Onsite Sewage Disposal Assessment Report

839 Hill End Road
Erudgere, NSW, 2850

For

Terry Turner
10 Mona Road, Woodford NSW 2778

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Apr-14

(Our Reference: 20504 - ER01b)

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APPENDICES

1.0 INTRODUCTION

This report has been prepared by Barnson Pty Ltd on behalf of Terry Turner for submission to Mid Western Regional Council.

Barnson Pty Ltd has relied upon the soil sample, general project and site details provided by the client in this instance.

It is proposed that an effluent disposal system, incorporating a ***Conventional Bed Absorption System*** be fed from a septic tank holding system, and be constructed adjacent to the proposed residence and cottage.

The septic holding system will be supplied by ***A & A Worm Farm Systems*** *as preferred by client. Details of this particular system are shown in* ***Appendix E***

The system shall dispose of effluent from the proposed residence at 839 Hill End Road, Erudgere NSW, 2850.

The following geotechnical report analyses a septic tank method of disposal for the site, with reference to AS/NZS 1547-2012, "On-site Domestic-Wastewater Management". As such, this document shall incorporate the following:

- Site & soil evaluation report (in accordance with section 5 of AS/NZ 1547-2012);
- Design report (in accordance with Appendix L of AS/NZ 1547-2012).

Guidance and documentation should also been sought and used from the Environment & Health Protection Guidelines *"On-Site Sewage management For Single Households"* (OSMSH)

NOTE: *The easy septic guide issued by the NSW Department of Local Government should also be used to manage the septic system safely.*

2.0 SOIL & SITE ASSESSMENT FOR INDIVIDUAL LOTS

In order to analyse the on-site disposal of sewage, the following information has been obtained in accordance with ***Appendix D*** of AS/NZS 1547-2012.

2.1 Site Information

2.1.1 Location Details

Applicant:	Terry Turner
Address:	10 Mona Road, Woodford NSW 2778
Phone:	(m) 0429 811 490
Site:	839 Hill End Road, Erudgere NSW, 2850
Local Gov:	Mid Western Regional Council
No. of Bedrooms:	5 (cottage included)

2.1.2 Soil Type & Major Consideration

The soil sample was submitted by the client for analysis to the Barnson Pty Ltd NATA laboratory for testing. The sample was classified as **Orange Clayey Gravely Silt (ML).**

2.1.3 Geology of the Site

Reference to the New South Wales 1:250,000 Geological Series Sheet SI/55-4 indicates the area is underlain by *"Carbonaceous siltstone, quartz-lithic sandstone, conglomerate and coal lenses, rare varves"*.

2.1.4 Climate

Climate plays a large role in the suitability of land for effluent treatment infrastructure. When evaluating an area and the design of an effluent treatment facility there are two climatic factors that need to be considered. They are as follows for the Site:

- Annual Rainfall: 655.1mm
- Annual Evaporation: Unknown, though is expected to be greater than the annual rainfall.

Climate information has been obtained from the Bureau of Meteorology for the Mudgee Area.

2.1.5 Groundwater

Based on data obtained from the NSW Natural Resource Atlas website, www.nratlas.nsw.gov.au, there were approximately 3 boreholes established along Hill End Road near the Site. There is no current groundwater data for these 3 boreholes along Hill End Road, Erudgere, NSW.

2.1.6 Intended Water Supply

The intended water supply is from rainwater roof collection.

2.1.7 Preliminary Solution

Preliminary solution is a ***Conventional Bed Absorption System*** in this instance.

2.1.8 Site Evaluator

Name:	Matthew Brown
	Geotechnical Consultant/Director
Company:	Barnson Pty Ltd.
Address:	Unit 1/36 Darling Street Dubbo.
Phone:	1300 138 657
Fax:	(02) 6884 5857.

2.2 On-Site Evaluation

2.2.1 Work Undertaken

A visual assessment of the soil in conjunction with NATA soils properties laboratory testing. **Orange Clayey Gravely Silt (ML)** has been adopted in this instance.

2.2.2 Topography

Slope: Moderate fall to the north west

Geology: As suggested in section 2.1.3.

Drainage: Stormwater will run north towards Hill End road.

2.3 Soil Investigation

2.3.1 Soil Profile Determined

Method: Visual assessment of the soil and NATA soil properties laboratory testing. See reports attached in **Appendix A**.

2.3.2 Soil Type

The soil profile is **Orange Clayey Gravely Silt (ML)**

2.3.3 Estimated Soil Category

Category: 4 – Clayey Loam

2.3.4 Recommended DLR

DLR: 10mm/day, from Table 5.2 & L1 of AS/NZS1547:2012. (Conservative Rate)

2.3.5 General Comments

It is recommended that a ***Conventional Bed Absorption System***, be fed from a septic tank holding system adjacent to the proposed residence. The bed details are shown in ***Appendix B*** (Figures L5).

2.3.6 Seasonal Surface Movement:

The seasonal soil surface movement has been determined as per Barnson Pty Ltd report 20504-GR01a.

3.0 ANALYSIS

Barnson Pty Ltd has analysed the proposed septic effluent and liquid waste disposal unit in accordance with AS/NZS 1547-2012, "On-site Domestic-Wastewater Management".

3.1 Hydraulic Load

The following design flow-rate has been determined for the development, in accordance with the flow allowances shown in the Australian Standard AS/NZS1547:2012.

NOTE: *Number of persons = 2 persons for each of the first two bedrooms, then 1 person for each other bedroom.*

- Rain Water = 120L/person/day;
- Total = 7 persons x 120L/person/day = 840 L/day;

3.2 Length of Bed

The required bed length shall be determined from the relationship:

Length of Bed (L) = (Q) / (DLR x W)

Where:

Depth of Bed = 600mm (Max)

Width of Bed (W) = 2000mm;

Daily Flow (Q) = 840L (see above);

DLR = 10mm/day (see section 2.3.4);

Length of Bed (L) = (840L) / (10x2) = **42*m***

Septic Tank Capacity Calculation

(As per the NSW Health "Septic Tank and Collection Well Accreditation Guideline")

Septic tank capacity = Daily Flow + 1550 Litres = 840 + 1550 = 2390L

*NOTE: No allowance has been made for precipitation due to the higher annual evaporation (see section 2.1.4).

4.0 RECOMMENDATIONS

Barnson Pty Ltd analysed the required ***Conventional Bed Absorption System*** length for the proposed residence and cottage. Our calculations indicated that for a width of ***2000mm*** and a depth of ***600mm*** the bed should be a minimum of **42*m*** long. It is therefore our recommendations that two (2) beds be constructed parallel to each other, and be **21*m*** long each in accordance with AS1547-2012.

The system should consist of two (2) beds, each having two perforated pipes or self supporting arches of the above dimensions within each bed. Durable aggregate will surround the pipe with at least 150mm of topsoil, as shown in the attached sketch in ***Appendix B***.

The beds should be laid in accordance with the recommendations shown in ***Appendix B***. The final location of the beds shall be determined by the plumber installing the system, but should also comply with Mid Western Regional Council's setback requirements and/or the setbacks shown in ***Appendix C***.

Barnson has relied upon the information provided by the client in preparing this effluent disposal system design. Barnson will not be liable for the incorrect installation and/or construction of the system unless when inspected by Barnson the installation and construction of the system holds true to the design featured in this report.

As stated in AS1547-2012 section 5.5.3.4, a reserve absorption area of similar size to the current design should be considered as part of the risk management process to be available on a site for expansion or for resting of the land application system.

The septic tank shall be in accordance with Appendix J of AS/NZS 1547-2012 and have a minimum capacity of at least **3000L**.

Water conservation measures should be adapted to the greatest extent possible in the house, particularly in relation to the high water use activities of showering, clothes washing and toilet flushing. AAA rated plumbing appliances and fittings should be used. Measures including use of front loading washing machines, low volume shower roses and dual flush toilets can reduce water usage by 30 to 40%. Detergents low in phosphorous and sodium should be used as much as possible. Following these measures will ensure the greatest lifespan for this effluent treatment and disposal design.

All workmanship should comply with the relevant Australian Standards.

Barnson has not verified the accuracy or completeness of this data, except otherwise stated in this report. The recommendations for the proposed system as suggested in this report are based on data provided.

Barnson will not be liable in relation to incorrect recommendations should any information provided by the client be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed.

Please do not hesitate to contact the undersigned if you have enquires regarding this report.

Matthew Brown
Geotechnical Consultant
DIRECTOR

Luke Morris
BE MIE Aust CPEng
DIRECTOR

Appendix A
NATA Laboratory Testing Reports

barnson
DESIGN . PLAN . MANAGE
Barnson Pty Ltd A.C.N. 088 342 625

16L Yarrandale Road
Dubbo NSW 2830

Ph: 1300 138 657
Fax: (02) 6884 5857

Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For The Soil Index Properties

CLIENT: Terry and Lisa Turner
ADDRESS: 10 Mona Road, Woodford NSW 2778 — Reference: 20504-02
PROJECT: Septic Design
LOCATION: 839 Hill End Road, Erudgere NSW
DATE: 26/3/2014

Sample		1		
LIQUID LIMIT % Method: Standard [ ] One Point [ ] **As per AS 1289.3.1.1/3.1.2**	**WL**	32		
PLASTIC LIMIT % **As per AS 1289 3.2.1**	**WP**	17		
PLASTICITY INDEX % **As per AS 1289 3.3.1**	**IP**	15		
LINEAR SHRINKAGE % **As per AS 1289 3.4.1**	**LS**			
FIELD MOISTURE CONTENT AS1289.2.1.1	(%)			

Comments: Sample Supplied by Client to Laboratory

Sample Preparation:

Air Drying			Wet Sieving	
Oven Drying		x	Dry Sieving	x
Curling	Slight		Crumbling	
	Moderate			
	High			

Length of Linear Shrinkage Mould if Differs from 250mm: N/a

Pretreatment Method: T102 [ ] **CA3**
T103 [ ] **W**

Sample Prepared as per AS 1289.1.1. section 5.1 & 5.3.1
Soil moisture content was done as per AS1289.2.1.1

Approved Signatory: ______________ Date: 26.3.2014
Nick Reardon

NATA

Accredited for compliance with ISO/IEC 17025
Laboratory No. 9605

Barnson Pty Ltd A.C.N 088 342 625

16L Yarrandale Road
Dubbo NSW 2830

Ph: 1300 138 657
Fax: (02) 6884 5857

Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For The Emerson Class Number

CLIENT: Terry and Lisa Turner
ADDRESS: 10 Mona Road, Woodford NSW 2778
PROJECT: Septic Design
LOCATION: 839 Hill End Road, Erudgere NSW
DATE: 26/3/2014

Reference: 20504-03

Sample	1		
EMERSON CLASS NUMBER	6		
SOURCE OF MATERIAL	Field		
DATE OF SAMPLING	19/03/2014		
SOIL DESCRIPTION	Orange Clayey Gravely Silt		
TYPE & TEMPERATURE OF WATER USED	Distilled 25°C		

Comments: Sample Supplied by Client to Laboratory

Pretreatment Method: T102 **CA3**
T103 **W**

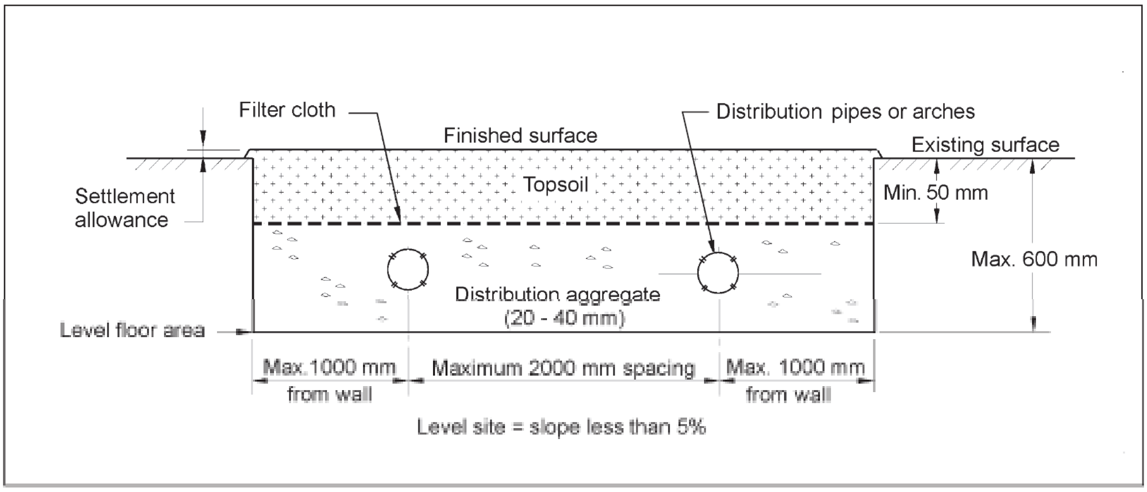
Sample Prepared as per AS 1289.1.1.
Determination of Emerson Class Number was as per AS 1289 3.8.1

Approved Signatory: **Nick Reardon** Date: 26.3.2014

NATA

Accredited for compliance with ISO/IEC 17025
Laboratory No. 9605

Appendix B
Typical Absorption Bed Detail



NOTE: LPED lines can be used instead of distribution pipes when dose loading effluent into beds.

FIGURE L5 CONVENTIONAL BED

Appendix C
Setback Requirements

TABLE R1
GUIDELINES FOR HORIZONTAL AND VERTICAL SETBACK DISTANCES
(to be used in conjunction with Table R2)

Site feature	**Setback distance range** (m) (See Note 1)	**Site constraint items of specific concern** (from Table R2) (see Note 1)
	Horizontal setback distance *(m)*	
Property boundary	1.5 – 50 (see Note 2)	A, D, J
Buildings/houses	2.0 – > 6 (see Note 3)	A, D, J
Surface water (see Note 4)	15 – 100	A, B, D, E, F, G, J
Bore, well (see Notes 5 and 6)	15 – 50	A, C, H, J
Recreational areas (Children's play areas, swimming pools and so on) (see Note 7)	3 – 15 (see Notes 8 and 9)	A, E, J
In-ground water tank	4 – 15 (see Note 10)	A, E, J
Retaining wall and Embankments, escarpments, cuttings (see Note 11)	3.0 m or 45° angle from toe of wall (whichever is greatest)	D, G, H
	Vertical setback distance *(m)*	
Groundwater (see Notes 5, 6, and 12)	0.6 – > 1.5	A, C, F, H, I, J
Hardpan or bedrock	0.5 – ≥ 1.5	A, C, J

NOTES:

1 The overall setback distance should be commensurate with the level of risk to public health and the environment. For example, the maximum setback distance should be adopted where site/system features are on the high end of the constraint scale. The setback distance should be based on an evaluation of the constraint items and corresponding sensitive features in Table R2 and how these interact to provide a pathway or barrier for wastewater movement.

2 Subject to local regulatory rules and design by a suitably qualified and experienced person, the separation of a drip line system from an upslope boundary, for slopes greater than 5%, may be reduced to 0.5 m.

TABLE R1
GUIDELINES FOR HORIZONTAL AND VERTICAL SETBACK DISTANCES
(to be used in conjunction with Table R2) (continued)

3	Setback distances of less than 3 m from houses are appropriate only where a drip irrigation land application system is being used with low design irrigation rates, where shallow subsurface systems are being used with equivalent low areal loading rates, where the risk of reducing the bearing capacity of the foundation or damaging the structure is low, or where an effective barrier (designed by a suitably qualified and experienced person) can be installed. This may require consent from the regulatory authority.
4	Setback distance from surface water is defined as the areal edge of the land application system to the edge of the water. Where land application areas are planned in a water supply catchment, advice on adequate buffer distances should be sought from the relevant water authority and a hydrogeologist. Surface water, in this case, refers to any fresh water or geothermal water in a river, lake, stream, or wetland that may be permanently or intermittently flowing. Surface water also includes water in the coastal marine area and water in man-made drains, channels, and dams unless these are to specifically divert surface water away from the land application area. Surface water excludes any water in a pipe or tank.
5	Highly permeable stony soils and gravel aquifers potentially allow microorganisms to be readily transported up to hundreds of metres down the gradient of an on-site system (see R3, Table 1 in Pang et al. 2005). Maximum setback distances are recommended where site constraints are identified at the high scale for items A, C, and H. For reading and guidance on setback distances in highly permeable soils and coarse-grained aquifers see R3. As microbial removal is not linear with distance, data extrapolation of experiments should not be relied upon unless the data has been verified in the field. Advice on adequate buffer distances should be sought from the relevant water authority and a hydrogeologist.
6	Setback distances from water supply bores should be reviewed on a case-by-case basis. Distances can depend on many factors including soil type, rainfall, depth and casing of bore, direction of groundwater flow, type of microorganisms, existing quality of receiving waters, and resource value of waters.
7	Where effluent is applied to the surface by covered drip or spray irrigation, the maximum value is recommended.
8	In the case of subsurface application of primary treated effluent by LPED irrigation, the upper value is recommended.
9	In the case of surface spray, the setback distances are based on a spray plume with a diameter not exceeding 2 m or a plume height not exceeding 0.5 m above finished surface level. The potential for aerosols being carried by the wind also needs to be taken into account.
10	It is recommended that land application of primary treated effluent be down gradient of in-ground water tanks.
11	When determining minimum distances from retaining walls, embankments, or cut slopes, the type of land application system, soil types, and soil layering should also be taken into account to avoid wastewater collecting in the subsoil drains or seepage through cuts and embankments. Where these situations occur setback clearances may need to be increased. In areas where slope stability is of concern, advice from a suitably qualified and experienced person may be required.
12	Groundwater setback distance (depth) assumes unsaturated flow and is defined as the vertical distance from the base of the land application systems to the highest seasonal water table level. To minimise potential for adverse impacts on groundwater quality, minimum setback distances should ensure unsaturated, aerobic conditions in the soil. These minimum depths will vary depending on the scale of site constraints identified in Table R2. Where groundwater setback is insufficient, the ground level can be raised by importing suitable topsoil and improving effluent treatment. The regulatory authority should make the final decision in this instance. (See also the guidance on soil depth and groundwater clearance in Tables K1 and K2.)

TABLE R2

SITE CONSTRAINT SCALE FOR DEVELOPMENT OF SETBACK DISTANCES

(used as a guide in determining appropriate setback distances from ranges given in Table R1)

Item	Site/system feature	Constraint scale (see Note 1) LOWER ←→ HIGHER Examples of constraint factors (see Note 2)		Sensitive features
A	Microbial quality of effluent (see Note 3)	Effluent quality consistently producing ≤ 10 cfu/100 mL *E. coli* (secondary treated effluent with disinfection)	Effluent quality consistently producing ≥ 10^6 cfu/100 mL *E. coli* (for example, primary treated effluent)	Groundwater and surface pollution hazard, public health hazard
B	Surface water (see Note 4)	Category 1 to 3 soils (see Note 5) no surface water down gradient within > 100 m, low rainfall area	Category 4 to 6 soils, permanent surface water <50 m down gradient, high rainfall area, high resource/environmental value (see Note 6)	Surface water pollution hazard for low permeable soils, low lying or poorly draining areas
C	Groundwater	Category 5 and 6 soils, low resource/environmental value	Category 1 and 2 soils, gravel aquifers, high resource/environmental value	Groundwater pollution hazard
D	Slope	0 – 6% (surface effluent application) 0 – 10% (subsurface effluent application)	> 10% (surface effluent application), > 30% subsurface effluent application	Off-site export of effluent, erosion
E	Position of land application area in landscape (see Note 6).	Downgradient of surface water, property boundary, recreational area	Upgradient of surface water, property boundary, recreational area	Surface water pollution hazard, off-site export of effluent
F	Drainage	Category 1 and 2 soils, gently sloping area	Category 6 soils, sites with visible seepage, moisture tolerant vegetation, low lying area	Groundwater pollution hazard
G	Flood potential	Above 1 in 20 year flood contour	Below 1 in 20 year flood contour	Off-site export of effluent, system failure, mechanical faults
H	Geology and soils	Category 3 and 4 soils, low porous regolith, deep, uniform soils	Category 1 and 6 soils, fractured rock, gravel aquifers, highly porous regolith	Groundwater pollution hazard for porous regolith and permeable soils
I	Landform	Hill crests, convex side slopes, and plains	Drainage plains and incise channels	Groundwater pollution hazard, resurfacing hazard
J	Application method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	Off-site export of effluent, surface water pollution

NOTES:

1 Scale shows the level of constraint to siting an on-site system due to the constraints identified by SSE evaluator or regulatory authority. See Figures R1 and R2 for examples of on-site system design boundaries and possible site constraints.

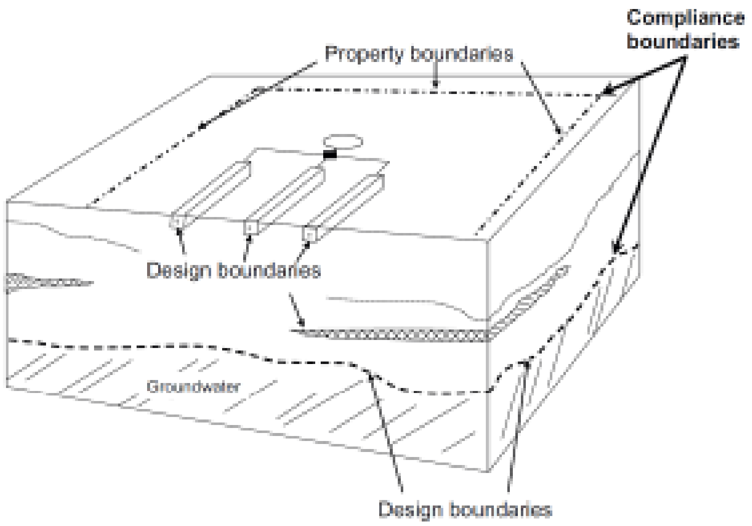
2 Examples of typical siting constraint factors that may be identified either by SSE evaluator or regulatory authority. Site constraints are not limited to this table. Other site constraints may be identified and taken into consideration when determining setback distances.

TABLE R2

SITE CONSTRAINT SCALE FOR DEVELOPMENT OF SETBACK DISTANCES

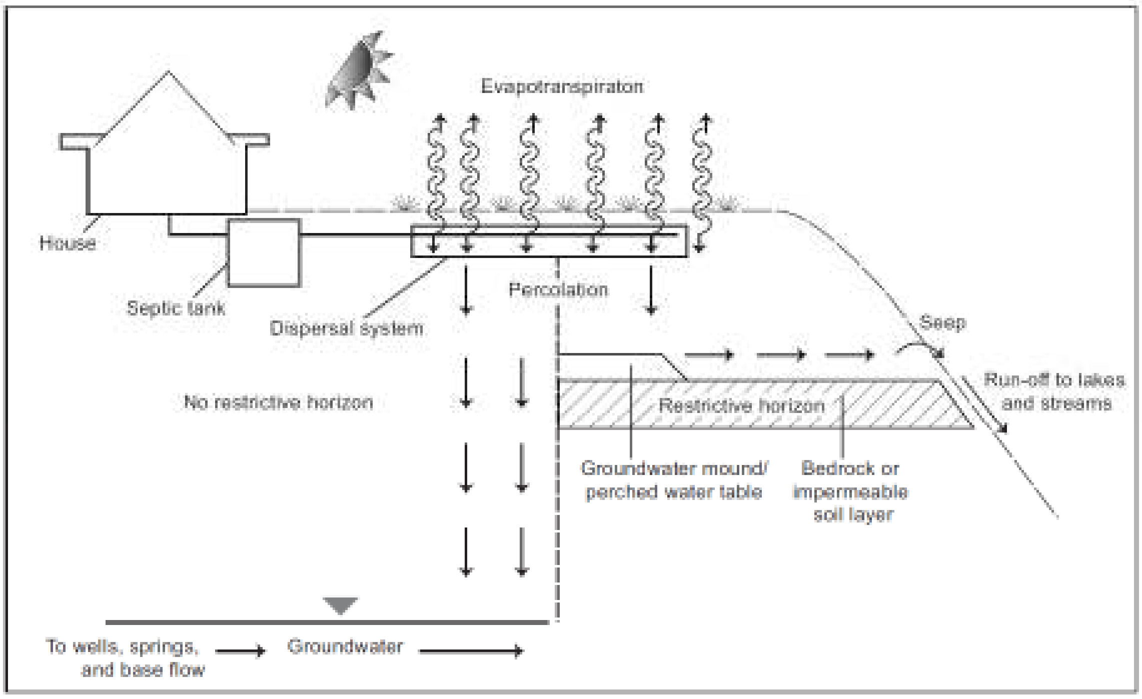
(used as a guide in determining appropriate setback distances from ranges given in Table R1) (continued)

3	The level of microbial removal for any on-site treatment system needs to be determined and it should be assumed that unless disinfection is reliably used then the microbial concentrations will be similar to primary treatment. Low risk microbial quality value is based on the values given in ARC (2004), ANZECC and ARMCANZ (2000), and EPA Victoria (*Guidelines for environmental management: Use of reclaimed water* 2003).
4	Surface water, in this case, refers to any fresh water or geothermal water in a river, lake, stream, or wetland that may be permanently or intermittently flowing. Surface water also includes water in the coastal marine area and water in man-made drains, channels, and dams unless these are to specifically divert surface water away from the land application area. Surface water excludes any water in a pipe or tank.
5	The soil categories 1 to 6 are described in Table 5.1. Surface water or groundwater that has high resource value may include potable (human or animal) water supplies, bores, wells, and water used for recreational purposes. Surface water or groundwater of high environmental value include undisturbed or slightly disturbed aquatic ecosystems as described in ANZECC and ARMCANZ (2000).
6	The regulatory authority may reduce or increase setback distances at their discretion based on the distances of the land application up or downgradient of sensitive receptors.



(Adapted from USEPA 2002)

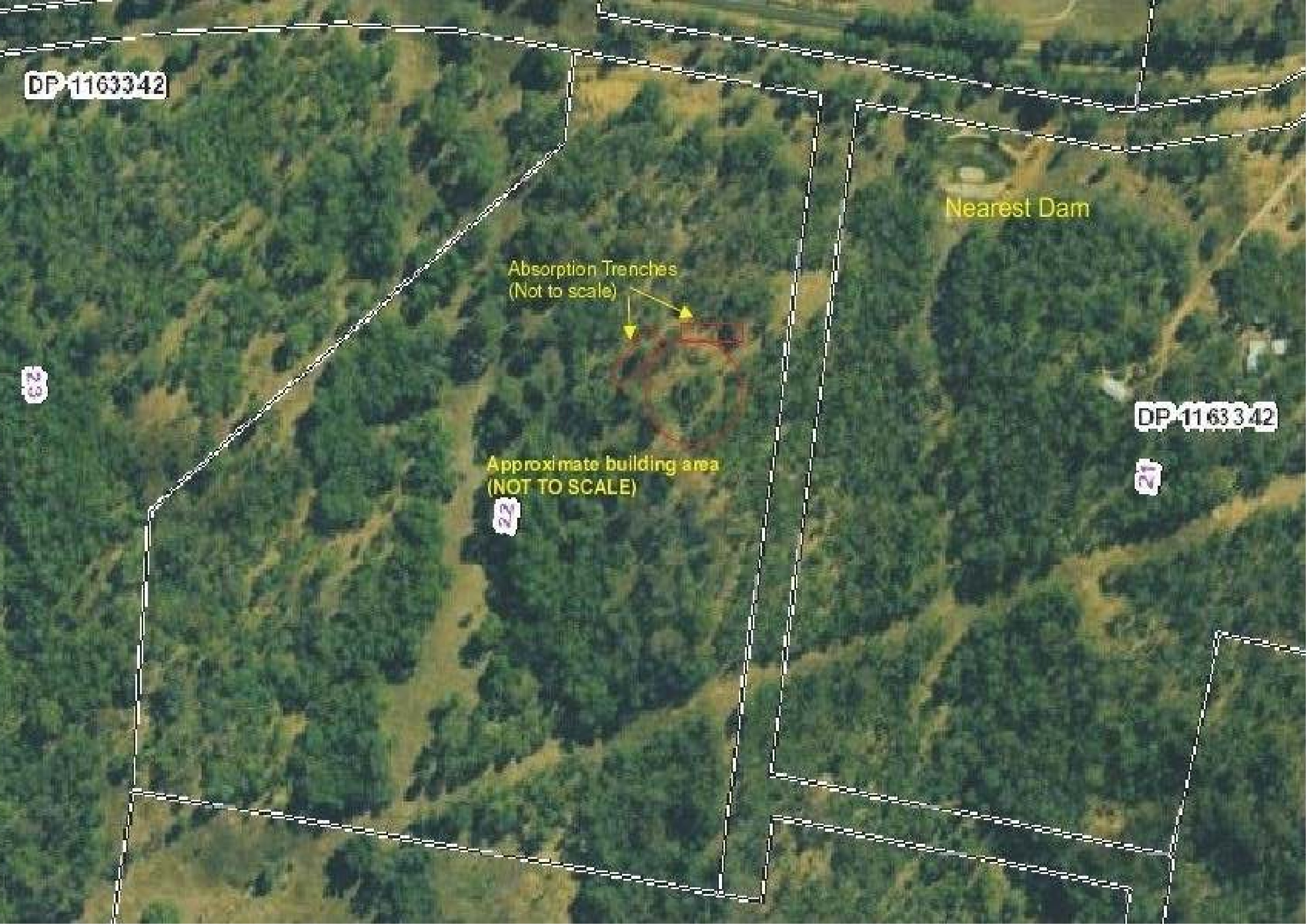
FIGURE R1 EXAMPLE OF DESIGN AND COMPLIANCE BOUNDARIES FOR APPLICATION OF SETBACK DISTANCES FOR A SOIL ABSORPTION SYSTEM

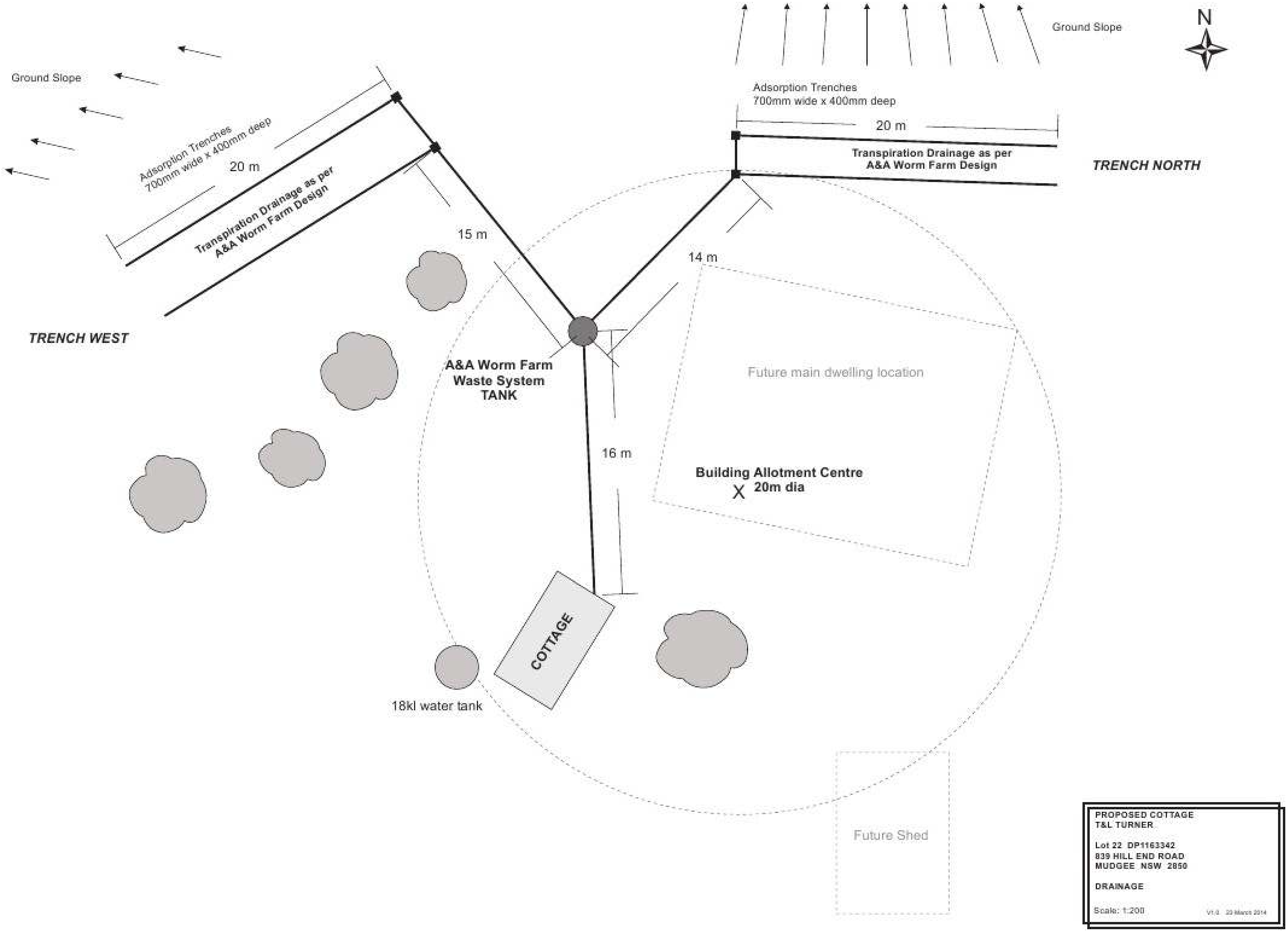


(Adapted from Venhuizen 1995)

FIGURE R2 EXAMPLE OF WASTEWATER PATHWAYS AND SITE CONSTRAINTS FOR APPLICATION OF SETBACK DISTANCES FOR A SOIL ABSORPTION SYSTEM

Appendix D
Site Plan


DP 1163342
Nearest Dam
Absorption Trenches
(Not to scale)
DP 1163342
23
Approximate building area
(NOT TO SCALE)
22
21



PROPOSED COTTAGE
T&L TURNER

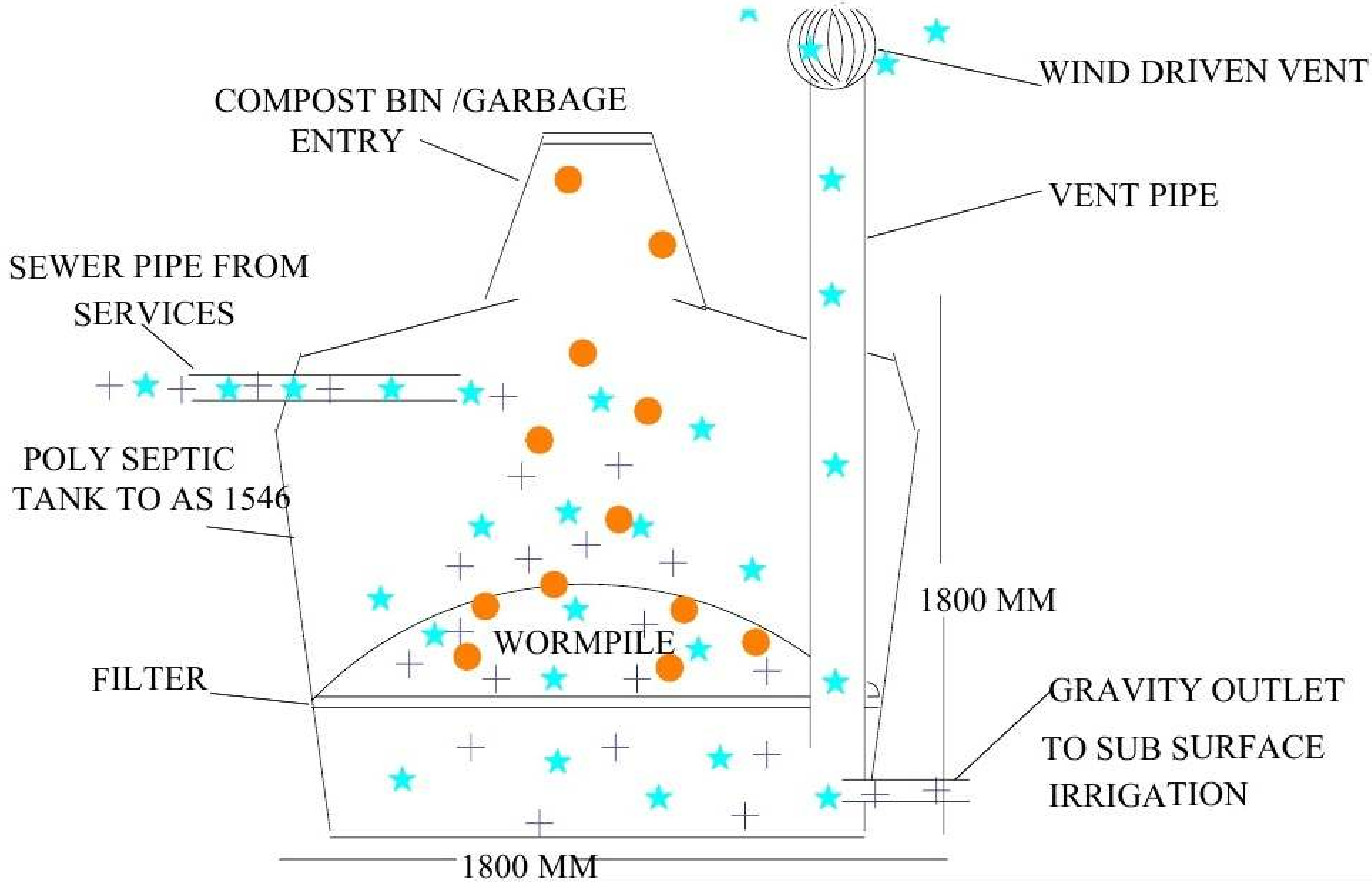
Lot 22 DP1163342
839 HILL END ROAD
MUDGEE NSW 2850

DRAINAGE

Scale: 1:200 V1.0 23 March 2014

Appendix E

Wormfarm Septic Holding



A & A WORMFARM WASTE SYSTEMS			
8-2-2002	PT 1800 LG	WATER FLOW +	GARBAGE
DIA8	NOT SCALED	AIR FLOW ★	