

Wastewater System Design Report

Andrew Pope Homes – Holdaway, 284 Dillons Point Rd

4th December 2015



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Attached Separately: AES Design Calculator

Report by: Hazel Pearson, Wastewater Design Ltd.

284 Dillons Point Rd

4th December 2015

1/22

1.0 Introduction

Wastewater Design Ltd has been engaged by Andrew Pope Homes to provide a wastewater system design report for the proposed new 4 bedroom dwelling at 284 Dillons Point Rd, Blenheim. The new house will have two other rooms – a snug and a store room that could potentially be used as bedrooms – and for the purposes of this design will be considered a 6 bedroom house with a design occupancy of 12 people and a daily design flow of 1980L/d. The existing dwelling at this property is to be demolished, and the new house built on the same site. The existing primary system is to the NE of the house, and will be decommissioned. The wastewater system for the new house will be to the SW of the house.

On the 18th October, Dick Lamb of Wastewater Design Ltd conducted a site and soil assessment at the property. The findings of this assessment, along with the soil analysis, have been used to determine site specific conditions and soil category.

The proposed system complies with the Wairau Awatere Resource Management Plan (WARMP) Permitted Activity - rule 30.1.8.2 On Site Sewage Disposal. However, as there is another existing dwelling on this property – a three bedroom dwelling with an estimated daily allowance of 1200L/d - the combined wastewater flow from this dwelling and the proposed dwelling exceeds 2000 L/d and does not comply with rule 30.1.8.2.4 (f). There is one other non-compliant area to be noted: WARMP Permitted Activity rule 30.1.8.2.4.1 (b) requires septic tanks to have 24hr retention time after 3 years of sludge accumulation at 80L sludge/p/y. This rule calculates the minimum capacity to be $80L \times 12p \times 3y + 1980L = 4860L$ – the proposed 4500L septic tank does not comply with this rule. A resource consent is required for these reasons.

Regarding the excavation required to install the proposed wastewater system this design complies with Wairau Awatere Resource Management Plan (WARMP) Permitted Activity - rule 30.1.7.3 Excavation and Tracking. The relevant clause being:

30.1.7.3.2 No excavation may take place within 8 metres of the landward toe of a stopbank and the depth of any excavation beyond that may not exceed 15% of the distance from the stopbank.

The owner desires to install a passive treatment system with low maintenance requirements and this design is intended to meet this objective. An Advanced Enviro-Septic (AES) advanced-secondary treatment and disposal system was chosen as it aligns with the owner's preferences. AES is an appropriate solution for the site as it can easily achieve the required treatment quality, and can be installed at this site as a completely passive system.

Summary of proposed wastewater system:

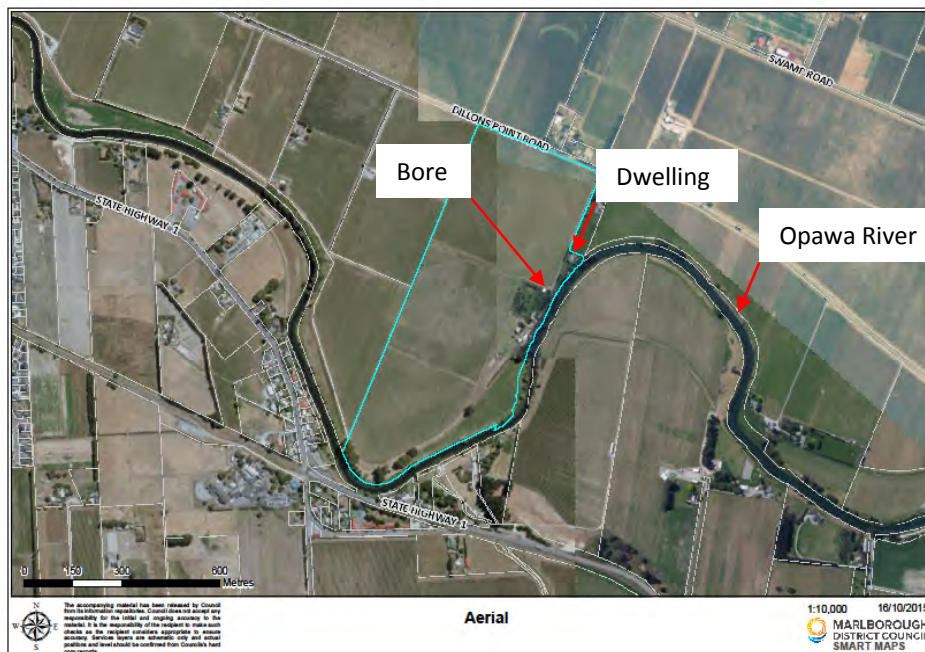
Number of bedrooms	4 + 2 habitable rooms
Number of people	12
Water supply	Bore
Water reduction fixtures	Standard water reduction fixtures
Total daily flow allowance	1980L/day (12x165L/d = 1980L/d)
Soil Category	Category 2 Sandy Loam
Design loading rate	50mm/day
Proposed treatment & disposal system	AES
Land application area	39.6m ²
Limiting factor/s in design	Groundwater est. >1.9m at disposal field

2.0 Site Assessment – Desktop study

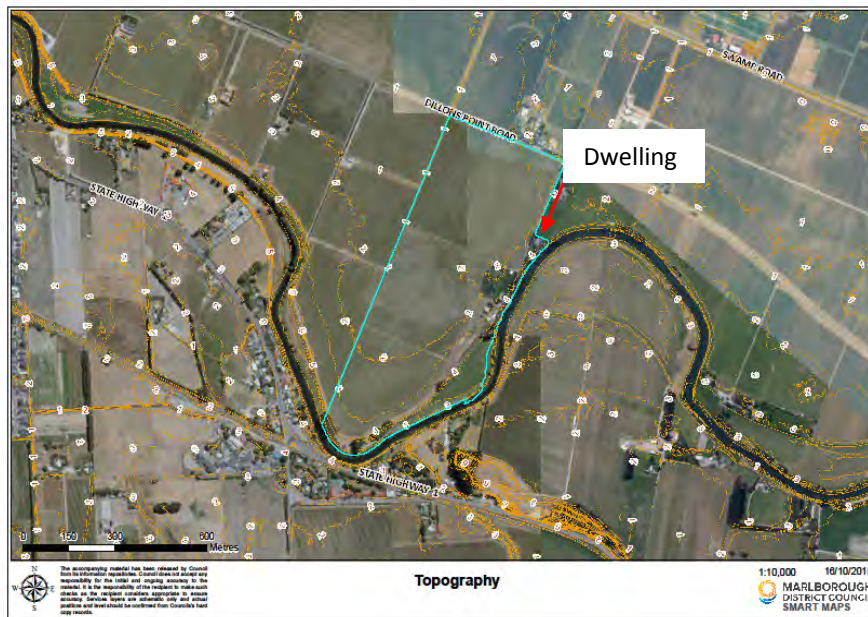
2.1 Site Details

Owner: Richard Holdaway
 Address: 284 Dillons Point Rd
 Phone: 027 464 6910
 Property Number: 167759
 Lot No: LOT 1 DP 2179 & LOT 2 DP 1101 & LOT 2 DP 462
 BLK XVI CLOUDY BAY SD EASEMENT DP 373217
 Local Authority: Marlborough District Council

2.2 Aerial photo details: Area = 42.8512 hectares.



2.3 Topographic map:



2.4 Geology of site from geological map

Name: Late Quaternary swamp deposits and peat

Description: Unconsolidated to poorly consolidated mud, silt, sand and peat of swamp origin.

Geologic history: Late Quaternary



Geology data sourced from the Institute of Geological & Nuclear Sciences and <http://data.gns.cri.nz/geology/> date sourced: 11.11.15.



2.5 Climate

Annual Rainfall: 674mm average

The climate is warm and temperate in Blenheim. The driest month is February, with 35 mm of rainfall. Most of the precipitation here falls in July, averaging 70 mm. <http://en.climate-data.org/location/12571/> date sourced: 9.11.15.

2.6 Intended water supply source

Bore water supply.

3.0 Site Assessment – Onsite Evaluation

3.1 Site Evaluator:

Name: Dick Lamb
Company: Wastewater Design Ltd
Address: 14 Onekaka Iron Works Road, Takaka
Phone: 03 5248222
Email: info@wastewaterdesign.co.nz

3.2 Work Undertaken

Details: 3x bore holes. See Appendix A: 'Drawing WD1518-01; 1. Site Plan' for details.
Date: 18th October 2015 Time: 4.30pm; High Tide.
Weather: Fine. Rainfall for the preceding weeks of October <5mm; for September and August 53mm and 47mm respectively.

3.3 Topography

Slope: Flat site
Ground cover: Grass
Drainage patterns: Well structured soils on flat property with several ditches running SE to NW – classed as Stormwater drains on the Council overlay maps.
Boundaries: Closest property boundary to treatment and disposal area is 30m. See Appendix A – Drawing WD1518-01 for details. See Table 5.2 for setback distance assessment. This property is made up of several Lots. The proposed house is on Lot 1, and the wastewater system is near the Lot 1 boundary. The disposal bed should be a minimum of 1.5m inside Lot 1 boundary to avoid possible complications in future.
Waterways: Opawa River 30m to east of disposal field.
Well, bores: Bore water supply situated approx. 60m to the south of the proposed disposal field. Bore is 30m deep, and draws from a confined aquifer. See Appendix A: 'Drawing WD1518-01' for location.
Embankment: Stopbank – septic tank and disposal field greater than 8m from landward toe of stopbank. **Excavation depth beyond 8m from stopbank not to exceed 15% of the distance from the stopbank. For example, if the excavation for the septic tank is 2m in depth, the excavation cannot be closer than 13.3m from the toe of stopbank.**

3.4 Site exposure

Site aspect: Open flat site - stopbank immediately to east of building site.
Predominant wind direction: Northwest

3.5 Environmental concerns

Proximity of river 30m from disposal field; groundwater at 1.9m in category 2 soil.
Risks mitigated by high effluent treatment quality and setback distance.

3.6 Site stability

No site instability was observed.
No expert assessment necessary.
Excavation for the installation of the AES bed will not increase instability to the immediate or surrounding site due to the flat nature of the site.

3.7 Drainage controls

Flat site - AES bed to be crowned to shed rain. Runoff from roofs or hardstands to be diverted away from the septic tank and disposal area.

3.8 Flood risk

The disposal field is *not* located in the Formal, or 50 year flood zone. See Appendix B: 'Flood Information for PN167759'.

3.9 Availability of reserve / set back areas

Reserve area available for extensions: 100% reserve area available. See Appendix A: 'Drawing WD1518-01' for details. See Table 5.2 for setback distances.

4.0 Soil Investigation

4.1 Soil profile determination

Method: 3x auger bore holes. Depths of boreholes 1.5m

4.2 Reporting

	Lower depth (mm)	Moisture condition	Colour (moist)	Field texture	Coarse %	Structure	Soil category	Sample taken	Ribbons (mm)
BH 1	200	Dry/ moist	Brown	Light clay	0%	Strong	5	No	-
	1200	Dry/ moist	Brown	Light clay	0%	-	5	No	-
	1500	Moist	Orange/ brown	Sandy loam	0%	Structureless	2	No	-
BH 2	200	Dry/ moist	Brown	Light clay	0%	Strong	5	No	-
	1200	Dry/ moist	Brown	Light clay	0%	-	5	No	-
	1500	Moist	Orange/ brown	Sandy loam	0%	Structureless	2	No	-
BH 3	200	Dry/ moist	Brown	Light clay	0%	Strong	5	Yes	>70
	1200	Dry/ moist	Brown	Light clay	0%	-	5	Yes	60
	1500	Moist	Orange/ brown	Sandy loam	0%	Structureless	2	Yes	15

The soil profile was consistent across the three boreholes, with the bottom sandy loam layer being the moistest. Water level at the Opawa River 30m to the west was measured at 1.9m below ground level at BH3. Rainfall for the preceding weeks of October was <5mm; and for September and August 53mm and 47mm respectively. The seasonal ground water level is assumed to be no higher than 1.9m below ground level at the disposal field. Base of AES bed to be no deeper than 1.30m into existing soil to ensure >600mm vertical separation to groundwater is maintained.

4.3 Estimated soil category

The soil category chosen for this design is category 2, sandy loam. The base of the AES bed is at 1.3m, and will be discharging into category 2 soil.

Summary: Category 2, sandy loam.

4.4 Geology confirmation

Site and soil investigation confirms geology from geological map, chapter 2.4 above.

4.5 Recommended DLR

DLR: 50mm/day. The base of the AES bed at 1.3m will discharge into Category 2 soil; a DLR of 50mm/day was selected (Table L1, AS/NZS1547:2012).



4.6 Type of land application system considered best suited to site and why;

AES advanced secondary treatment has been chosen as the best system for this site for the following reasons:

- AES treatment beds are capable of achieving <2mg/L BOD, <2mg/L TSS and 218CFU/100ml Faecal Coliforms. Combined with subsurface disposal, this treatment option poses minimal risk to health or of contamination of surface water.
- Little maintenance or servicing is required which is favoured by the owners and a reflection of how reliable the AES system is.
- Secondary treatment allows for a smaller treatment and disposal area than that required for a primary treatment system, also favoured by the owners.

4.7 Assessment of alternative treatment options

A conventional primary disposal bed is also a viable treatment option for this site and the free draining category 2 soil, however this option treats to a lesser quality. Given the proximity to the river, advanced secondary quality is preferred. A primary disposal system would also require a much larger disposal area. AES was selected as it provides high quality treatment with little risk of failure.

5.0 Requirements of onsite wastewater service

5.1 Daily Flow Allowance;

Dwellings with rain water supply	Typical wastewater flow allowances
Households with Standard water reduction fixtures including: <ol style="list-style-type: none"> 1. 11/5.5 litre toilets (average flush = 6.6L) 2. Shower flow restrictors 3. Aerator taps 4. Water-conserving automatic washing machines 	Daily allowance for bore water supply: 165litres/person/day
Number of bedrooms	4 + 2 ancillary rooms
Number of people	12
Total daily flow allowance*	1980Litres/day

*Daily flow allowance is determined by AS/NZS 1547:2012, Table H3.

A commissioning letter shall be supplied to the Marlborough District Council by Wastewater Design Ltd, or a delegated person, at the time of commissioning confirming that the water reduction fixtures specified above have been installed.

5.2 Setback distances of disposal bed, in accordance with 1547:2012 table R1;

Site feature:	Actual setback distance:	Risk of adverse effects	Notes/ reasoning:
<i>Horizontal setback</i>			
Property boundary 1.5-50m	30m	None	A 1.5m setback distance would also be acceptable given the treatment quality and terrain. This property is made up of several Lots. If the owner wishes for the wastewater system to be installed on one lot only care should be taken to maintain a 1.5m setback to the boundary of Lot 1.

Site feature: (cont.)	Actual setback distance:	Risk of adverse effects	Notes/ reasoning:
Buildings/houses 2.0-6m	>10m	None	None
<i>Horizontal setback (cont.)</i>			
Surface water 15-100m	30m	Low/medium	30m setback to river. Low risk of surface water contamination due to stopbank. Migration of treated effluent through receiving Category 2 soil to river possible; effect mitigated by advanced secondary treatment of effluent, and the coliform reduction that will take place in the Category 2 soil.
Bore, well 15-50m	>60m	Low	Bore draws from 30m below ground level, from a confined aquifer. Low risk of contamination.
Retaining wall and Embankments, escarpments, cuttings 3.0m or 45°	>9m	Low	This is the minimum setback to the stopbank for the excavation proposed according to WARMP 30.1.7.3.2.
<i>Vertical setback</i>			
Groundwater 0.6-1.5m	0.6	Low/medium	Low risk of contamination due to vertical separation and advanced secondary treatment.
Hardpan or bedrock 0.5-1.5m	NA	None	None

5.3 Compliance with the Building Act 2004

Code/clause	Requirements	Assessment
B2 Durability	To ensure durability of the "building". The code implies durability of materials.	Wastewater Design Ltd is confident that all component materials will, within reason, meet the durability requirements of B2, and in particular Table 1 requirements for plumbing and piping. AES components have a 20yr warranty.
G13 Foul Water	This code applies to above-ground non-pressure (gravity flow) sanitary plumbing for buildings having 3 levels or less and includes all pipe work for foul water within, or on the building, including any basements.	All conditions and requirements under G13 can be met. Drawing plan states installation is to be in accordance with NZBC Compliance document G13 – Foul Water.
E1 Surface Water	(a) Safeguard people from injury or illness, and other property from damage, caused by surface water, and (b) Protect the outfalls of drainage systems	All stormwater from roofs or hardstands is to be diverted away from the installed onsite wastewater treatment and disposal area.

6.0 Proposed onsite wastewater service

6.1 Septic tank – 4500L minimum operating capacity, no outlet filter.

A new 4500L concrete septic tank. The minimum septic tank operating capacity required for this system 4500L - recommended by AS/NZS 1547:2012, Table J1). WARMPP Permitted Activity rule 30.1.8.2.4.1 (b) requires 24hr retention time after 3 years of sludge accumulation at 80L sludge/p/y. This rule calculates the minimum capacity to be $80L \times 12p \times 3y + 1980L = 4860L$ – the proposed 4500L septic tank does not comply with this rule. The proposed tank capacity of 4500L is a standard operating capacity, and more practical to source in this area; resource consent is required for the septic tank size.

The septic tank shall be pumped out as required only, to minimise disturbance to the bacteria in the tank. Depending on use, pumpouts are expected to be required at 3-5 year intervals. The larger the tank the better the treatment level achieved.

No outlet filter to be installed - these are not recommended by the manufacturers of AES due to the potential of becoming clogged if not maintained, which can restrict the essential air flow through the AES bed.

See Appendix A: 'Drawing WD1518-01'

6.2 AES bed

A 39.6m² AES bed consisting of 3 rows of 6 AES pipes. Effluent gravity flows via 100mmDWV pipe to the AES bed from the septic tank. The AES bed treats the effluent to advanced-secondary quality. Treated effluent is dispersed evenly through AES System Sand and disposed of to ground. See Appendix A: 'Drawing WD1518-01' for detail. See also 'AES Design Calculator' included as separate file. AES System Sand details are in Appendix D: 'AES System Sand'.

6.2.1 AES pipe loading rate

Manufacturers of AES allow a loading rate of 30 - 38 litres per lineal metre of AES pipe. As the loading rate increases the buffer capacity decreases and should be considered when choosing a loading rate. In this design 38/m AES pipe is used; the buffer capacity is 3816L/d – nearly twice the design flow, and considered to be sufficient.

6.2.2 Venting the AES bed

The AES bed is to be vented with 1x 100mm diameter Low Vent at the AES bed no less than 150mm above ground and 1x 80mm High/terminal vent at the house, no less than 3m above the low vent. Ensure all septic tank risers and inspection ports are above ground level and sealed.

6.3 Compliance to WARMP Permitted Activity Rule 30.1.8.2 On Site Sewage Disposal

The proposed wastewater system complies will all rules outlined in the WARMP, section 30.1.8.2 except for the following:

Rule	Proposed
30.1.8.2.4 f) The rate of discharge shall not exceed 2 m ³ /d, averaged over any one week period.	Proposed discharge of 1980L/day combined with existing discharge estimated at 1200L/d = 3180L/d average daily flow for the property.
30.1.8.2.4. 1 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 three year average	12 people x 80 litres x 3 years = 2880 litres of sludge after 3 years. 2880 + 1980 = 4860L. 4500L tank capacity does not quite provide 24 hour retention for 1980 litres after 3 years. Septic tank must therefore be emptied every 2 years, or when sludge and scum are equal to half the capacity of the septic tank.

7.0 Maintenance and management

AES components are supplied with an AES owner's manual from Environment Technology to be given to the owner upon installation of their AES system. Maintenance requirements of the wastewater treatment system are outlined in Appendix C: 'Management and Maintenance of your septic tank and AES wastewater system'.

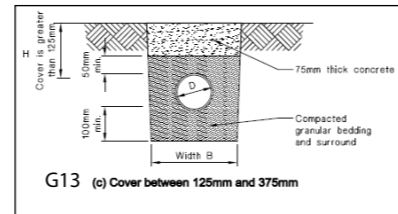
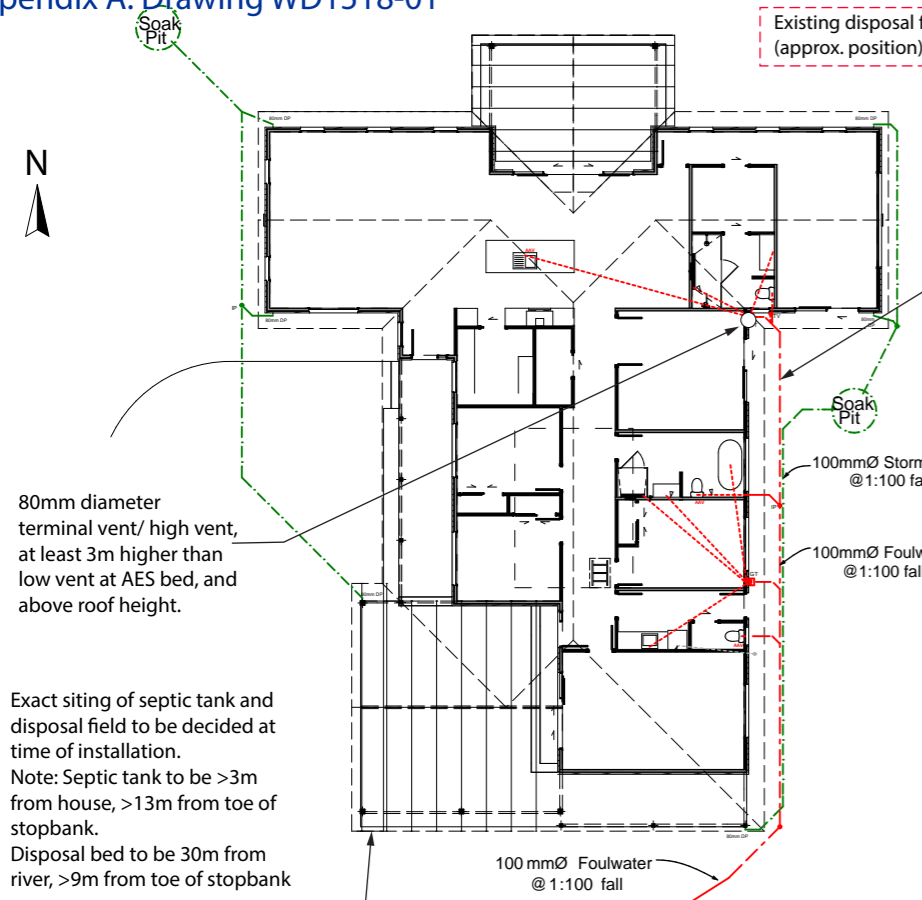
8.0 Land use activities

The land application/disposal bed shall not be:

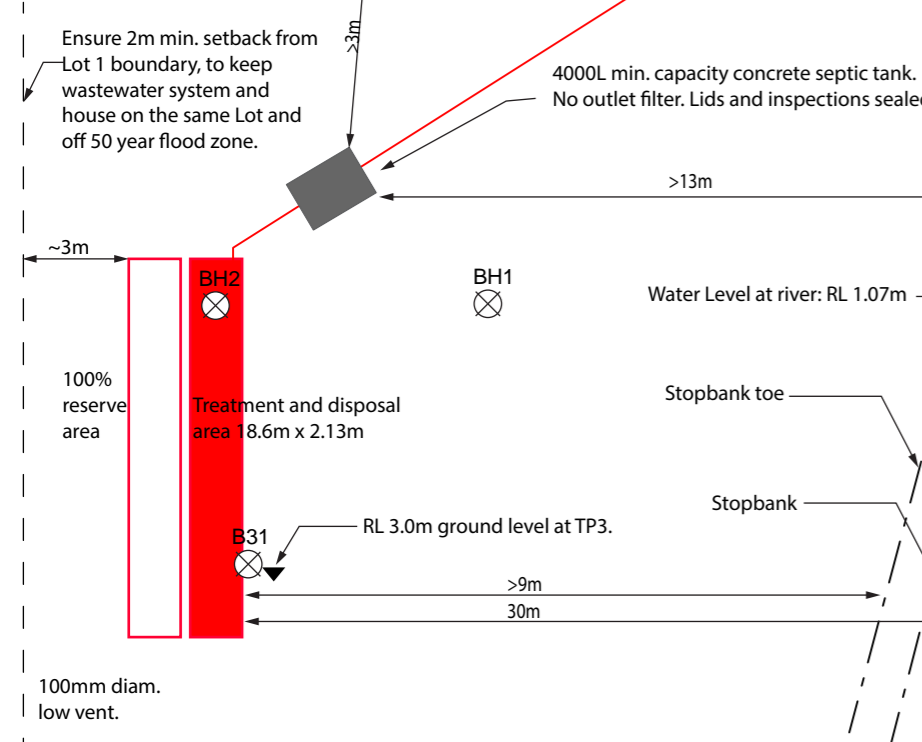
- a) Paved or sealed
- b) Subject to heavy vehicular traffic,
- c) Subject to regular foot traffic such as pathways to clothes line areas, or
- d) Subject to heavy grazing animals. Light grazing by sheep is acceptable

The owner is to ensure a) to d) above.

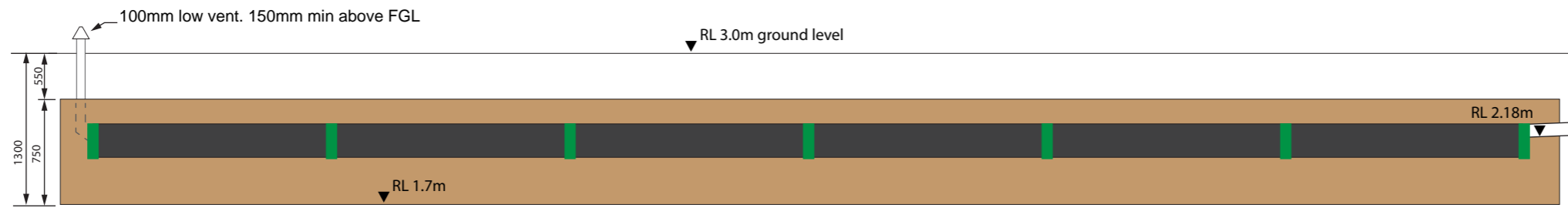
Regarding vehicle access, **the septic tank should not be driven over**. The septic tank and disposal field are positioned near the driveway or parking areas and the septic tank lids and the vent at the AES bed are to be visible. To decrease the risk of accidental damage to the septic tank and vent these should be protected locally by plantings, posts, rocks, or equivalent, or by similar methods that restrict vehicle access to the general area.



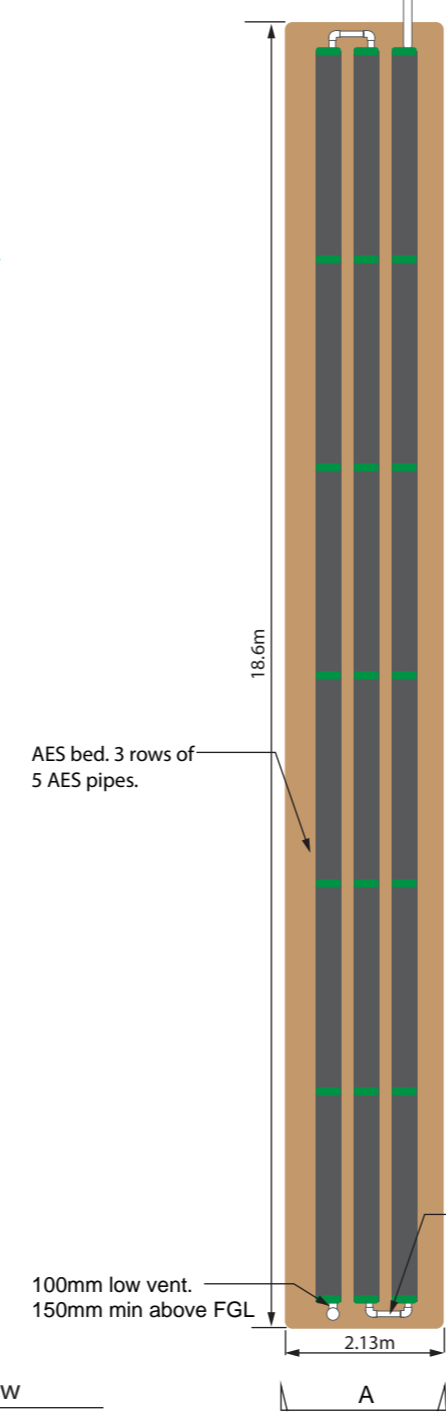
Bedding may need to be G13 type (c) to achieve base of AES bed no greater than 1300 below GL



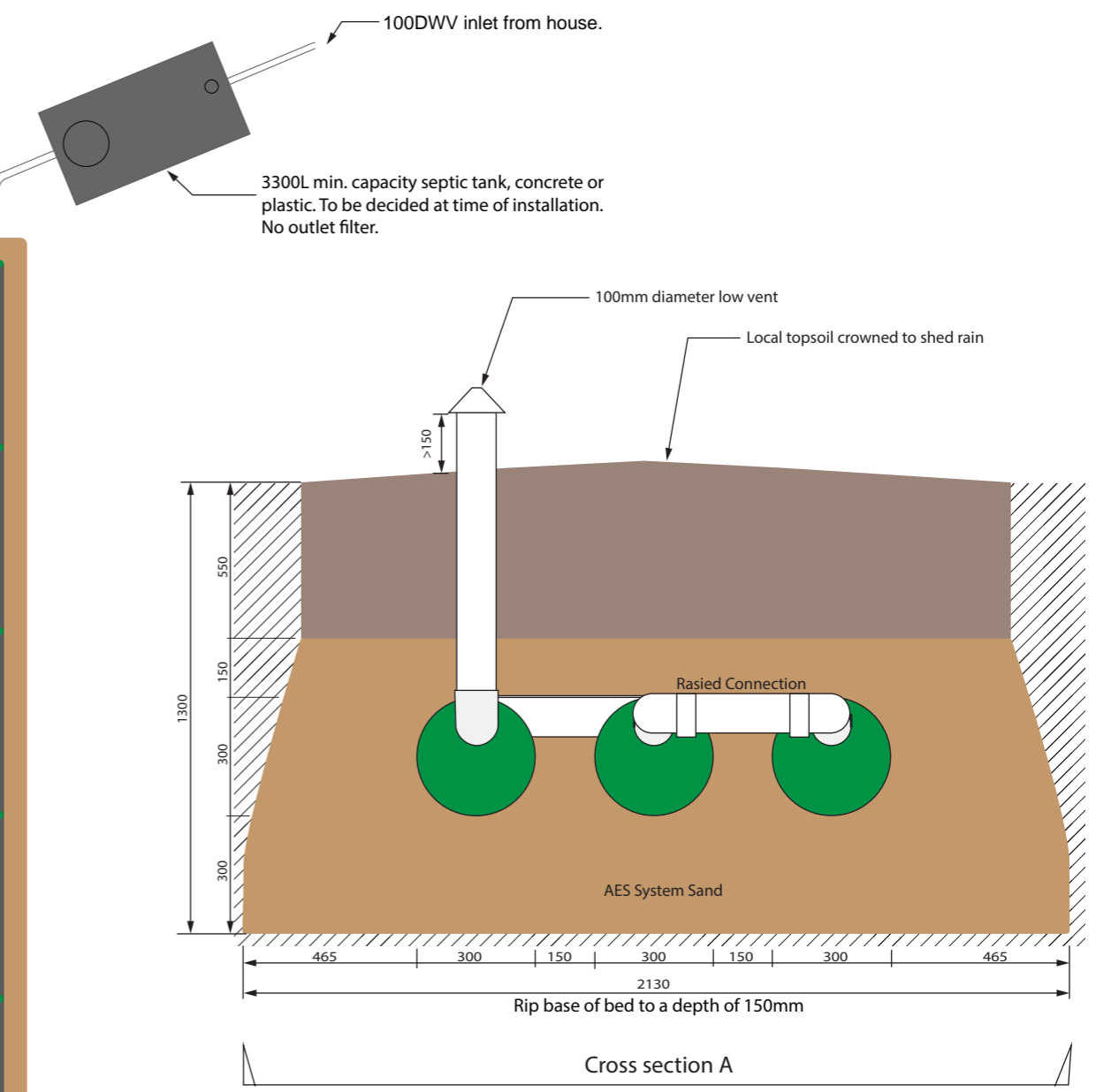
1. Site Plan



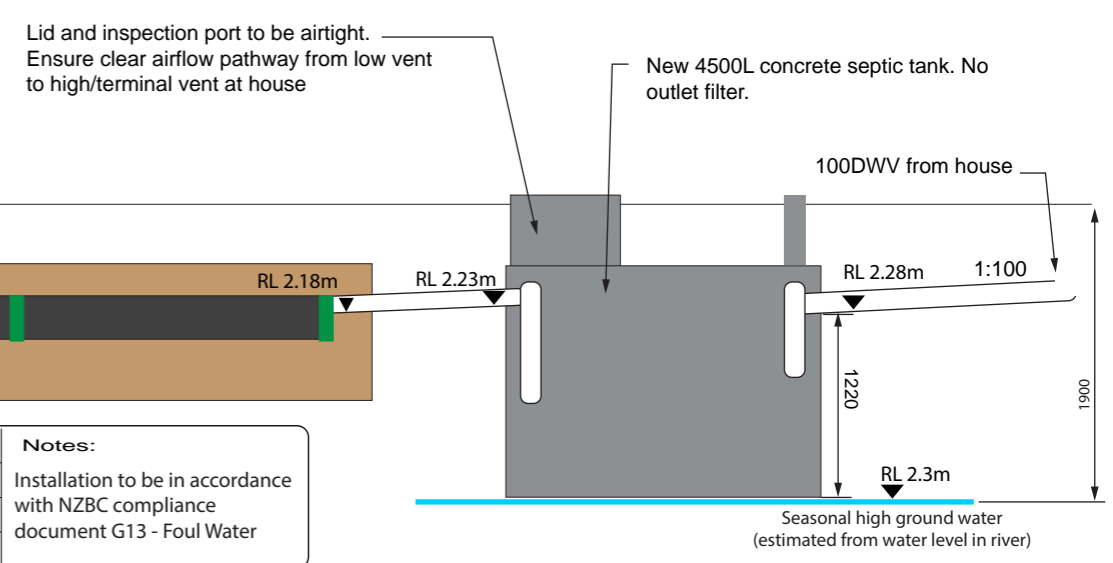
2. Long view



3. Plan view

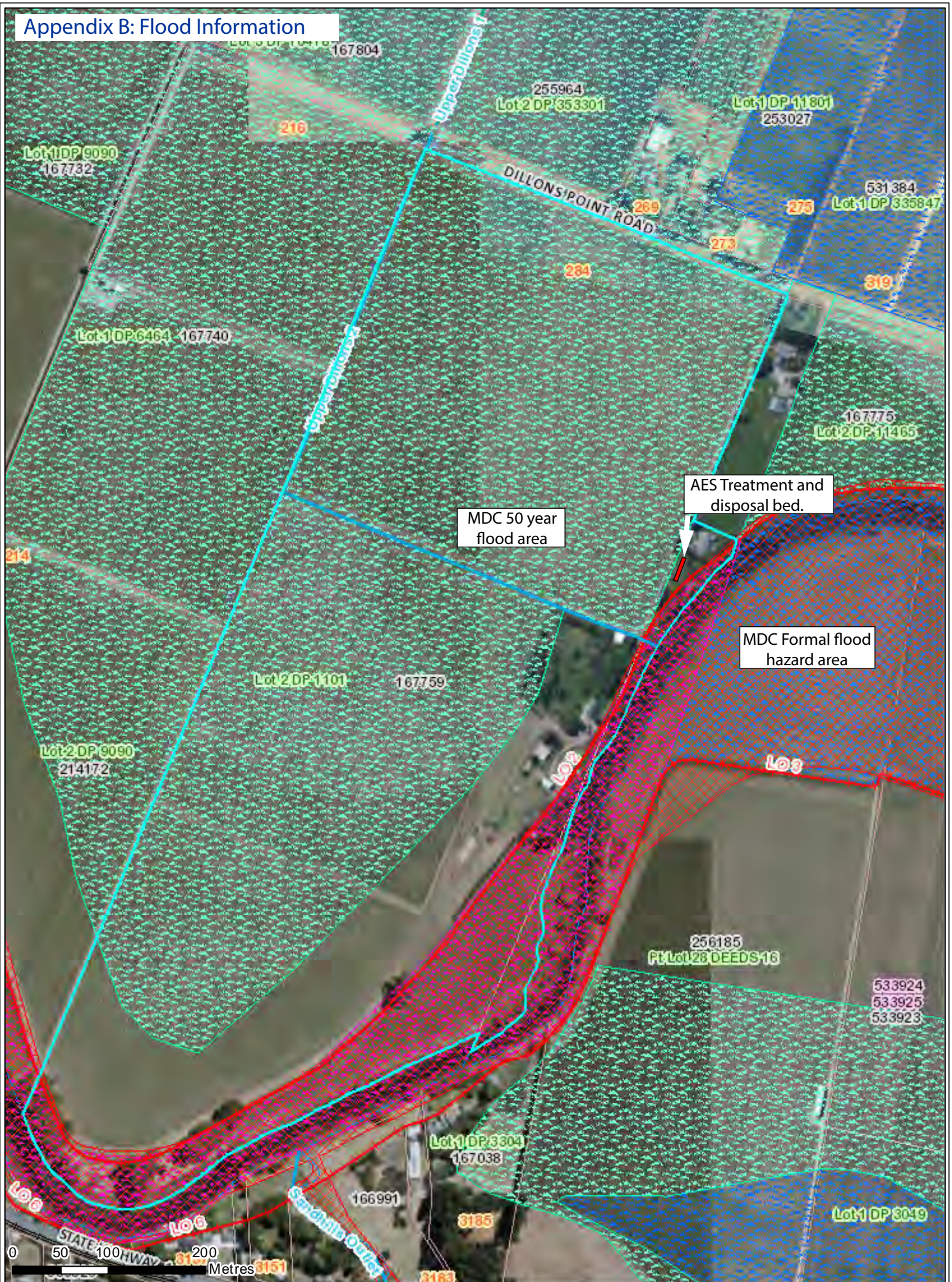


4. Cross Section



Drawing Title:		Job Title:		Plan Information:		Date:	Checked:	Page:	1 of 1	Notes: Installation to be in accordance with NZBC compliance document G13 - Foul Water
AES Wastewater System Plan & Details		284 Dillons Point Road Andrew Pope Homes		Drawn:	H. Clemens	11.11.15	HP	Drawing No.	WD1518-01	
				Revision:	H. Clemens	3.12.15	HP	Scale:	NTS	
				Design Flow increased						

Appendix B: Flood Information



The accompanying material has been released by Council from its information repositories. Council does not accept any responsibility for the initial and ongoing accuracy to the material. It is the responsibility of the recipient to make such checks as the recipient considers appropriate to ensure accuracy. Services layers are schematic only and actual positions and level should be confirmed from Council's hard copy records. Printed by Imu

Flood Information for PN167759

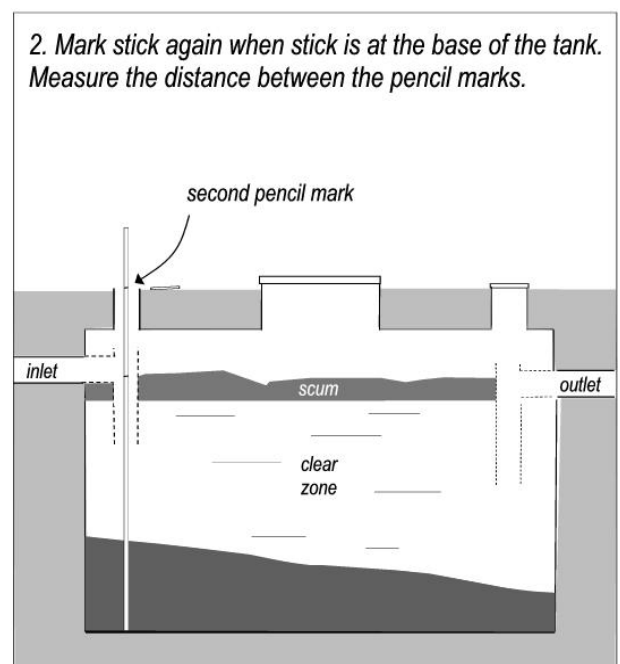
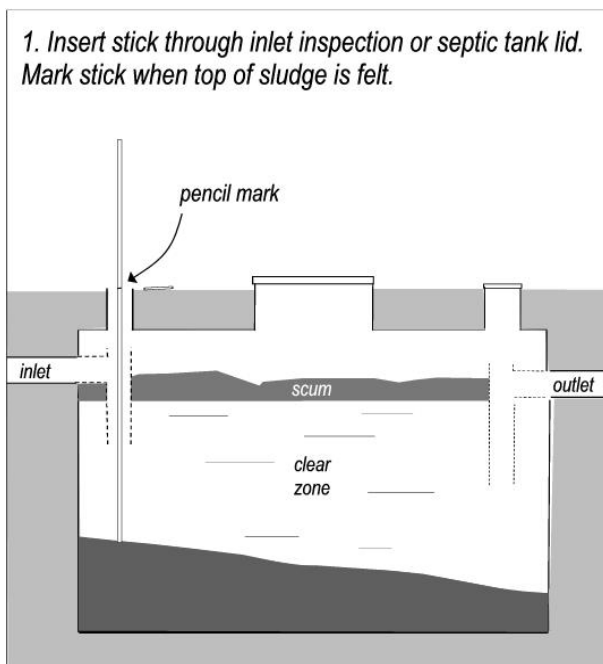
1:5,000

2/12/2015



Appendix C: Maintenance & management of your septic tank and AES system

1. **Ensure lids of the wastewater treatment system are readily accessible at all times;**
2. **Visually inspect the proprietary effluent filter if fitted;**
Clean by rinsing with a garden hose, repair or replace as required. Dispose of rinse water into the septic tank.
3. **Check your septic tank sludge level;**
This can be achieved by inserting a suitable stick into the inlet vent and measuring the level at which resistance is felt as the probe enters the bottom sludge, and again when it stops on the tank base. Check your septic tank sludge level at least once a year.



4. Pumping out the septic tank;

If solids and scum layers combined are greater than one half the depth of the wastewater treatment tank. Pump-outs should be undertaken only when necessary as they disrupt the efficient working of the bacteria in the tank.

*As the outlet usually draws from halfway down the tank we recommend the more conservative $\frac{1}{2}$ the tank volume; some literature recommends pumping out when sludge occupies $\frac{2}{3}$ the volume of the tank

5. Air Vent (Low Vent) at AES bed;

It is the owner's responsibility to keep vegetation away from the low vent in order to maintain a free flow of air into the vent. Check low level air inlet vent at the AES bed is clear of vegetation and the insect screen inside the vent is clear. Check also that the high level vent at the dwelling is clear.

Water reduction fixtures

The daily wastewater flow has been calculated based on the following water reduction features remaining in place in the house. If any of these features are removed a new wastewater design may need to be completed.

1. 11/5.5 litre toilets (average flush = 6.6)
2. Shower flow restrictors
3. Aerator taps
4. Water-conserving automatic washing machines

Indicators of system failure

In the unlikely event that the AES pipes become anaerobic due to a lack of oxygen, a system Rejuvenation will be required to return the system's bacteria to an aerobic state. Contact your AES Certified servicer if you detect the following: A foul odour, or pooling of water at ground level, or if System Sand around the pipes turns a darker colour.

Care of your Septic Tank Wastewater Disposal System

Your wastewater disposal system depends for its satisfactory operation on providing a suitable environment for 2 types of bacteria to live and thrive – anaerobic (without oxygen) bacteria in the primary treatment aspect/ septic tank of your system and aerobic (with air or oxygen) in the secondary treatment aspect/ discharge to land of your system. You **must** consider the effects on this bacterial life when you are choosing cleaning and disinfecting products as all these products will kill the bacteria in your system.

Potential indicators of performance problems are odour, overflow and wet patches on the disposal field.

DO ✓	AVOID / DON'T ✗	NOTE
<p>Minimise Water Use</p> <ul style="list-style-type: none"> • Install water saving fixtures • Use showers instead of baths • Spread laundry activities across the week • Fix any leaking taps/running toilets immediately 	<ul style="list-style-type: none"> • High organic loading wastewater production fixtures such as garbage grinders • Spa baths and multi-head showers • Ingress of groundwater into septic tank through cracks in the tank or fittings 	<p>Surges of wastewater should be avoided as they can stir up settled solids within the septic tank, reduce the quality of treated wastewater flowing to the disposal field and lead to the overloading of the disposal field – which can result in wastewater breakout at the ground surface and increased potential for adverse health and environmental effects.</p>
<p>Use bio-degradable soaps and cleaners</p> <ul style="list-style-type: none"> • Minimise use of strong toilet cleaners and bleach • Use phosphate free/ low phosphorous based laundry detergents • Use liquid based organic washing liquids in preference to sodium based washing powder 	<ul style="list-style-type: none"> • Pouring toxic/strong chemicals down any drains e.g. paint, oil, grease, pesticides and bleach • Tipping chlorine or disinfectant products into wastewater system • Discarding pharmaceuticals down sink or toilet • Avoid washing powder with significant sodium content 	<p>Some soaps and cleaners contain chemicals that can kill the bacteria within the septic tank, greatly impairing treatment quality.</p> <p>Detergents with high sodium content can destroy the effectiveness of your disposal field by altering the composition of clays in the soil</p>
<p>Reduce Fats/Grease Inputs</p> <p>Scrape all plates and dishes to remove as much fat and grease as possible.</p>	<ul style="list-style-type: none"> • Discharging oils/fats down the kitchen sink 	<p>Excess fats and grease in the septic tank can lead to filter blockages or impairment of the disposal field function.</p>
<p>Avoid discharging unnecessary solids to the septic tank</p> <ul style="list-style-type: none"> • Compost any food scraps for use on the garden 	<p>Flushing any products down the toilet except toilet paper</p> <ul style="list-style-type: none"> • Putting coffee grinds down the sink – they add to the solids level and may affect the bacterial colonies living in the septic tank 	<p>The addition of unnecessary solids to the septic tank will result in the faster build up of sludge levels and the need for more frequent pumping out.</p>

Appendix D: AES System Sand

Suitably tested AES System Sand will be used as 150mm of sand surrounding the AES pipes with 300 beneath the pipes. Approved AES System Sand details can be accessed at Environment Technology’s website www.et.nz, or you can contact Environment Technology at 03 970 7979 or info@et.nz. The following is approved sand for AES System Sand:

ADVANCED ENVIRO-SEPTIC™
 "Always The First Option"

Spec-Check™ System Sand Report

This test determines if the sand sample meets the requirements of System Sand to be used in Advanced Enviro-septic™ (AES) wastewater system installations.

Sample number or project name: Gill Contracting - river sand

System or sand pit's location: _____

Type of sand: bank run, washed, manufactured, on-site

Sand supplier (if known): _____

Sieve analysis available: no yes (please attach copy)

Sketch silt level on illustration below:

Notes and comments: _____

Fines must be below the 2% line for AES System Sand

Distances measured from the top of the screens to the top of the sand:
 (Maximum possible measurement - no sand - is 153mm)

Distance to top of sand within the #30 screen: 5 mm
Distance must be less than 100mm for AES System Sand

Distance to top of sand between #30 & #100 screens: 123 (if possible)

Distance to top of sand between #100 & #200 screens: 149 (if possible)

Sand from this source can be used as System Sand in AES installations? Yes / No

Inspector (please print): S. Uement Date: 24/3/14

Phone number: 03 970 7979 Mobile: 022 496 9418

Email address: sales@environmenttechnology.co.nz Spec-Check serial number: 017

Environmenttechnology
 A signature of responsibility

14 Onekaka Iron Works Rd, RD 2, Takaka 7182, NZ
 P: 03 970 7979, M: 0275 21 21 29, info@et.kiwini.z

Appendix E: AES installation instructions

AES components are supplied by Environment Technology, 03 970 9797, info@et.nz.
Before purchasing AES components drainlayers must complete the AES Certification course:
(online at <http://secure.environmenttechnology.co.nz>)
An Owner's Manual accompanies every order of AES components
AS/NZS 1547:2012 L7.1 Good construction techniques p148:

The following excavation techniques shall be observed so as to minimise the risk of damage to the permeability of the soil:

- a) Excavate only when the weather is fine;
 - b) Avoid excavation when the soil has a moisture content above the plastic limit. This can be tested by seeing if the soil forms a 'rod' when rolled between the palms;
 - c) When excavating by machine, use a bucket with sharp teeth and excavate in smaller 'bites' to minimise compaction;
 - d) During the 'wet' season or when construction cannot be delayed until weather becomes fine, smeared soil surfaces may be raked to reinstate a more natural soil surface, taking care to use fine tines and only at the surface;
 - e) Avoid compaction by keeping people off the finished trench or bed floor.
 - f) In particular for trenches and beds:
 - i) If rain is forecast then cover any open trenches, to protect them from rain damage;
 - ii) Excavate perpendicular to the line of fall or parallel to the contour of sloping ground;
- and
- iii) Ensure that the base of the excavation is horizontal parallel to the slope

1. Set out

- a) Ensure that the set out of the work is in accordance with the design approved by Council.
- b) Each row of AES System pipe must be horizontal from end to end.
- c) The AES calculator footprint dimensions are based upon the DLR of the receiving soil and the influent volumes to the AES system. They are the **minimum** foot print area of the AES bed.
- d) Any system extension must be to the down slope side of the AES installation **unless** the infiltration footprint is horizontal or level.

2. Excavation – (track machinery causes less compaction of the soil.)

- a) A laser level and receiver which has been checked for calibration is a necessity for accurate bed excavation and the placement of system sand under the AES pipe. Strip vegetation from the bed and system extension area including the area which will be covered by the constructed mound if a mound is required.
- b) Strip topsoil to a stockpile and keep separate for recovering the installation.
- c) Excavate to reduce levels to a minimum of 475mm below the effluent inlet invert level at the AES bed, leaving the base of excavation loose to aid infiltration. This 475mm is made up of 175mm to AES pipe invert from inlet pipe invert plus 300mm of system sand below the AES pipe.

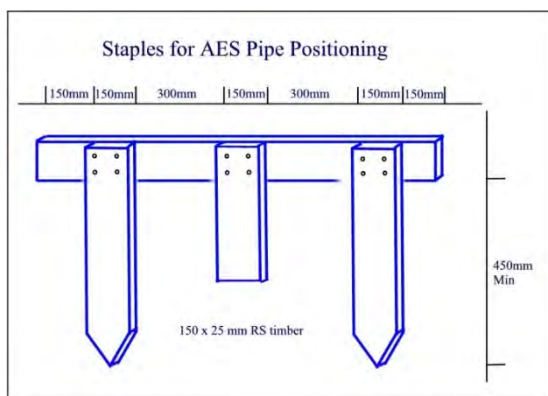
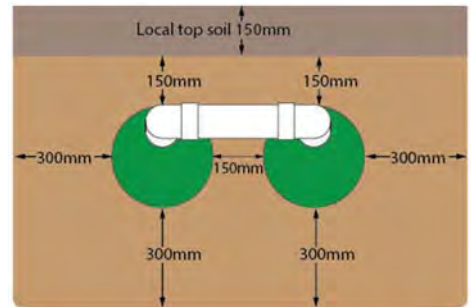


- d) Ensure the sub-base of the bed is left in this loose and friable state by ripping or scarifying the infiltration area to a minimum depth of 150mm, parallel to the AES pipe, particularly in Category 4,5,6 soil with high clay content.
- e) If there is a raised bed configuration required ensure you have sufficient material on site including finishing topsoil to create and cover the entire mound or bring in enough sand to fill out batters (1 vertical: 3 horizontal) prior to covering with topsoil etc.
- f) Experience shows that it is simpler to create the mound out of site or imported soils **and then** excavate into the mound to form the AES bed.

3. System Sand – Coarse washed sand

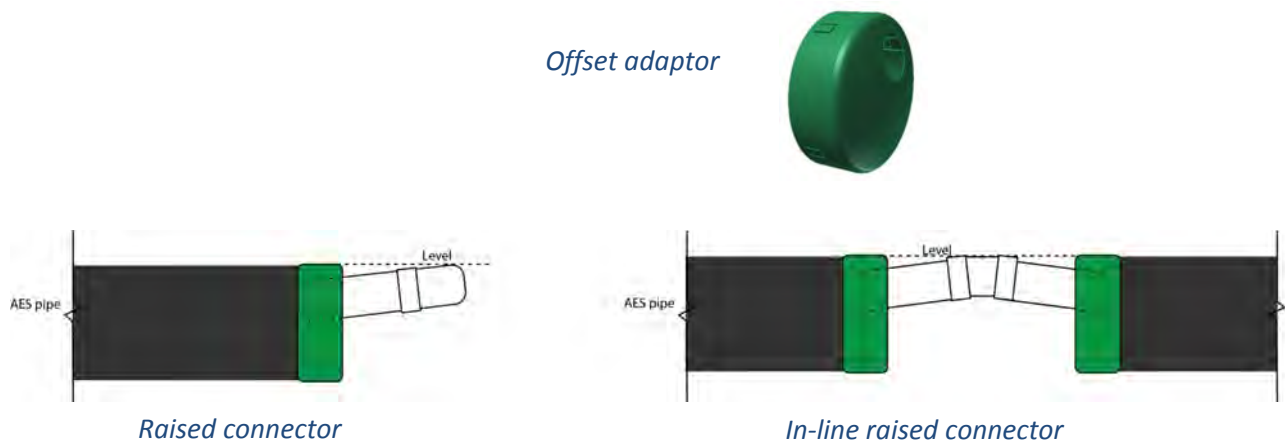
System sand is coarse washed sand (>40% 0.5mm-2.0mm, with <2% silt). Sand can be tested free of charge by ET. Send 2 cups to 14 Onekaka Ironworks Road, Takaka 7182.

- a) Place a minimum of 150mm of system sand in the bed extension area and then a minimum 300mm under the actual AES pipe footprint area. Ensure this thickness of sand under each row of AES pipe has a completely level surface and is evenly compacted by foot traffic.
- b) Place rows of AES pipe roughly in position with the fabric seam at the top or 12 o'clock position and the white bio-accelerator fabric at the bottom or 6 o'clock position. Leave a 300mm minimum clearance to all of the footprint edges.
- c) Join lengths of AES pipe with AES couplings. To do this slide the fabric and the fibre back on the two pipe ends to be joined. Clip the AES coupling in place. Slide the fibre and fabric layers back over the coupling. Ensure that the base of the excavation is horizontal.
- d) Place offset adaptors at the beginning and end of each row of AES pipe with the 100mm hole at the top.
- e) Ensure there is a minimum separation of 150mm between rows of AES pipes. This can be done with pegs, short pieces of 150mm pvc or preferably using AES 'staples' constructed from 150mmx25mm timber. One side must be set to provide the minimum 300mm of system sand required at the footprint edge
- f) Place system sand around AES pipes ensuring they stay level and in position. Pipes must be restrained while sand is being placed. This is most easily achieved with the wooden staples. Remove and progressively position staples or other spacers until all pipes are surrounded by system sand to the top or soffit of the pipes. Walk on the sand between rows to aid compaction with the first compaction when the sand is 2/3rds the thickness of the pipes.



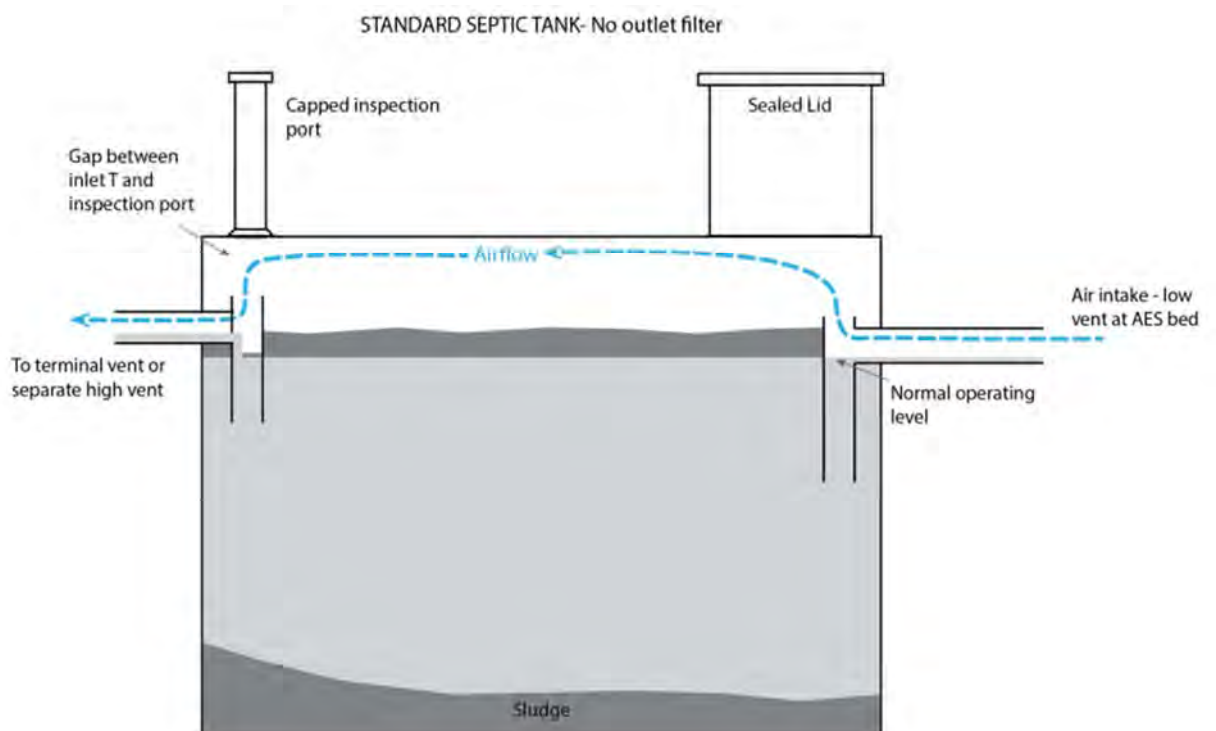
4. Connecting Rows

- a) Connect rows with 100mm pipe as required with a maximum 100mm extending through the Off-Set Adaptor into the AES system pipe.
- b) Raised connections: After placing raised connection pipes, the top of the PVC must be level with the top of the AES pipe. Lift and pack with compacted sand. This ensures the airflow is not restricted even when the AES pipe is working to maximum buffer capacity.

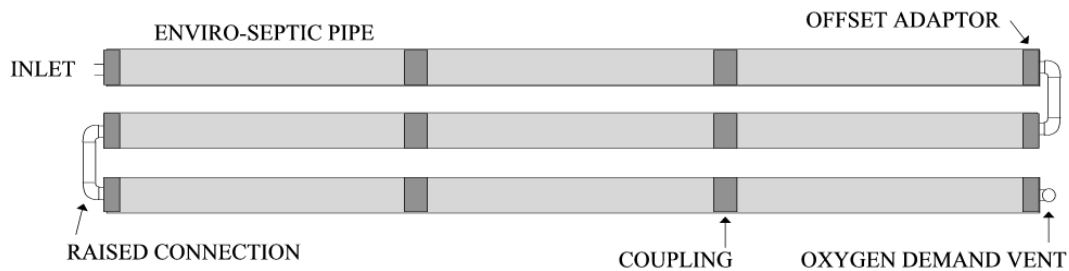


5. Venting

- a) You must ensure the system has a high/air outlet vent and a low/air entry vent as shown in the design. The Low vent must be a minimum of 150mm above ground preferably in a protected position away from mowers or vehicles, and above snowfall level. Vents can be located any distance from the system provide they have no water traps that can block air flow through the system. The High Vent must be a minimum of 3 meters higher than the low vent.
- b) If the terminal vent at the building is to be the high vent there must be no air leakage between the AES bed and the terminal vent. This means that all possible air entry points on the septic tank must be air tight. Septic tank inlets & outlets must allow free passage of air.

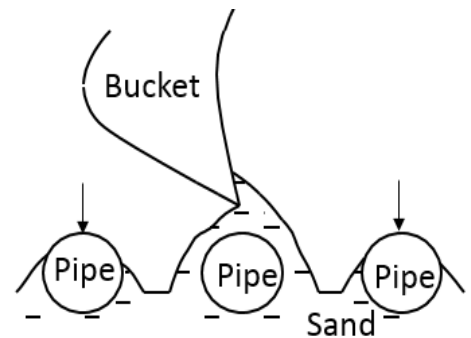


- c) Collect 'As Built' information by recording the position of all AES pipe end points and any other required specific features and inspection points between the septic tank and the AES bed.
- d) Usually rows are connected in series with one low vent as pictured following:



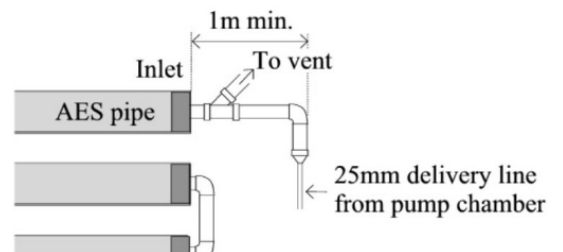
6. Back Filling

- a) **Ensure a minimum of 150mm of System Sand covers the AES pipes and connecting PVC pipe work.**
- b) Refer to the onsite design and Council approval and ensure that all stormwater diversions, drains or site specific requirements are correctly installed.
- c) Backfill with natural soil and compact. System extensions may require compaction in multiple layers depending on the depth of backfill material to be placed.
- d) On mounds and down slopes strip vegetation and place fill evenly and level to all sides to avoid breakout from low points during high seasonal loadings.
- e) Cover excavation area with topsoil creating a finished surface level 50 to 100mm higher than the natural surface level ensuring that water sheds off the land application area and does not pond, compact lightly and seed or grass when completed.



7. Use of Velocity Diffuser

Pressurised or steep gravity systems require a **Velocity Diffuser** - a 100mm 90° bend 1m before the AES pipe inlet – to minimise turbulence when the septic tank effluent enters the AES pipes. A distribution box can also function as a velocity diffuser.



8. Use of Filter Cloth/ Geo-Fabric

The manufacturer of AES strongly advises against using geo-fabric between the topsoil and the AES sand, as it can become clogged. It is up to the local designer or installer whether geo-fabric should be used or not.

**For supply of AES components, sand specification testing and installation support phone
 Environment Technology 03 9707979, 0800 Waste H20 email : info@et.nz
 14 Onekaka Iron Works Rd, Takaka 7182**

Appendix F: Producer Statement – Design – PS1



14 Onekaka Iron Works Rd, RD 2, Takaka 7182

phone 03 524 8222, mob 0275 212126

0800 WASTE H₂O (0800 927 834)

info@wastewaterdesign.co.nz

Producer statement – PS1 Design

13 November 2015

ON-SITE EFFLUENT DISPOSAL SYSTEMS

ISSUED BY: **Hazel Pearson** (approved wastewater designer in Tasman District and Marlborough District)

TO: **Richard Holdaway** (owner)
TO BE SUPPLIED TO: **Marlborough District Council.**

PROPERTY LOCATION: **284 Dillons Point Rd**
LEGAL DESCRIPTION: **LOT 1 DP 2179 & LOT 2 DP 1101 & LOT 2 DP 462
BLK XVI CLOUDY BAY SD EASEMENT DP 373217**

TO PROVIDE : Design of an on-site effluent disposal system in accordance with the relevant specifications and provide a schedule to the owner for the system maintenance.

THE DESIGN: Has been made in accordance with AS/NZS 1547:2012, Wairau/Awatere Resource Management Plan sections 30.1.8.2 and 30.1.7.3, with the exception of 30.1.8.2.4 (f) and 30.1.8.2.4.1 (b), and G13 (Foul Water) B2 (durability 15 years) of the Building Regulations 1992 where appropriate.

I BELIEVE ON REASONABLE GROUNDS that if the system is constructed according to the plans and specifications and subject also to:

(1) All proprietary products specified meeting their claimed performance standards

That the proposed design will meet the relevant provisions of the Building Code, AS/NZS 1547:2012, and the Wairau/ Awatere Resource Management Plan.

A handwritten signature in blue ink that reads "Hazel M. Pearson". The signature is written in a cursive, flowing style.

Hazel Mary Pearson
BA, MDC Wastewater System Designer, TDC Approved Wastewater System Designer

Wastewater Design Ltd
14 Onekaka Iron Works Road, RD2, Takaka 7182
t. 03 5248222 m. 0204 000 5325 e. info@wastewaterdesign.co.nz



Site Address	284 Dillons Point Rd, RD 3, Blenheim		
Client Name	Holdaway		
Designed By	Hazel Pearson	Designer Ph. Number	35248222
		Designer AES Cert. Number	QDL00351
Installer	Ken Kerr	Installer Ph. Number	
		Plumb/Drainlayer Lic Number	
Council Area	Marlborough District Council	Installer AES Cert. Number	NZ00143
		Date	6.11.15

This Calculator is a guide only. Receiving soil classification, surface water, water tables and all other site constraints are required to be addressed by the design.

System Designers site and soil calculation data entry. Enter data in all light blue fields		IMPORTANT NOTES	
Is this a new home installation Y or N	y	>>	Minimum single vent size is 80mm.
Number of people	12		or 2 x 50mm house vents
Daily Design Flow Allowance Litre/Person/Day	165		A septic tank outlet filter is NOT RECOMMENDED
Number of rows required to suit site constraints	3	>>	Longer AES runs are better than multiple short runs.
Soil Category established by site and soil evaluation. CATEGORY	3		
Design Loading Rate based on site & soil evaluation DLR (mm/day)	50		
Enter AES Bed Slope in % for standard AES systems to calculate extension	0		
Is this design a gravity system Y or N	y	>>	A HOUSE Vent & a LOW vent are required on this system

PLEASE CHECK YOU HAVE A MINIMUM OF 1:100 FALL FROM TANK TO AES SYSTEM PIPES

COMMENTS :- " The outcome must be important to everyone. "

- Drainlayers are reminded to practice good construction techniques as per AS/NZS 1547 and as provided on AES installation instructions supplied with components.

AES System Calculator Outcomes			AES dimensions		
Total System load - litres / day (Q).	1980	l/d		AES System	System Extension
Min Length of AES pipe rows to treat loading	17.4	lm	Lth m : (L)	18.6	18.6
Number of FULL AES Pipe lengths per row	6	lths	Width m:(W)	1.80	0.33
Buffer Capacity of AES System pipe in Litres	3816	ltr.	Sand Depth :	0.75	0.15
			Area m2	33.5	6.1

IF YOU WISH TO USE A TRENCH EXTENSION DESIGN OPTION ENTER "Y"

Enter Custom Width m >

AES INFILTRATION FOOT PRINT AREA - $L = Q / (DLR \times W)$	Length	Width	Minimum AES foot print required .	
<i>for this Basic Serial design is</i>	18.6	x 2.13	=	39.6 m2 total


Code	AES System Bill of Materials.	Length	Width	Minimum AES foot print required .
AES-PIPE	AES 3 mtr Lths required	18	lths	
AESC	AESC Couplings required	15		
AESO	AESO Offset adaptors	6		
AESODV	AES Oxgen demand vent	1		
TOTAL SYSTEM SAND REQUIRED (Guide Only)		31	m3	

Please email your AES Calculations and Drawings to: -

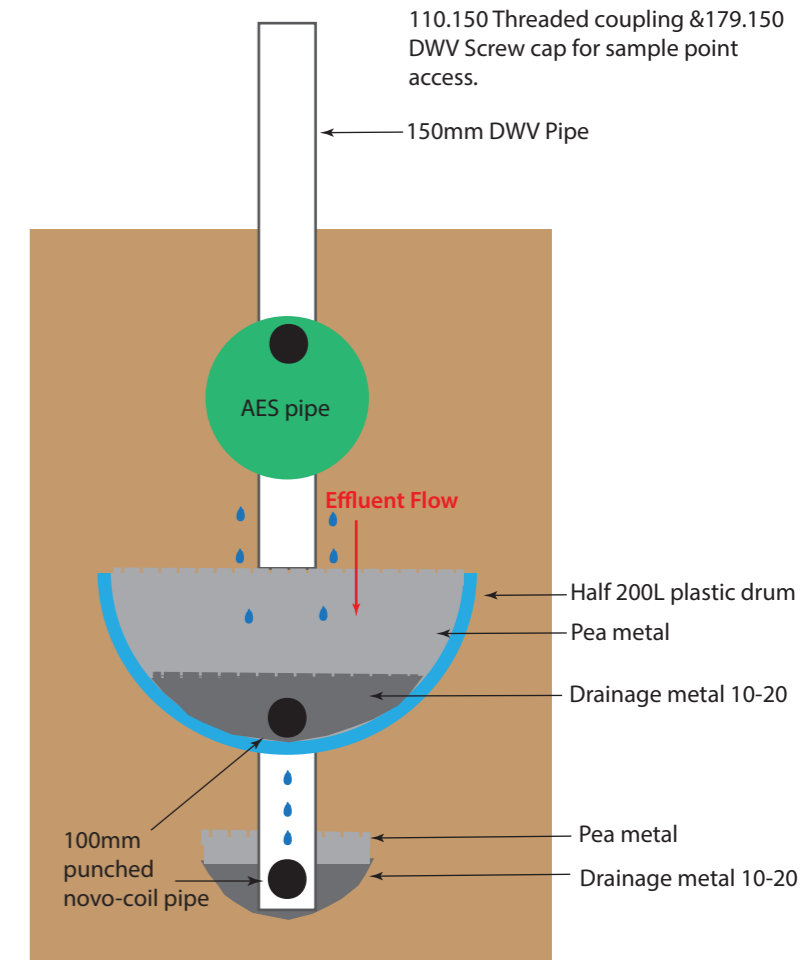
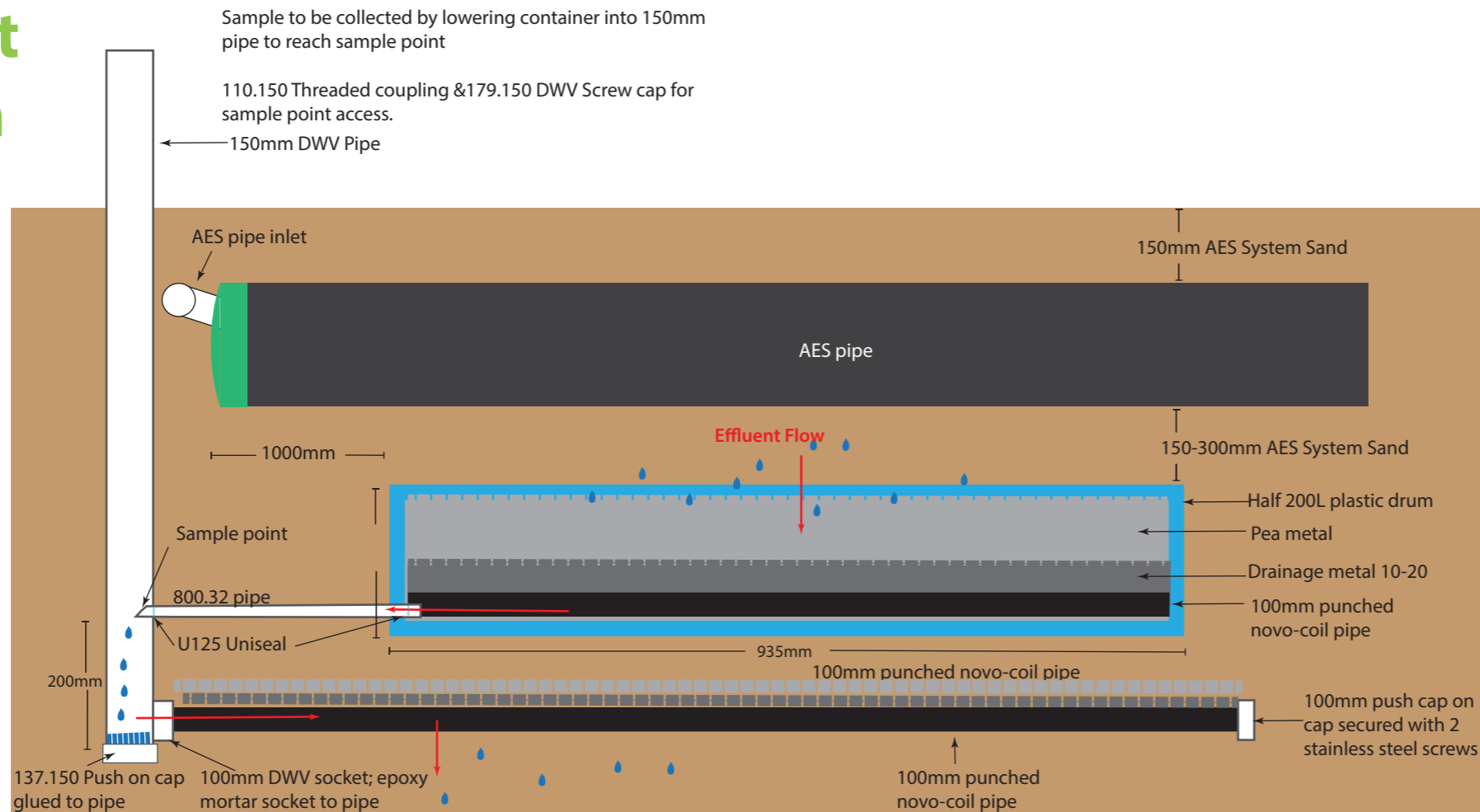
Design@Environmenttechnology.co.nz

design@environmenttechnology.co.nz

- > The AES Calculator is a design aid to allow checking of the AES components and configuration and is a guide only.
- > Site and soil conditions referencing as specified in AS/NZS 1547:2012 are calculated and designed by a Qualified Designer
- > Environment Technology has no responsibility for the soil evaluation, loading calculations or DLR entered by the designer for this calculator.
- > AES pipes can be cut to length on site. They are supplied in 3 metre lengths only.


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 Click on signature to view signature validation

Sample port installation



The sample port is designed to collect treated effluent from below an AES bed.

The sample port is installed beneath the first row of AES pipes in the bed.

Novo-coil pipes are covered with drainage metal 10-20 and then pea metal to allow free drainage into pipes and prevent sand blocking the pipes.

The sampler can lower a container attached to a string down the sample pipe to collect an effluent sample at the sample point. When there is no sample container in the port the effluent is dispersed beneath the collector.

