therefore Q = 6 \times 200$

$= 1200 L / day$

GRAVEL DISTRIBUTION BED AREA LOADING RATE

$= 40 mm / day$

REQUIRED GRAVEL DISTRIBUTION BED AREA

$= 1200 / 40 = 30 m^2$

$\therefore$ 15 M LENGTH × 2 M ~~WIDTH~~ WIDTH

BASAL LOADING AREA FOR MODERATE STRUCTURE CLAY LOAM SOIL (CAT 4) $= 16 mm / DAY$

REQUIRED BASAL AREA $= 1200 / 16$

$= 75 m^2$

BASAL AREA SUPPLIED

$= 21.2 m \times 8.2 m$

$= 174 m^2$ ✓ OK

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Appendix C – Wairau/Awatere RMP Checklist

30.1.8.2 On Site Sewage Disposal

The discharge of any contaminant from any domestic on-site treatment system onto or into land is a permitted activity subject to the following conditions:

30.1.8.2.1 A public sewer is not located within 60 metres of the lot boundary.

***No public sewer in close proximity to the site**

30.1.8.2.2 A public sewer does not exist within 60 metres of the closest building on the lot to be serviced.

***No public sewer in close proximity to the site**

30.1.8.2.3 The discharge is not within any catchment classed NS as defined in Appendix J.

***Catchment not classed as NS as defined in Appendix J**

30.1.8.2.4 Where discharges are to soil absorption systems (drainage fields) these shall include the following functions:

(a) The effluent must be able to infiltrate the soil;	**Mound design allows soil infiltration**
(b) The effluent must be able to percolate through a sufficient distance of soil such that it is 'renovated' to have no measurable impact on any surface or ground water body, or any coastal water	**No public sewer in close proximity to the site**
(c) Any effluent directed to the drainage fields should be of a consistent high quality and meet the following standards: • Faecal Coliforms<10,000/100ml • BOD^5<100g/m^3 • Suspended solids<60g/m^3 and not be subject to episodic high values of suspended solids and BOD	**Treatment to a satisfactory standard. – refer to Section 4 of the Wastewater Report**
(d) No stormwater shall enter the treatment system;	**Low Risk**
(e) The system shall be maintained in a functional condition at all times;	**System regularly maintained**
(f) The rate of discharge shall not exceed 2m^3/d averaged over any one week period;	**Discharge < 2m^3/d averaged over any one week period**
(g) The discharge shall not be within 30 metres of any surface water body;	**Discharge 35m from Tuamarina River**

(h) There shall be no surface ponding of any effluent, nor runoff of any contaminant either directly or indirectly into a surface water body;	**Low Risk-Refer Section 5 of Wastewater Report**
(i) The discharge shall be no less than 600mm above the ground water table at all times;	**Mound System provides sufficient seperation**
(j) The discharge shall not be within 30 metres of any bore drawing ground water from an unconfined aquifer;	**No bore in close proximity**
(k) No objectionable odours shall be able to be detected at or beyond the legal boundary of the area of land on which the contaminants are discharged;	**Low Risk-Refer Section 5 of Wastewater Report**
(l) The effluent treatment unit shall be located in a manner that can be readily accessed for periodic servicing.;	**Treatment unit readily accessible**

30.1.8.2.4.1 In the case of a septic tank being utilised that it:

(a) Shall have a minimum design life of fifteen years (Note: The building Act 1991 deals with other matters relating to construction and performance.)	**Design life > 15 years**
(b) The septic tank shall have provisions for 24 hour minimum retention time of average daily flow after three years sludge/scum accumulation at full loading i.e. sludge/scum accumulation at a rate of 80 litres per person per year as a 3 year average.	**Minimum tank size to be installed 4000L as per Marlborough District Council Specification**

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Appendix D – Site Photographs

Looking North to the proposed wastewater field

The Tuamarina River, the proposed wastewater field in the distance to the right

Auger 1

Auger 3