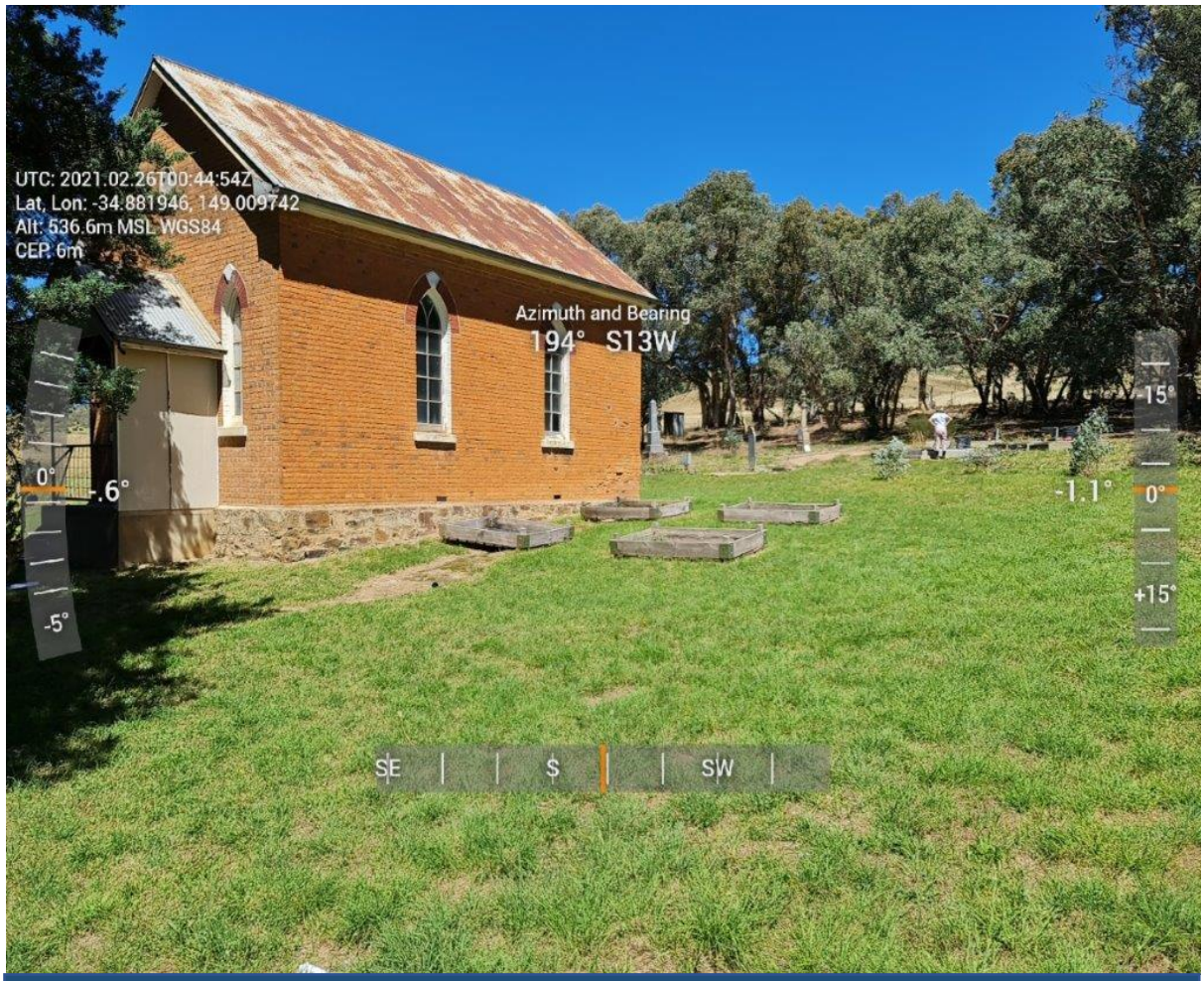
ON-SITE SEWAGE MANAGEMENT REPORT

1316 Yass River Road
YASS RIVER NSW 2582

10 March 2023

Version 02

SOILANDWATER



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SOIL AND WATER

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We provide our services to individual land holders, sub-division developers, surveyors, commercial business owners, and land development and regulatory agencies.

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Disclaimer

This report is based on the information provided by the client regarding the proposed development and the condition of the site on the date of the site visit. The recommendations in this report are not valid if there are subsequent changes to the proposed development or changes to the site such as earthworks or vegetation clearing. Franklin Consulting Australia Pty Ltd takes no responsibility for the installation of wastewater management systems.

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SUMMARY

Development	Installation of a new effluent management system to service a dwelling extension to an old church building on Lot 1 DP 131409 at 1316 Yass River Road, YASS RIVER, NSW, 2582.
Owner/Developer	Michelle Hyde
Expected wastewater load/day:	Daily effluent load is based on an equivalent 2-bedroom dwelling (3 potential occupants @ 120L/person/day), therefore **360L/day**.
Recommended treatment system:	Primary Treatment consisting minimum 3,000L septic tank with internal baffle. [The make and model of treatment system will be selected from NSW Health Accredited primary treatment systems in consultation between the installer and landholders]
Recommended effluent dispersal system:	Treated effluent will be dispersed through a subsoil absorption bed with a minimum base area of **40m^2**
Site classification:	**M-Moderately Reactive** (in accordance with AS 2870). **Should soils excavated for footings differ from those described in Appendix 1 then additional soil assessment may be required to assign a Site Classification.** **Footings should be founded in a consistent soil layer beneath topsoil and any fill material.**

REPORT SCOPE AND TECHNICAL REFERENCES

The report assesses land near the proposed development to identify specific areas required for the optimal functioning of an on-site sewage management system.

This involves excluding land with major physical constraints such as steep slopes, rocky outcrops, poor drainage, areas within buffer distances of property boundaries watercourses, storages, flow lines and existing and proposed buildings.

The assessment also includes determining a Site Classification for the building envelope consistent with AS 2870.

All information required by the approving authority, usually regional Councils, is contained in this report, including suitable types of sewage management systems, management prescriptions, site plan and photographs, with supporting information in this report including nutrient balance and limitation tables.

The report also refers to, or relies on, standards and technical references listed below.

On-site Sewage Management for Single Households (The Silver Book) NSW Govt, 1998.

AS/ANZ Standard 1547:2012 On-site Domestic Wastewater Management.

Yass Valley Local Environment Plan, 2013.

Soil Landscapes of the Canberra 1:100,000 Sheet. Jenkins, B.R. (2000) Department of Land and Water Conservation, NSW.

AS 2870 Residential slabs and footings – Construction

Soil Landscapes of the Goulburn 1:250,000 Sheet. Hird,C (1991) Soil Conservation Service

LANDSCAPE CHARACTERISTICS

LANDSCAPE

The landscape is identified as the Blakeney Creek Soil Landscape Unit in the *Soil Landscapes of the Goulburn 1:250,000 Sheet,* (Hird, C. 1993). This is described as footslopes and valley floors of undifferentiated Ordovician and early Silurian metasediments. Local relief between 20-50m with low slopes generally less than 10%. Elevations range between 600 and 900m. Drainage patterns are permanent erosional stream channels with non-directional or convergent tributary patterns.

The local landscape is extensively cleared and modified for historical use as a Church with associated cemetery.

The land is gently sloping at 3-8%.

SOILS

Detailed soil profile descriptions are provided in **Appendix 1** of this report.

The soils in the effluent dispersal areas deep moderately drained Red and Brown Chromosols. These were formed in situ and on alluvial and colluvial material derived from the metamorphosed Ordovician and Silurian sedimentary parent material.

Soils comprise a weak to moderate silty loam textured upper layer overlying a weak to moderately structured red silty clay subsoil. Soil depth extends >150cm.

The area is identified as the Blakeney Creek Soil Landscape Unit in the Soil Landscapes of the Goulburn:250,000 Sheet, Hird, C. (1993). This soil landscape is analogous to the Bywong Soil Landscape Unit in Soil Landscapes of the Canberra 1:100,000 Sheet, Jenkins, B.J. (2000). The representative analytical shows a moderate phosphorous sorption level, non-saline subsoils and low exchangeable sodium. As such the soils are free of any significant chemical limitations to effluent dispersal.

.

SITE INFORMATION

Local Government Area:	Yass Valley Council
Address/locality:	1316 Yass River Road YASS RIVER, NSW, 2582 Lot 1 DP 131409
Owner/Developer:	Michelle Hyde
Block Configuration:	

Figure 1a: Regional location

Figure 1b: Block configuration

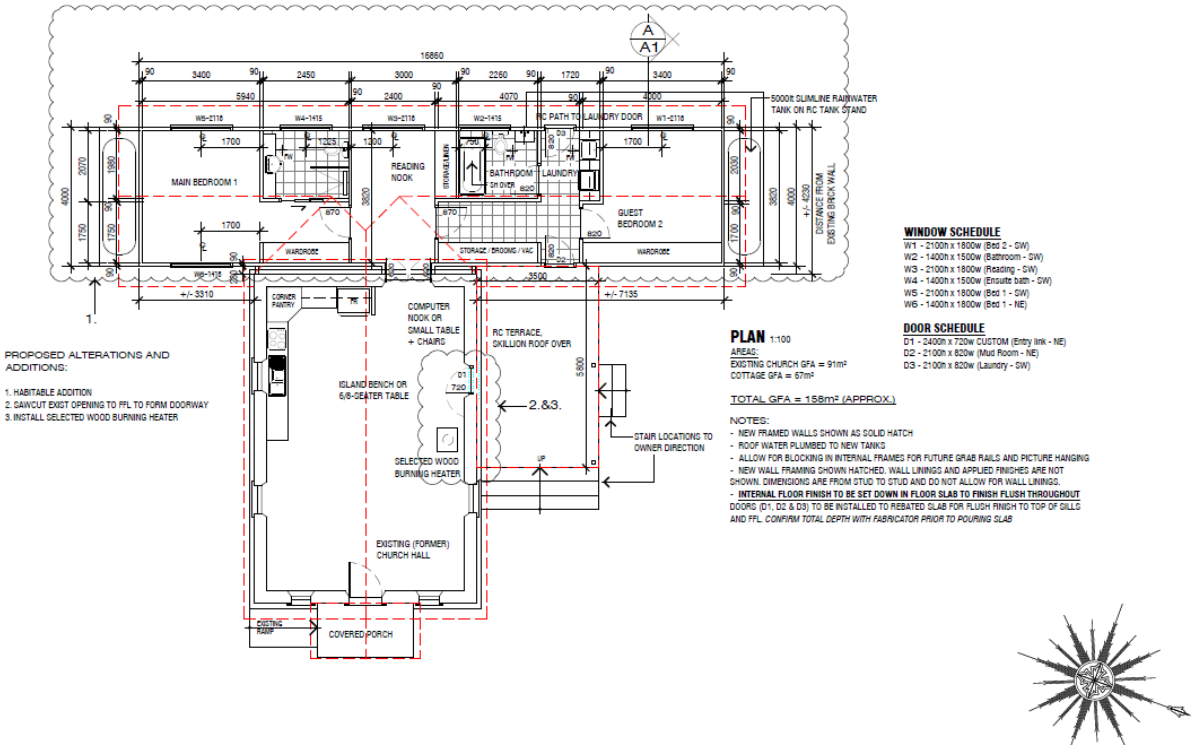

Figure 1c: Floor Plan (indicative)

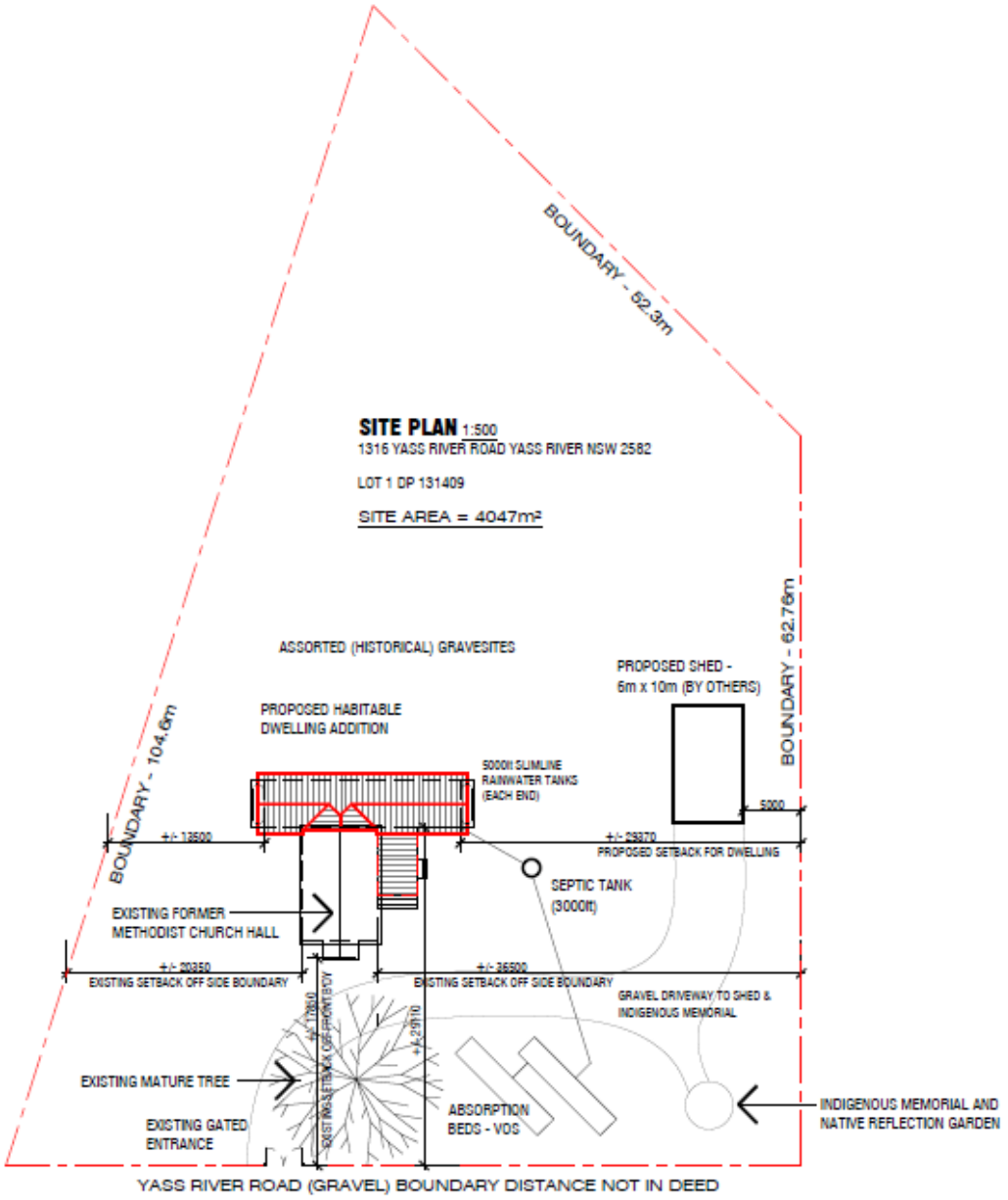

Figure 1d: Site Plan

INTENDED WATER SUPPLY: Non-reticulated – roof catchment – tank storage for domestic water.

EXPECTED WASTEWATER LOAD (LITRES/DAY): The design in this report is based on a 2-bedroom dwelling. The design occupancy is 3 persons which will generate a design wastewater load of 360L/day (@ 120l/person/day) – therefore **360L/day**.

LOCAL EXPERIENCE: Most primary treatment systems combined with subsoil absorption work well in similar landscapes where soil depth and permeability is suitable. The silty clay subsoil is not ideal for subsoil absorption however this soil material does not occur until depths exceeding 110cm in the area identified as suitable for effluent disposal. This type of system is also suited to intermittent occupancy and off-grid applications. Systems need to be maintained regularly, in accordance with council regulations and prescriptions in this report.

Figure 2: Looking south west across the site

Figure 3: Looking south across the site

Figure 4: Looking west across the site

Figure 5: Looking north east across the site

Figure 6: Existing chapel building

Figure 7: Looking south west across site

Figure 8: Looking north east across effluent disposal area

SITE ASSESSMENT

CLIMATE: The climate is typically a cool and moderately dry climate. Average rainfall for the area is 600 – 800 mm. Warm summers with large evaporative deficit, cool winters with small evaporative deficit; median summer monthly rainfall for Canberra airport 49 mm; median monthly winter rainfall 38 mm; mean monthly summer evaporation is 177 mm, mean monthly winter evaporation is 60 mm.

Climate is well suited for the subsoil absorption of primary treated effluent.

RAINFALL WATER BALANCE ATTACHED: Yes. Refer to *Sizing the Effluent Disposal Area*.

LAND APPLICATION AREA CALCULATED: Yes. Refer to *Sizing the Effluent Disposal Area*.

WET WEATHER STORAGE CALCULATION ATTACHED: Not applicable (rainfall < 1,000mm).

FLOOD POTENTIAL:

Land application area above 1:20 year flood:	Yes
Land application area above 1:100 year flood:	Yes
Electrical components above 1:100 year flood:	N/A

EXPOSURE: Site is exposed with limited vegetative shading.

Exposure is suitable for the subsoil absorption of primary treated effluent.

SLOPE: The effluent dispersal area has a gentle slope of approximately 3-5% to the north east.

Slopes are not a constraint to effluent dispersal by subsoil absorption.

LANDFORM: Slope form of the site is divergent in the proposed effluent disposal area.

Landform is suited to effluent dispersal by subsoil absorption.

RUN-ON: Limited run-on water will impact the site due to upslope topography.

Run-on water is not a constraint to effluent disposal on the site

SEEPAGE: ***No seepage*** was evident on the property.

EROSION POTENTIAL: The site is extensively cleared, and the soils have a moderate erosion risk. No active erosion was visible. The erosion risk is mitigated by a good groundcover of grass species and low slopes.

Limited erosion potential will be addressed through the maintenance of 100% groundcover on the effluent dispersal area

SITE DRAINAGE: Site drainage is via overland flow across the building envelope and effluent disposal area. The Yass River is located to the north and east of the site and requires a 100-metre buffer from effluent disposal practices. A minor drainage

depression parallels the eastern boundary and requires a 40-metre buffer from effluent disposal practices.

A 100-metre watercourse buffer is required from Yass River downslope of the effluent disposal area. A 40-metre buffer is required from the drainage depression adjacent to the eastern boundary.

FILL: No fill was detected on the property. The building platform from the previous dwelling lost to fire, will require only minor groundworks to establish a level building site.

There will be no areas of fill in the effluent disposal area.

GROUNDWATER:

Horizontal distance to groundwater well used for potable domestic supply: There are no known bores used for potable water supply in the area.

Groundwater vulnerability map category: The lot containing the proposed dwelling is not mapped as groundwater vulnerable in the Yass Valley Local Environment Plan (2013). The lot is mapped as Moderate Groundwater Vulnerability in the Murrumbidgee Catchment Groundwater Vulnerability Map (DLWC)

Bores in area and purpose: There are no bores within 500 m of the effluent disposal site. The closest bore (GW416863.1.1) is located 1437m north of the site. This bore is 104m deep.

The effluent management practices proposed in this report will not impact this bore or the groundwater aquifer due to:

- ***separation of > 1400 m,***
- ***low transmissivity of fractured rock aquifer systems, and***
- ***low application rate of effluent to the near surface.***

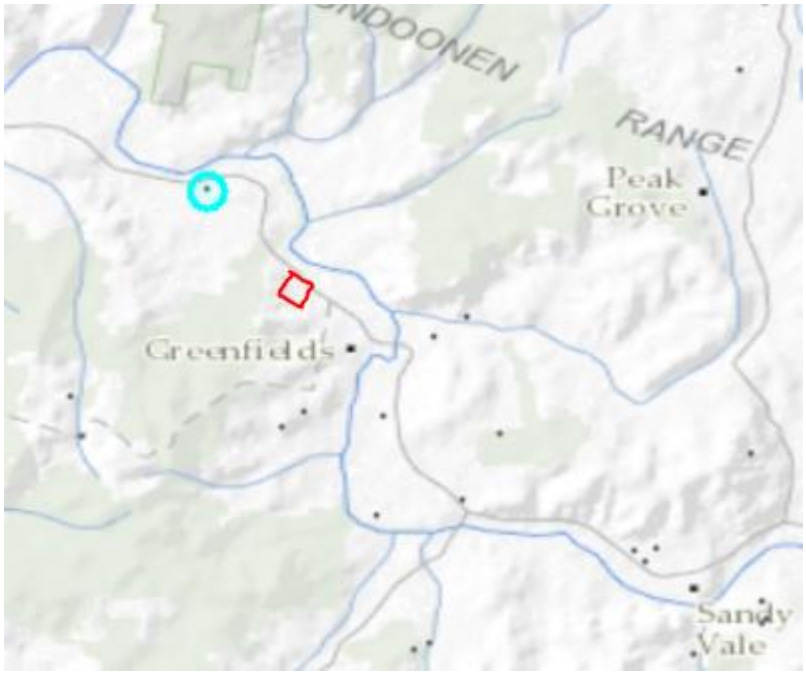

Figure 9: Location of proposed dwelling (WaterNSW)

BUFFER DISTANCE FROM TREATMENT SYSTEM TO:

Perennial rivers and creeks:	100m (Yass River)
Drainage depressions:	40m
Other sensitive environment:	NA
Boundary of premises:	12/6m (downslope/upslope)
Swimming pools:	Not applicable
Buildings:	6/3m (downslope/upslope)

[Buffers distances as per Silver Book – Table 5]

IS THERE SUFFICIENT LAND AREA FOR:

Application system including buffers: Yes, refer **Figure 10**

Reserve application system: Yes, refer **Figure 10**

SURFACE ROCK AND OUTCROP:

No rocky outcrops.

SOIL ASSESSMENT

Depth to bedrock or hardpan:	>1.5
Depth to high soil water table:	>1.5m
Minimum Separation distance:	>600mm
Hydraulic loading rate Soil texture: Soil structure: Permeability (*from table M1 of AS1547:2012)*: Recommended design loading rate for effluent irrigation *(from table M1 of AS1547:2012)*:	 Sandy Clay Loam Moderate 0.5-1.5 m/day 4 mm/day
Coarse fragments:	5-10%
Bulk density*	1.6-1.8 t/m^3 in topsoil, 1.5 t/m^3 in subsoil
PH field*:	5.5 in topsoil, 6.6 in subsoil
Electrical conductivity dS/m*:	0.05 in topsoil, 0.05 in subsoil
Exchangeable sodium %*:	5 in topsoil, 10 in subsoil
Cation exchange capacity (mequiv/100g)*:	4.8 in topsoil, 11 in subsoil
Phosphorous sorption capacity mg/kg*:	191(topsoil) 503 (subsoil)
Geological feature Discontinuities: Fractured rock:	 None None
Soil landscape reference*:	Bywong, Type 1 Profile
Dispersiveness EAT class*:	2(1) in topsoil, 3(2) in subsoil
Site Classification [AS2870]	**M-Moderately Reactive** • **Should soils excavated for footings differ from those described in Appendix 1 then additional soil assessment may be required to assign a Site Classification.** • **Footings should be founded in a consistent soil layer beneath topsoil and any fill material**

* extrapolated from Jenkins (2000) Soil Landscapes of the Canberra 1:100,000. DLWC

SYSTEM SELECTION

Consideration of connection to centralised sewerage system:	Distance: Greater than 5 kms Potential for future connection: None Potential for reticulated water: None
Type of land application system best suited:	Subsoil absorption in absorption bed(s) with minimum basal area of 40m^2. Simple reliable system suited to site and soil conditions.
Type of treatment system best suited:	NSW Health accredited primary treatment system with minimum 3,000L capacity. Simple reliable systems with no power requirements and suited to intermittent occupancy.

RECOMMENDED EFFLUENT MANAGEMENT PRESCRIPTIONS

EFFLUENT MANAGEMENT PRESCRIPTIONS

Effluent treatment

The following specific recommendations are made in respect of the septic tank treatment system:

1. Effluent will be treated by the existing NSW Health accredited system capable of achieving primary treatment standards, refer suitable systems in the below table:

Septic Tanks		
All Septic Services	Certificate of Accreditation: STCW 004	(02) 4930 5321
Beachline (NSW) Pty Ltd	Certificate of Accreditation: STCW 017	(02) 6493 8327
Bennetts Concrete Products	Certificate of Accreditation: STCW 009	(02) 4422 3861
Bettacrete Precast Pty Ltd	Certificate of Accreditation: STCW 040	(08) 8262 1042
Bioseptic	Certificate of Accreditation: STCW 003	(02) 4629 6666
Bissett Company Ptt Ltd	Certificate of Accreditation: STCW 014	(07) 5442 2522
BVCI Pty Ltd	Certificate of Accreditation: STCW 031	(03) 5335 8741
Central Coast Septics Pty Ltd	Certificate of Accreditation: STCW 015	(02) 4352 2154
Eco-Septic Pty Ltd (trading as Econocycle)	Certificate of Accreditation: STCW 037	(02) 4774 1316
Everhard Industries Pty Ltd (Geebung)	Certificate of Accreditation: STCW033	(07) 3637 5857
Fabranamics Pty Ltd (trading as Pureablue)	Certificate of Accreditation: STCW 012	(02) 6772 3810
Fuji Clean Australia Pty Ltd	Certificate of Accreditation: STCW-008	1300733319
Global Rotomoulding Pty Ltd	Certificate of Accreditation: STCW 021-40297	(07) 4697 7099
Gough Industries Pty Ltd	Certificate of Accreditation: STCW 035	1800 069 805
Graf Australia Pty Ltd	Certificate of Accreditation: STCW 019	1300 466 469
Grahams's Concrete Pty Ltd	Certificate of Accreditation: STCW 013	(02) 6632 1978
Highland Tanks Pty Ltd (trading as Highland Concrete Tanks)	Certificate of Accreditation: STCW 005	(02) 4889 8288 or (02) 4889 8562
Icon-Septech Pty Ltd (Bayswater North)	Certificate of Accreditation: STCW 024	(03) 9729 8655
Mid North Coast Concrete Products Pty Ltd	Certificate of Accreditation: STCW 028	(08) 8262 1042

Mid West Concrete Pty Ltd	Certificate of Accreditation: STCW 016	(02) 6368 2444
Penguin Composites Pty Ltd	Certificate of Accreditation: STCW 026	(03) 6437 2791
Precast Concrete Wangaratta Pty Ltd	Certificate of Accreditation: STCW 018	(03) 5722 3955
Precision Poly Vic Pty Ltd	Certificate of Accreditation: STCW 006	(02) 4577 8371
Quality Tanks (QLD) Pty Ltd	Certificate of Accreditation: STCW 022	(07) 3382 7666
Reln Pty Ltd	Certificate of Accreditation: STCW 002	(02) 9605 9999
Ri-Industries	Certificate of Accreditation: STCW 029	(08) 8445 7822
Suncoast Waste Water Management	Certificate of Accreditation: STCW 041	(07) 5459 4900
Taylex Industries Pty Ltd	Certificate of Accreditation: STCW 027	(07) 3441 5200
Viscount Rotational Mouldings Pty Ltd	Certificate of Accreditation: STCW 007	(03) 9775 0310

2. The septic tank will be a minimum 3,000L in capacity and include an internal baffle.
3. The septic tank should be desludged at a minimum every 5 years to maintain the operational efficiency of the absorption bed, or more frequently in accordance with guidance provided AS/NZS 1547:2012.
4. Excess fats, oils, paint products, particulate fines, strong disinfectants and antibiotics should not be added to the septic system as they will reduce the efficiency of the septic's operation
5. Further information on managing septic tanks can be found at: http://www.dlg.nsw.gov.au/dlg/dlghome/documents/Information/ssguide.pdf

Effluent dispersal

Effluent will be dispersed by a Subsoil Absorption Bed.

The following specific management practices should be implemented to ensure effluent is appropriately treated:

1. The absorption beds should be located on land shown as suitable in **Figure 10**
2. A basal absorption (floor) area of 40 m^2 is required. This can be achieved by the installation of two absorption beds constructed parallel on the contour with a 10m length and 2 m width. A design is provided in **Figure 11.** (Other absorption bed configurations may be considered provided they provide a minimum of 40m^2 basal area).
3. The absorption beds should be excavated parallel to the contour so the floor of the trench is level across both length and width to ensure an even spread of effluent along the length of the bed
4. The base of the absorption beds should be left with a rough scarified finish into which 25kg of gypsum should be spread on the floor of each bed and loosely raked into in situ soils
5. Distribution aggregate (20-40mm) should be laid on top of the bed base to a depth of 375mm into which the perforated 90-100mm distribution lines should be bedded

	6. The beds should each be fed by two delivery lines (perforated pipe or self-supporting arches) which are spaced at 500 mm from the edge of the bed with 1,000 mm between the delivery lines. 7. The pipe delivery lines will be two runs of 100mm PVC sewer pipe drilled out with 5-10mm holes every 500mm, and 45 degrees off the bottom of the pipe. Seep holes of 5mm diameter should be drilled at 1m intervals along the bottom of the pipe. 8. The two absorption beds and the delivery lines within each bed should be joined such that effluent is distributed evenly between each. This can be achieved using a proprietary distribution box (e.g. Everhard) or a splitter comprising a level T piece with outlets as required. 9. Each bed should include an inspection port of 50mm PVC pipe which is slotted/perforated for the bottom 100mm, should be installed to the level of the base of the distribution aggregate layer and end flush with the topsoil layer with an inspection cap. 10. The effluent line between the septic tank and the absorption beds should be buried a minimum of 450 mm in areas which may be subject to vehicular traffic. 11. The topsoiled beds should be sown immediately with suitable perennial grass/pasture species or commercial turf laid. 12. The floor of the beds should be at a minimum depth of 500mm and excavated using a survey level to ensure it is level 13. Landscaping around the beds can provide for the additional utilization of effluent discharged to the bed. Suitable species include Callistemon pallidus, C. palludosis, Kunzea ericoides, K. parvifolia, K. phyllicoides (burgen), Leptospermum continentale (prickly ti tree), L. multicaule, L. flavescens, L. squarrosum, Melaleuca armillaris (honey myrtle), M. decussata, M. squamea, M. thymifolia, M. ericifolia, M. hypericifolia, M. linariifolia.
Special Conditions	1. An earth diversion bank should be constructed downslope of the absorption beds to create a flow path of greater than 12 metres between the bed and the downslope boundary, refer **Figure 10**.
General	1. Water conservation measures should be adopted in the shed and dwelling, particularly in relation to the high-water use activities of showering, clothes washing and toilet flushing. AAA+ plumbing appliances and fittings should be used. Measures including use of front loading washing machines, low volume shower roses and dual flush toilets reduce water usage by 30 to 40%. 2. Detergents low in phosphorous and sodium should be used as much as possible (see details in appendix) in order to protect the soil's capacity to absorb water.

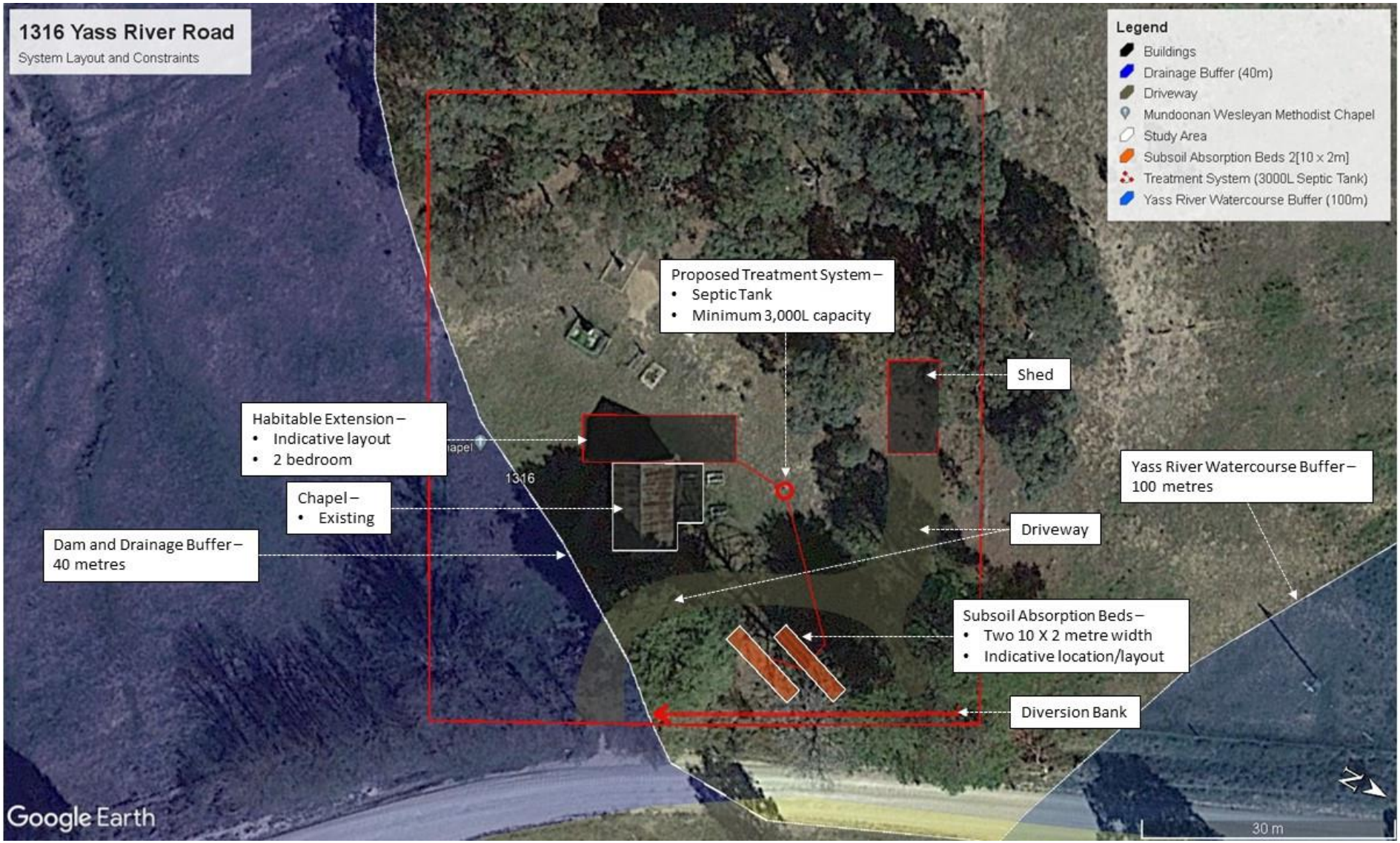

Figure 10: Site constraints and system layout

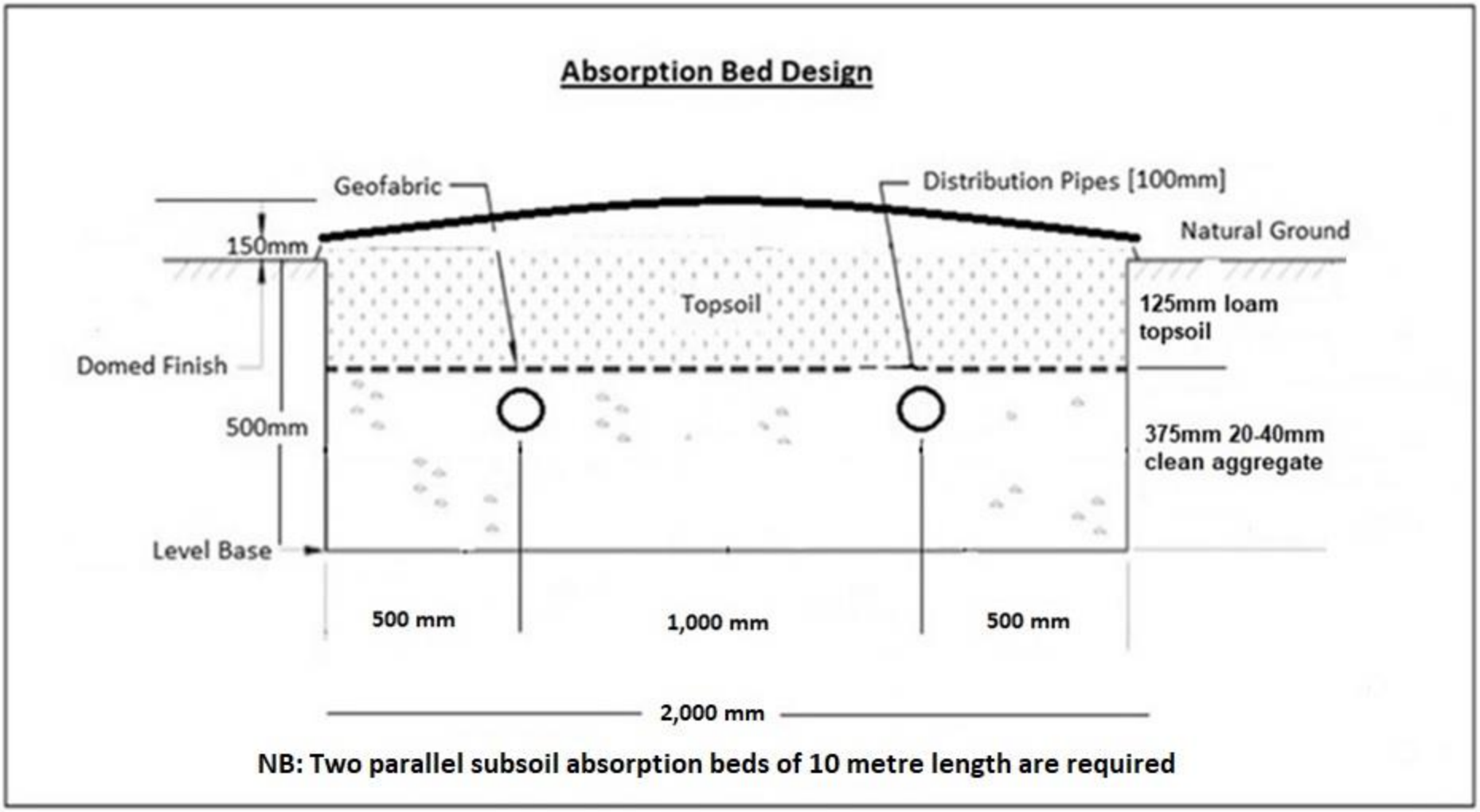

Figure 11: Absorption Bed Design

SIZING EFFLUENT DISPOSAL AREA

Water balance	Using the Design Loading Rate (DLR) for absorption beds of primary treated effluent on a moderately structured clay loam soils of 10 mm/day and adopting a design loading of 360 L/day, the following land application areas are required to manage additional hydraulic loading, nitrogen and phosphorous generated: • **Sizing based on hydraulic loading:** A = Q (l/day)/DLR (mm/day) where A = area; Q =360 L/day; DLR = 10 mm/day A = 360/10 = 36 m^2 **Area required = 40 m^2**
Design effluent disposal area	Therefore, a land application area of **40 m^2** delivered through an absorption bed, will account for phosphorous, nitrogen and water applied based on estimated connections and usage patterns associated with the connection of a 2-bedroom dwelling (design adopted for the proposed development).

SITE AND SOIL LIMITATION ASSESSMENT

The following two limitation tables are a standardised guide to the site and soil characteristics which may limit the suitability of the site for effluent disposal and which would require attention through specific management practices. The tables have been reproduced from *On-site Sewage Management for Single Households* (tables 4 and 6, Anon, 1998). The highlighted categories represent site and soil conditions of the land covered in this report. The tables show that the land designated for effluent application has slight to moderate limitations, but no severe limitations.

Site limitation assessment

Site feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Flood potential	All land application systems	> 1 in 20 yrs.		Frequent, below 1 in 20 yrs	Transport in wastewater off site
	All treatment systems	components above 1 in 100 yrs.		Components below 1 in 100 yrs.	Transport in wastewater off site, system failure
Exposure	All land application systems	High sun and wind exposure		Low sun and wind exposure	Poor evapo-transpiration
Slope %	Surface irrigation	0-6	6-12	>12	Runoff, erosion potential
	Sub-surface irrigation	0-10	10-20 (surface drip)	>20	Runoff, erosion potential
	Absorption	0-10	10-20	>20	Runoff, erosion potential
Landform	All systems	Hillcrests, convex side slopes and plains	Concave side slopes and foot slopes	Drainage plains and incised channels	Groundwater pollution hazard, resurfacing hazard
Run-on and seepage	All land application systems	None-low	Moderate	High, diversion not practical	Transport of wastewater off site
Erosion potential	All land application systems	No sign of erosion potential	Limited signs of erosion	Indications of erosion e.g. rills, mass failure	Soil degradation and off-site impact

Site feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Site drainage	All land application systems	No visible signs of surface dampness		Visible signs of surface dampness	Groundwater pollution hazard, resurfacing hazard
Fill	All systems	No fill	Fill present		Subsidence
Land area	All systems	Area available		Area not available	Health and pollution risk
Rock and rock outcrop	All land application systems	<10%	10-20%	>20%	Limits system performance
Geology	All land application systems	None		Major geological discontinuities, fractured or highly porous regolith	Groundwater pollution hazard

Soil limitation assessment

Soil feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Depth to bedrock	Surface and sub surface irrigation	> 1.0	0.5-1.0	< 0.5	Restricts plant growth
or hardpan (m)	Absorption	> 1.5	1.0-1.5	< 1.0	Groundwater pollution hazard
Depth to seasonal water table (m)	Surface and sub surface irrigation	> 1.0	0.5-1.0	< 0.5	Groundwater pollution hazard
	Absorption	> 1.5	1.0-1.5	< 1.0	Groundwater pollution hazard
Permeability	Surface and sub surface irrigation	2b, 3 and 4	2a, 5	1 and 6	Excessive runoff and waterlogging
Class	Absorption	3, 4		1, 2, 5, 6	Percolation
Coarse fragments %	All systems	0-20	20-45	>40	Restricts plant growth, affects trench installation
Bulk density (g/cc) **SL** **L, CL** **C**	All land application systems	 < 1.8 < 1.6 < 1.4		 > 1.8 > 1.6 >1.4	restricts plant growth, indicator of permeability
pH	All land application systems	> 6.0	4.5-6.0	-	Reduces plant growth
Electrical conductivity (dS/m)	All land application systems	<4	4-8	>8	Restricts plant growth
Sodicity (ESP)	Irrigation 0-40cm; absorption 0-1.2mtr	0-5	5-10	> 10	Potential for structural degradation

Soil feature	Relevant system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
CEC mequiv/100g	Irrigation systems	> 15	5-15	< 5	Nutrient leaching
P sorption kg/ha	All land application systems	> 6000	2000-6000	< 2000	Capacity to immobilise P
Aggregate stability	All land application systems	Classes 3-8	class 2	class1	Erosion hazard

APPENDIX 1: SOIL PROFILE DESCRIPTIONS

Soil Profile 1 – Building Envelope Area

Soil classification	Depth (cm)	Properties
Red Chromosol	0-20 25-60 60->150	A1 Light to medium brown silty loam, moist and friable, weak structure, <5% coarse fragments, grades to A2 Grey silty loam, moist and friable, weak structure, <5% coarse fragments, strong boundary to B Grey/red/orange mottled silty clay, moist and firm, weak structure, <5% coarse fragments, continues

Figure 11: Soil Profile 1 – Building Envelope

Soil Profile 2 – Effluent Disposal Area

Soil classification	Depth (cm)	Properties
Red Chromosol	0-10 10-110 110->150	A1 Light to medium brown silty loam, moist and friable, weak structure, <5% coarse fragments, grades to A2 Grey silty loam, moist and friable, weak structure, <5% coarse fragments, strong boundary to B Grey/red/orange mottled silty clay, moist and firm, weak structure, <5% coarse fragments, continues

Figure 12: Soil Profile 2 – Effluent dispersal area

APPENDIX 2: SUPPORTING INFORMATION

Powder Laundry Detergents

What did we test?

Lanfax Laboratories purchased laundry detergents powders from supermarkets in Armidale, NSW (during late 2008) and a few samples were supplied, without charge, by various individuals to total 71 powders.

Samples of each of these products were mixed at two rates: one specifically for front loading washing machines (25 L); and one for top loading washing machines (60 L) to simulate the wash cycle of a normal wash program.

The rates of detergent were calculated from weighed samples of a known volume from a freshly opened packet and mixed at the manufacturer's recommended dose for a normal wash.

The samples were mixed with rainwater at the chosen dose and agitated for 30 minutes to replicate washing action. Samples were tested within one hour for pH and salinity. Other tests followed normal good laboratory practice.

Why carry out the tests?

The quality of greywater from domestic dwellings is a cocktail from the numerous chemicals used in the home for personal and general cleaning. Perhaps the greatest use of chemicals is in the laundry where modern detergents are used at rates from a teaspoonful per wash to 1½ cups per wash. Manufacturers have their formulations and marketing strategies that mostly fail to address the problem of potentially hazardous chemicals. The impacts of pH, salinity, sodium, phosphorus and sulphur are not addressed in advertising. Most product labels don't state the ingredients, so astute purchasers can never be sure what is actually in the product. More importantly, very few even let you know how many washes in a packet. This research set out to address some of those shortcomings.

These data are not an endorsement of any product. ***Lanfax Labs*** has a policy of not endorsing or degrading any product.

No "safe in septic" standards or acceptable guidelines exit, and no laundry product can be "environmentally friendly".

The term "biodegradability" can only apply to the organic components of a powder detergent. When the detergent has a positive reading for Electrical Conductivity, you know immediately that inorganic components are included so the product cannot be "100% biodegradable".

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Commercial and Research Laboratories with special expertise in analysis for:

Domestic On-site Sewage Treatment
Laundry product testing
Greywater reuse
Effluent irrigation
Wastewater treatment
Environmental Monitoring
Soil and Landscape Assessments
Environmental Engineering

Principal Scientist:

Dr Robert Patterson FIEAust, CPSS, CPAg

NOTE: Product formulations may have changed since this research was undertaken. Lanfax Labs has no way of knowing which products may have changed and manufacturers have no requirement to advertise formulation changes to the public.

Lanfax Laboratories

Laundry Detergents

Research Results - 2009

Front Loading & Top Loading Powders

How to interpret the results

The graphs shown on these pages are examples of the numerous graphs available on the website.

Greywater pH

pH is a measure of the acid or alkaline status of the liquid. Acids have a pH <7, while alkaline solutions have a pH>7. Natural systems prefer pH between 6 and 8.

High pH causes soil to disperse and where greywater is used for landscaping, a high pH may be detrimental to both the plants, soil microbes and the soil structural stability.

Phosphorus (symbol P)

Phosphorus is an essential biological element and a non-renewable resource. It is an excellent component of modern detergents, but detrimental when discharged into waterways as it encourages growth of algae and bacteria ("blue-green algae"). When greywater is used for landscaping, plants can uptake the P and so reduce the need for P from other fertilisers. On sandy soils P may leach into groundwater. With care on heavy clay soils much of the P may be locked up in the soil and not be an environmental problem.

If your greywater system may impinge on a sensitive environment, you need to choose a product with a very low P. The "P" symbol on the packet is not a good indicator as some products marked "P" have relatively high levels of P. The "NP" symbol is a good indicator of extremely low (almost absent) P. See Figure F1 and T1 for P ratings.

Sulphur (symbol S)

Sodium sulphate is often used as a "manufacturing" agent, in other words a "filler". Detergents high in sulphur are more likely to have ingredients that may not be essential to a clean wash. Usually there is no indication on the packet to suggest high proportions of "filler" other than a big bulky box. Choose a concentrate and one with a small dose.

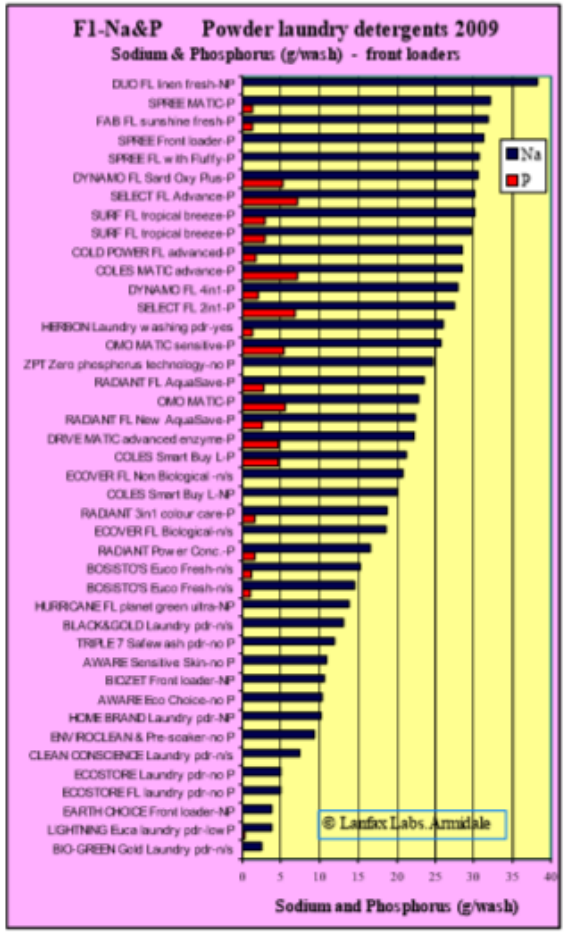
How much detergent to use.

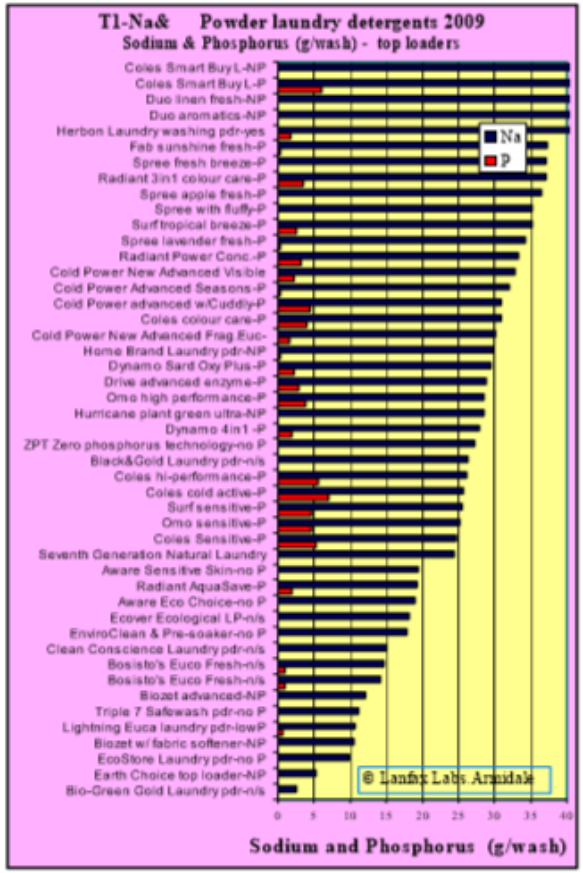
The "builder" in detergents (often sodium tripolyphosphate, or zeolite as a replacement) has to immobilise the "hardness" in water. Hardness is caused by calcium and magnesium in the water. Rainwater has almost none of these two elements and is "soft" water. Use less detergent than recommended in "soft" water. You may need to use more detergent in "very hard" water. How do you know if water is soft or hard?Hard water leaves a scum with soap.

Sodium (symbol Na)

Sodium is an element essential for all life, however, in elevated concentrations leads to serious plant water stress and potential soil structural instability. Laundry detergents that contain more than 20 g sodium per wash may be detrimental to plants and soil structure. In the figures F1 and T1, the lower the sodium the better. Take care with products over 20 g Na/wash by spreading greywater over a larger area, or dilute with the rinse water.

When in doubt, choose low sodium and no phosphorus.





WASH and RINSE efficiency

Whether you have a front loader or a top loader, the efficiency of the wash and rinse cycles are more important than the quantity of water used. Some powders are slow to fully dissolve so the particles will be difficult to wash from the clothes. Always try your own experiment and see how much detergent you need to a wash to your satisfaction. Be aware of great cleaning claims. Remember, the performance of your wash will depend upon the washing machine action, the hardness of your water, the temperature of the wash, and the quality of the detergent. They all go together for a clean wash.

DO

- ✓ Learn how your sewage management system works and its operational and maintenance requirements.
- ✓ Learn the location and layout of your sewage management system.
- ✓ Have your AWTS (if installed) inspected and serviced four times per year by an approved contractor. Other systems should be inspected at least once every year. Assessment should be applicable to the system design.
- ✓ Keep a record of desludgings, inspections, and other maintenance.
- ✓ Have your septic tank or AWTS desludged every three years to prevent sludge build up, which may 'clog' the pipes.
- ✓ Conserve water. Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.
- ✓ Discuss with your local council the adequacy of your existing sewage management system if you are considering house extensions for increased occupancy.

DON'T

- ✗ Don't let children or pets play on land application areas.
- ✗ Don't water fruit and vegetables with effluent.
- ✗ Don't extract untreated groundwater for cooking and drinking.
- ✗ Don't put large quantities of bleaches, disinfectants, whiteners, nappy soakers and spot removers into your system via the sink, washing machine or toilet.
- ✗ Don't allow any foreign materials such as nappies, sanitary napkins, condoms and other hygiene products to enter the system.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't install or use a garbage grinder or spa bath if your system is not designed for it.

Reducing water usage

Reducing water usage will lessen the likelihood of problems such as overloading with your septic system. Overloading may result in wastewater backing up into your house, contamination of your yard with improperly treated effluent, and effluent from your system contaminating groundwater or a nearby waterway.

Your sewage management system is also unable to cope with large volumes of water such as several showers or loads of washing over a short period of time. You should try to avoid these 'shock loads' by ensuring water use is spread more evenly throughout the day and week.

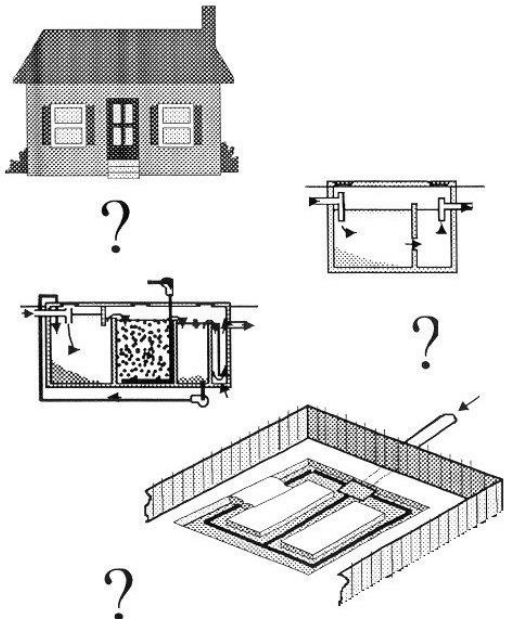
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained sewage management systems are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

By looking after your management system you can do your part in helping to protect the environment and the health of you and your community.

For more information please contact:

Managing Wastewater In Your Backyard



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