Broadcrest Environmental Pty Ltd

22 Cicada Glen Road, Ingleside NSW

On-Site Wastewater Report

February 2025

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Approval and Authorisation

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Signed:	
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CONTENTS

1 INTRODUCTION

1.1 Foreword

An On-Site Wastewater Report is a technical document which specifies how the sewage produced on-site will be managed, treated, and then disposed. An On-Site Wastewater Report carefully considers the environment, health, cost, and long-term management options for the on-site management of sewage.

1.2 Background

Broadcrest Environmental Pty. Ltd. was engaged by Elcom Developments Group PTY LTD to produce an On-Site Wastewater Management Report at 22 Cicada Glen Road, Ingleside NSW (the site). The report will accompany a proposal for a single (KDR) 4-bedroom dwelling. A site inspection was carried out on 12 September 2024 which involved a visual assessment of the site and soil sampling. The assessment of the results, system design and recommendations are detailed in this report.

1.3 Objectives

The performance objectives of the On-Site Wastewater Assessment are to:

- Protect human health
- Protect ground and surface water
- Maintain and enhance the quality of the land and vegetation
- Maintain and enhance community amenity
- Ensure maximum re-use of resources
- Promote an ecologically sustainable development.

1.4 Scope of Works

The scope of works included the following:

- A site inspection
- Soil sampling and analysis
- Wastewater management assessment
- Drafting of the proposed system
- Reporting in accordance with the associated legislations and guidelines.

1.5 Compliance

This report has been produced in accordance with the following guiding documents:

- DLG 1998, On-site Sewerage Management for Single Households
- SCA 2012, Designing and Installing On-Site Wastewater Systems
- Australian Standard AS 1289.3.8.1:2006 Methods for testing soils for engineering purposes
- Australian Standard AS 1546.1-3:2008 On-site domestic wastewater treatment units
- Australian Standard AS 1547:2012 On-site domestic wastewater management

2 SITE ASSESSMENT & INVESTIGATION

2.1 Site Information

Address / Locality	22 Cicada Glen Road, Ingleside NSW
Lot Area:	1616 m2
Zoning:	RU2 Rural Landscape
Council / LGA:	Northern Beaches Council
Intended Water Supply:	Town Water
Inspection Officer:	Kyle Ryan - 12 September 2024

2.2 General

At the time of inspection, the site was occupied by a single dwelling situated centrally within the lot. The dwelling was surrounded by rockery gardens, lawns, and native bushland. Wastewater generated within the dwelling was being secondary treated in a BioCycle AWTS before being spray irrigated onto lawns and garden beds.

The proposed development consists of a knock down of the existing dwelling and construction of a new 4-bedroom dwelling on similar footprint.

It is proposed to continue utilising the existing BioCycle AWTS under the provisor that it can be verified by a suitably licensed plumber that the unit is working adequately and will not be damaged during the demolition / construction process. If this cannot be confirmed, it is proposed to install a new NSW Health Accredited AWTS.

Rock outcropping was evident and widespread on the high side of site (northeast) which has been avoided for effluent management purposes. Greater soil depth and a more suitable location was identified along the rear (western) side of the lot (landform of the proposed EMA). (See Figure 2-1).

Effluent Disposal is proposed to occur via a single 14.5m long Pressure Dosed Absorption Bed constructed on the apex of the hill at the rear of site (See Figure 2.1) where soil depth is maximal. The surface elevation here is variable as is the depth to bedrock. Accordingly, it is proposed to cut and fill as required to construct a suitable base whilst retaining a minimum 600mm separation distance from the base of the absorption bed to bedrock. An indicative cross section design has been produced to provide guidance (Appendix A2).

Figure 2-1: Photograph over part of proposed EMA

2.3 Assessment Methodology

The assessment methodology of this report follows that prescribed in DLG (1998), whereby the restriction imposed by a site/soil features are categorised by severity, and their impact forms the basis for subsequent system selection, design, and recommendations (Table 2.3.1).

Table 2.3.1 - Site / soil limitation assigned per DLG (1998)

Limitation	Description
Minor	This feature has been assessed and deemed to pose no obstacle to OSSM, given the recommended system and measures are implemented.
Moderate	This feature requires consideration. It may typically be overcome by site modifications or by appropriate selection, design and sizing of treatment / application systems.
Major	This feature precludes the use of a given treatment, land application method, or Effluent Management Area (EMA). Particular Major Limitations may prevent OSSM entirely, require an off-site management approach, or re-evaluation of the development scope.

2.4 Assessment Summary

A summary of limitations pertinent to the suitability of the site for On-Site Sewerage Management (OSSM) is provided in Table 2.4.1 below.

Table 2.4.1 – Assessment summary of site features

Factor Assessed	Description	Limitation
Climate	Evaporation exceeds precipitation during all months of the year	*Minor*
Temperature	Annual mean daytime maximum > 15°C.	*Minor*
Flood Potential	No flood study or flood levels have been provided. The site is located above any anticipated flood level.	*Minor*
Exposure	The proposed effluent management area (EMA) is well exposed to sun and wind	*Minor*
Slope	Gently Inclined: 3.9% waxing to 19.5%	*Moderate*
Landform	Slope Classification: Waxing divergent Morphological Type: Upper slope	*Minor*
Run-on and Seepage	Stormwater run-on is not anticipated to have an impact on the proposed EMA.	*Minor*
Site-drainage	Soils are Rapidly drained - excess water flows downward into coarse shallow soil material of moderate gradient	*Moderate*
Erosion Potential	The Landform within the proposed EMA is stabilised - no evidence of sediment movement, surface is vegetated	*Minor*
Site and Soil Disturbances	The landform will be modified with the removal of the existing dwelling and further modifications are proposed to construct a level base for the EMA.	*Moderate*
Groundwater Bores	No domestic groundwater bores have been identified within 250 m of the site. The nearest bore is Stock and Domestic bore GW115808.1.1 located approximately 1520 m from the site.	*Minor*
Rock Outcropping	Widespread rock outcropping on site but has been avoided for placement of the EMA	*Moderate*
Geology & Regolith	No geological discontinuities, fractures, or highly porous regolith are expected within and surrounding the EMA	*Minor*
Buffer Distances & Available land area	Reduced Buffers area proposed to: Downslope Lot Boundaries	*Moderate*

2.5 Climate

22 Cicada Glen Road, Ingleside NSW has a temperate climate with dry winters and a wetter summer. Median annual rainfall of 693.8mm and evaporation 1,569.5mm. (Appendix B1) (*Minor Limitation)*.

Average maximum temperatures range from 17.8°C to 30.5°C in July and January respectively. Average minimum temperatures range from 3.5°C to 17.9°C in July and January respectively. The mean annual daytime maximum of 24.3°C proves suitable for biological wastewater treatment systems (i.e. AWTS) (*Minor Limitation*).

2.6 Flood potential

No flood study or flood levels have been provided. The site is located above any anticipated flood level. *(Minor Limitation)*.

2.7 Exposure

The proposed effluent management area (EMA) is well exposed to sun and wind.

Table 2.7.1 – Site Exposure

Landform Feature	Aspect	Solar Exposure	Wind Exposure	Limitation
A	Western	Good	Good	*Minor*

2.8 Slope

Slope has the potential to become a restrictive landform feature for OSSM with increased slope increasing the risk of run-off and/or erosion. Slope within the proposed effluent management was determined via survey/lidar mapping (See Table 2.8.1).

Table 2.8.1 – Site Slope

Landform Feature	Approximate Slope Tangent (%)	Slope Classification	Limitation
A	3.9% waxing to 19.5%	Gently Inclined	*Moderate*

To mitigate the moderate limitation of slope within the EMA, the system has been designed maximal in length to minimise the linear loading rate (L/m/day) imparted on the soil.

Table 2.8.2 - Percentage Slope and Land Application Limitations

Slope Range [%]	Slope Classification	Limitation				
		Surface Irrigation (Spray & Drip)	Absorption Systems	Mounds	Conventional Trenches & LPEDs	Sub-surface Irrigation
0 – 1	Level	Minor	Minor	Minor	Minor	Minor
1 – 3	Very Gently Inclined	Minor	Minor	Minor	Minor	Minor
3 – 10	Gently Inclined	Minor	Minor	Minor	Minor	Minor
10 – 15	**Moderately Inclined**	**Major**	**Major**	**Moderate**	**Moderate**	**Minor**
15 – 20		**Major**	**Major**	**Major**	**Moderate [2]**	**Minor**
> 20	Steeply Inclined	Major	Major	Major	Moderate [3]	Moderate [1]

[1] 30% maximum slope without specific design (AS 1547:2012, p.133)
[2] >15% slope increase difficulty in construction (AS 1547:2012, Table K1)
[3] >25% slope creates difficulty in trenching, risk of erosion during construction (AS 1547:2012, Table K1)

2.9 Landform

The landform describes the surface shape and topographic position at the proposed EMA. Typical landform descriptors per AS1547:2012 are detailed below.

Table 2.9.1 – Landform Configuration

Landform Feature	Slope Configuration	Morphology	Limitation
A	Waxing divergent	Upper slope	*Minor*

2.10 Surface Water and Seepage

Surface water and seepage flow is determined by the catchment preceding the EMA and the prevailing landform features. General assessment of the likely surface water interaction with the landform and EMA has been provided.

Table 2.10 – Site surface water

Landform Feature	Catchment		Surface Flow		Soil Moisture	Seepage Potential	Limitation
	Size	Surface Coverage	Run-on	Run-off			
A	Minor	Grass	Minor	Minor	Slightly Moist	Minor	*Minor*

Stormwater run-on is not anticipated to have an impact on the proposed EMA.

2.11 Site drainage

At the time of inspection soils appeared to be rapidly drained - excess water flows downward into coarse shallow soil material of moderate gradient. *(Moderate Limitation).* It is proposed to maximise the disposal length to reduce effluent concentration as mitigation against off-site export of effluent.

2.12 Erosion potential

Erosion and surface soil movement results from the interaction of the existing landform, surface flows and surface coverage. The following existing erosion conditions were identified and assessed in proposing additional hydraulic loading in the form of effluent.

Table 2.12.1 – Site erosion potential

Landform Feature	Surface Flow Type	Erosion Hazard		Limitation
		Surface Flow	Wind	
A	Unconcentrated	Minor	Minor	*Minor*

The Landform within the proposed EMA is stabilised - no evidence of sediment movement, surface is vegetated.

2.13 Site & Soil Disturbances

The landform will be modified with the removal of the existing dwelling and further modifications are proposed to construct a level base for the EMA. The owner is to ensure that the EMA surface is vegetated with dense low growing vegetation prior to commissioning *(Moderate Limitation).*

2.14 Domestic Bore

No domestic groundwater bores have been identified within 250 m of the site. The nearest bore is Stock and Domestic bore GW115808.1.1 located approximately 1520 m from the site. (*Minor Limitation*).

2.15 Rock Outcropping

Rock outcropping has been identified across the site and generally avoided for the purposes of effluent management. To permit adequate basal clearance from a pressure dosed absorption system to the underlying bedrock, some soil importation will be required (*Moderate Limitation)*.

2.16 Geology / Regolith

No geological discontinuities, fractures, or highly porous regolith are expected within and surrounding the EMA (*Minor Limitation*).

2.17 Buffer Distances & Available Land Area

Minimum offset distances are designated by local approval authorities within their guiding documents to ensure the ongoing protection of community health, sensitive ecosystems, and the maintenance of community amenity. Where LGA guidance on a constraint is not available, appropriate offsets have been nominated in accordance with AS1547:2012 and Table 5 DLG (1998).

The site-specific constraints for the proposed EMA and land application method have been assessed as per Table 2.17.1.

Table 2.17.1 – Minimum buffer distances from sensitive site features

Site Feature	Minimum Setback		Proposed Setback: EMA Upslope/Downslope	Limitation
	If EMA is upslope of feature	If EMA is downslope / level with feature		
Dwellings	6m	3m	>6/3m	*Minor*
Property Boundaries	12m	6m	7.5/6m	*Moderate*
Driveways	6m	3m	>6/3m	*Minor*
Buildings	6m	3m	>6/3m	*Minor*
Pools / recreation	6m		>6m	*Minor*
Inground Potable Rainwater Tanks	10m		>10m	*Minor*
Watercourses	100m		>100m	*Minor*
Domestic Bore / Well	250m		1521m	*Minor*
Dam / Drainage Depression	40m from high water level		>40m	*Minor*

2.18 Constraint factors associated with proposed reduced buffers.

Reduced buffers to site features are proposed to accommodate the EMA. The constraints associated with the reduced buffers are evaluated in accordance with Table R1 & R2 of Appendix R of AS1547 – 2012 – excerpt below.

Table 2.18.2 – System constraints on impacted buffer & associated sensitive site features.

Impacted Buffer		Downslope Lot Boundaries			
Item	Site/System Feature	Constraint Scale		Sensitive Features	Constraint
		Lower	Higher		
A	Microbial Quality of Effluent	Effluent quality consistently producing ≤ 10 cfu/100 mL E. coli (secondary treated effluent with disinfection)	Effluent quality consistently producing ≥ 10 cfu/100 mL E. coli (primary treated effluent)	• Groundwater and surface pollution hazard, • public health hazard	Low
D	Slope	0 – 10% (subsurface effluent application)	> 10% (surface effluent application), > 30% subsurface effluent application	• Off-site export of effluent • erosion	Moderate (4% Waxing to 20%)
J	Application method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	• Off-site export of effluent, • surface water pollution	*Low*

2.19 Mitigations to proposed reduction in EMA setbacks

The matrix indicates a moderate constraint factor for items D, concerning the effect that the Slope of landform between the proposed EMA and the Downslope Lot Boundary is having on the potential for effluent to be transported off the site.

The following design mitigations to off-site export of effluent have been applied:

- Linear loading rate has been minimised by maximising the length of the proposed system, as much as possible given the site landscape. The design linear loading rate of the system is up to 72L/m length, which is less than maximum loading rate of 99L/m required to prevent effluent seepage from resurfacing downslope of the disposal location.
- Even effluent distribution over the entire system length is proposed to be achieved via pressure dosing.

It is proposed that given the site constraints identified, the existing landform, and the proposed design measures - the proposed buffer of 7.5m from the Proposed EMA to the Downslope Property boundary sufficiently restricts the potential for effluent to leave the site.

3 SOIL ASSESSMENT

3.1 Soil Assessment Summary

Investigation of the site for suitability for OSSM was accompanied by soil assessment within the proposed EMA. Soil characteristics were assessed and determined by Broadcrest Environmental In-house Testing in accordance with AS 1547:2012, AS 1289.3.8.1:2006, NSW DLG (1998) methodologies. A summary of the soil investigation is presented in Table 3.1.1.

Table 3.1.1 – Assessment summary of site features

Factor Assessed	Description	Limitation
Depth to bedrock / hardpan	A depth of 0.8-1.0m was encountered before termination	*Moderate*
Depth to high watertable	No free water or waterlogging characteristics	*Minor*
Coarse Fragments	< 10% across all upper strata	*Minor*
pH	>5.5 across all samples	*Minor*
Electrical Conductivity (EC)	< 4 dS/m across all samples.	*Minor*
Dispersiveness (EAT_m)	3+. Non-critical with respect to OSSM	*Minor*

3.2 Soil Landscape Map

1:100,000 Soil Landscape Mapping indicates the site occurs on the Oxford Falls Soil Landscape. The Landscape features hanging valleys on Hawkesbury Sandstone. Local relief <80 m, slopes <15%. Occasional broad benches and broken scarps, valley floors are relatively wide, gently inclined and often poorly drained. Low eucalypt woodland, scrub, heathland and sedgeland.

Typical soil profile: Up to 30 cm of dark brown, loose loamy sand overlies 20–100 cm of earthy, yellowish-brown clayey sand which often overlies 3–20 cm of friable sandstone

Site and soil assessment conformed to the Soil Landscape Mapping.

3.3 Depth to Bedrock / Hardpan

Soil depth was ascertained via extraction of five (5) boreholes within the potential EMA's identified. Borehole drilling was conducted using a UD50 thin wall tube. A depth of 0.8-1.0m was encountered before termination within the final area nominated (*Moderate Limitation).* However, soil depth is predicted to be variable. As such, it is proposed to cut and fill the EMA as required to maintain 600mm basal clearance to bedrock – preferentially sourced from topsoil stripping elsewhere on site for home / driveway construction. Where on-site cut is insufficient, import clean Sandy Loam Excavated Natural Material (ENM).

3.4 Depth to High Watertable

No free water or waterlogging characteristics; no soil saturation, grey mottling or similar was encountered within the sampling depth *(Minor Limitation).*

3.5 Soil Permeability Category

Soil permeability has been assigned per Table 5.2 of AS1547:2012 for the excavation site(s) most representative of the EMA location. The hydraulically limiting strata for the application system is bolded within Table 3.5.1 below.

Table 3.5.1: Soil permeability and Design Loading Rate (DLR) (Secondary)

Excavation #		BH 1-5		
Lower Depth (mm)	Field Texture	Structure	Indicative Permeability K_{sat} (m/day)	Design Loading Rate (DLR) (Secondary) (mm/day)
600 - 1000	**Sandy Loam**	**Massive**	**1.4 - 3**	**50**
800 - 1200+	Sand	Massive	>3.0	50

3.6 Soil Profiles

Table 3.6.1						
Excavation #	BH1	Sample size:	50	[mm]	Date Completed:	12/09/2024
Inspection Method:	thin wall tube				Water-table Encountered:	No

Layer Horizon	Lower Depth [mm]	Moisture	Colour	Field Texture	Structure	Coarse Fragment
1	700	Slightly Moist	Brown	Sandy Loam	Massive	<5%
2	1000	Slightly Moist	Brown	Sand	Massive	<5%
Refusal:	Refusal encountered on underlying sandstone bedrock					
Photo:						

Table 3.6.2						
Excavation #	BH2	Sample size:	50	[mm]	Date Completed:	12/09/2024
Inspection Method:	thin wall tube				Water-table Encountered:	No

Layer Horizon	Lower Depth [mm]	Moisture	Colour	Field Texture	Structure	Coarse Fragment
1	600	Slightly Moist	Brown	Sandy Loam	Massive	<5%
2	800	Slightly Moist	Orange, Brown	Sand	Massive	<5%
Refusal:	Refusal encountered on underlying sandstone bedrock					
Photo:						

Table 3.6.3						
Excavation #	BH3	Sample size:	50	[mm]	Date Completed:	12/09/2024
Inspection Method:	thin wall tube				Water-table Encountered:	No

Layer Horizon	Lower Depth [mm]	Moisture	Colour	Field Texture	Structure	Coarse Fragment
1	1000	Slightly Moist	Brown	Sandy Loam	Massive	<5%
2	1200	Slightly Moist	Yellow Brown	Clayey Sand	Weak	<5%
Refusal:	Refusal encountered on underlying sandstone bedrock					
Photo:						

Table 3.6.4						
Excavation #	BH4	Sample size:	50	[mm]	Date Completed:	12/09/2024
Inspection Method:	thin wall tube				Water-table Encountered:	No

Layer Horizon	Lower Depth [mm]	Moisture	Colour	Field Texture	Structure	Coarse Fragment
1	700	Slightly Moist	Brown	Sandy Loam	Massive	<5%
2	1200	Slightly Moist	Orange, Brown	Sand	Massive	<5%
Refusal:	Refusal encountered on underlying sandstone bedrock					
Photo:						

Table 3.6.5						
Excavation #	BH5	Sample size:	50	[mm]	Date Completed:	12/09/2024
Inspection Method:	thin wall tube				Water-table Encountered:	No

Layer Horizon	Lower Depth [mm]	Moisture	Colour	Field Texture	Structure	Coarse Fragment
1	900	Slightly Moist	Brown	Loamy Sand	Massive	<5%
2	1200	Slightly Moist	Brown	Sandy Loam	Massive	<5%
Refusal:	Refusal encountered on underlying sandstone bedrock					
Photo:	Some soil loss was observed at this sample location					

3.7 Soil Chemistry

Topsoil and sub-soil samples were collected from BH2 (one (1) each total) for In-house physical and chemical property anaylsis by Broadcrest Environmental. A summary is shown below:

Table 3.7.1: Soil Chemistry results

Excavation #		BH2			
Sample Depth (mm)	Test	Result	Description	Limitation	Recommendations
300	pH	6.17	Slightly Acidic	Minor	Nil.
	EC (dS/cm)	0.30	Non-saline	Minor	Nil.
	EAT_m	3 - 8	Slight to Non-Dispersive	Minor	Nil.
700	pH	5.98	Moderately Acidic	Minor	Nil.
	EC (dS/cm)	0.27	Non-saline	Minor	Nil.
	EAT_m	3 - 8	Slight to Non-Dispersive	Minor	Nil.

- Tested soil parameters indicated no restrictive properties to OSSM within the sample location.

4 NOMINATED WASTEWATER MANAGEMENT

4.1 Proposed OSSM Summary

Site and soil constraints were evaluated in selection of appropriate treatment and effluent management method. A summary of the recommended OSSM system and application sizing is presented below:

Treatment	Treatment	→	Effluent Management
Proposed Dwelling	Proposed Aerated Wastewater Treatment System (AWTS)	(Pumped Dosing)	21m^2 Pressure Dosed Absorption Bedding 1x [L:14.5m, W:1.45m, D:0.4m] Pressure Dosed Absorption Beds

4.2 Site Wastewater Loading

Table 4.2.1: Site Wastewater Loading

I.D	Equivalent Bedrooms [1]	Population per Bedroom [1]	Equivalent Population [Persons]	Wastewater Generation Rate per Capita [L/Person/Day]	Design Wastewater Loading [L/Day]
Proposed Dwelling	4	1.67	7	150	**1,050**

[1] Note: Design occupancy estimates per LGA & Industry standard.

4.3 Wastewater Treatment

It is proposed to continue utilizing the existing BioCycle AWTS under the provisor that it can be verified by a suitably licensed plumber that the unit is working adequately and will not be damaged during the demolition / construction process. If this cannot be confirmed, it is proposed to install a new NSW Health Accredited AWTS to secondary treat all wastewater from the dwelling. If necessary, decommissioning of the old system shall be undertaken per NSW Health requirements (Appendix E).

A list of accredited AWTS suppliers is available on the NSW Health website: *http://www.health.nsw.gov.au/environment/domesticwastewater/Pages/awts.aspx*

Justification for the proposed secondary treatment method is as follows:

- Higher quality effluent produced
- Accidental or deliberate discharges are less detrimental to the environment and have less potential to adversely impact on health
- High commercial availability
- Re-utilising existing system is prefereable outcome where of sufficient capacity and is in good condition.

Table 4.3.1: - Secondary Treatment Targets (per DLG 1998)

Biochemical Oxygen Demand (BOD^5)	Suspended Solids (TSS)	Total Nitrogen (TN)	Total Phosphorus (TP)	Faecal coliforms		Dissolved Oxygen (DO)
				Non-disinfected effluent	Disinfected effluent	
< 20 mg/L	< 30 mg/L	25 - 50 mg/L	10 - 15 mg/L	Up to 10^4 cfu/100 mL	< 30 cfu/100 mL	> 2 mg/L

4.4 Effluent Management

Given the development proposed and site and soil conditions encountered, it is proposed to dispose of effluent from the Proposed Dwelling via Pressure Dosed Absorption Bedding**.**

Sizing of the Effluent Management Area (EMA) was undertaken by assessing the hydraulic capacity of the limiting layer per AS1547:2012 methodology below. A minimum EMA sized 21m^2 is proposed.

1,050 L/day / 50mm/day = 21 m^2

It is proposed that the EMA be positioned as indicated within Appendix A and shall be serviced by 1x [L:14.5m, W:1.45m, D:0.4m] Pressure Dosed Absorption Beds. Pressure Dosed Absorption Bedding shall be installed as per Appendix D.

It is proposed to grade the area housing the EMA to achieve a level base whilst retaining maximal soil depth to achieve minimum 600mm basal clearance to bedrock. Some of the deeper soil found in the north of the site can be cut and utilised for this purpose. A conceptual cross section is provided within Appendix A2. Where cut is insufficient, it is proposed to import Category 2 Sandy Loam Excavated Natural Material (ENM) as fill material.

Justification of the proposed dispersal method is as follows:

- A pressure dosed absorption system ensures even effluent coverage over entire bed.
- An absorption area is available onsite meeting the minimum buffer distances.
- Suitable soil type and depth has been obtained onsite to permit an absorption system.

4.5 Recommended Site Modifications

To address present site constraints, the following modifications are recommended:

- Following the implementation of the EMA, the field is to be maintained with dense grass coverage and excluded from vehicle and livestock traffic.

5 ADDITIONAL INFORMATION

5.1 Pipework Detail

All associated plumbing / drainage work is to be in accordance with AS 3500.2:2015 *Sanitary Plumbing Drainage*. Positioning of the receiving treatment system is to ensure drainage from internal plumbing fixtures achieves the minimum grade and cover of the excerpts below.

Table 6.1 – Excerpts of AS3500.2:2015

Nominal Pipe Diameter (DN)	Minimum Grade	
(mm)	(%)	(Ratio)
65	2.50	1:40
80	1.65	1:60
100	1.65*****	1:60*****
125	1.25	1:80
150	1.00	1:100

*Drains from treatment plants may be 1.00% Min.

	Minimum depth of cover (mm)	
Location	Cast iron & Ductile iron	Other materials
Subject to vehicular loading	300	500
All other locations	NIL	300

5.2 Licensing

Operating a system of sewage management is a Prescribed Activity under the Local Government Act 1993 and clause 45 of the Local Government (Approvals) Regulation 1999. This means that an 'Approval to Operate' a system of sewage management must be obtained from Council.

5.3 Detailed Design

A detailed system design may still be requested at the 'Application to Install' stage. This design will include the size and location of all system components including tanks, distribution lines, valves, etc. These additional requirements will be furnished by the nominated treatment system suppliers / licensed installers. Additional information for the property owner is available in Appendix C.

6 CONCLUSION

It is proposed to Proposed Single Dwelling (KDR) 4-bedroom dwelling at 22 Cicada Glen Road, Ingleside NSW.

- The anticipated combined wastewater loading rate generated by the Proposed Dwelling is calculated to be **1,050 L/day.**
- It is proposed to continue utilizing the existing BioCycle AWTS under the provisor that it can be verified by a suitably licensed plumber that the unit is working adequately and will not be damaged during the demolition / construction process. If this cannot be confirmed, it is proposed to install a new NSW Health Accredited AWTS to secondary treat all wastewater from the dwelling. If necessary, decommissioning of the old system shall be undertaken per NSW Health requirements (Appendix E).
- Effluent from the Proposed Dwelling shall be dispersed by 21m^2 Pressure Dosed Absorption Bedding installed within the EMA marked within Appendix A.
- It is proposed that the EMA be positioned as indicated within Appendix A and shall be serviced by 1x [L:14.5m, W:1.45m, D:0.4m] Pressure Dosed Absorption Beds. Pressure Dosed Absorption Bedding shall be installed as per Appendix D.
- It is proposed to grade the area housing the EMA to achieve a level base whilst retaining maximal soil depth to achieve 600mm basal clearance to bedrock. Some of the deeper soil found in the north of the site can be cut and utilised for this purpose. A conceptual cross section is provided within Appendix A2. Where cut is insufficient, it is proposed to import Category 2 Sandy Loam Excavated Natural Material (ENM) as fill material.
- The Proposed Dwelling should be fitted with standard-water reductive fixtures.

APPENDIX A: SITE PLAN

SITE PLAN: DETAIL

EMA LANDFORM TO BE GRADED LEVEL TO FACILITATE INSTALL OF PRESSURE DOSED ABSORPTION BED (SEE APPENDIX A2 FOR INDICATIVE CROSS SECTION

REMOVE WATER TANKS - NO IN-GROUND WATER TANKS BELOW EMA

P.O.S 80SQM

ALFRESCO

EXISTING DWELLING TO BE DEMOLISHED

GROUND FLOOR

PROPOSED DWELLING

14.500

5.300

BH3

BH1

BH2

[PROPOSED 100% RESERVE AREA] TO BE UTILISED AS EMA IN CASE OF SYSTEM RESTING, REPLACEMENT OR EXPANSION

[PROPOSED EMA] 21m2 PRESSURE DOSED ABSORPTION BEDDING 1x [L]:14.500m [W]:1.45m [D]:0.400m BED

6.000

7.500

1.450

WORKSHOP

PROPOSED GARAGE/ WORKSHOP

PROPOSED 10,000L RWT

ROCK OUTCROP

EXISTING RAISED GARDEN

GARDEN SHED

EXISITNG AERATED WASTEWATER TREATMENT SYSTEM (AWTS) TANK (TO BE ASSESSED BY MAINTAINING CONTRACTOR TO DETERMINE SUITABILITY FOR CONTINUED USE)

CONTOUR INTERVALS AT 0.2m
SCALE: 1:125 @A3
0 1 1.67 4.16 12.5
METRES

SITE PLAN: LOCALITY

SCALE: 1:500 @A3
0 5 10 20 50
METRES

BH5

EXISTING DWELLING TO BE DEMOLISHED

ALFRESCO

PROPOSED DWELLING

PORCH

WORKSHOP

PROPOSED GARAGE/ WORKSHOP

10,000L RWT

ROCK OUTCROP

EXISTING RAISED GARDEN

GARDEN SHED

KEY

- SITE BOUNDARY
- NEIGHBOURING LOT BOUNDARIES
- WATERWAYS / FLOWPATH
- BH1 BORE HOLE LOCATION 1
- SURFACE FLOW DIRECTION
- BUILDING (PROPOSED)
- BUILDING (EXISTING)
- EFFLUENT MANAGEMENT AREA (EMA)
- RESERVE EMA (RSV)
- BURIED DISTRIBUTION LINE TO EMA

WASTEWATER – GENERAL NOTES

1. UNDERLYING CONTOURS DERIVED FROM NSW GOV. 1m LiDAR DATA – THIS PLAN IS NOT A SURVEY.
2. UNDERLYING SATELLITE IMAGERY DERIVED FROM NEARMAP.
3. WATERWAYS (NAMED & UNNAMED) AND DRAINAGE ELEMENTS DERIVED FROM NSW GOV. HYDROGRAPY, SATELLITE IMAGERY AND STRAHLER ANALYSIS.

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE MADE INCOMPLETE IF COPIED

ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS
A-02	30/01/25	KR	KR	KR	REVISED BUILDING PLANS
A-01	17/09/24	KR	KR	RS	ISSUE FOR RELEASE

BROADCREST
ENGINEERING AND ENVIRONMENTAL CONSULTANTS
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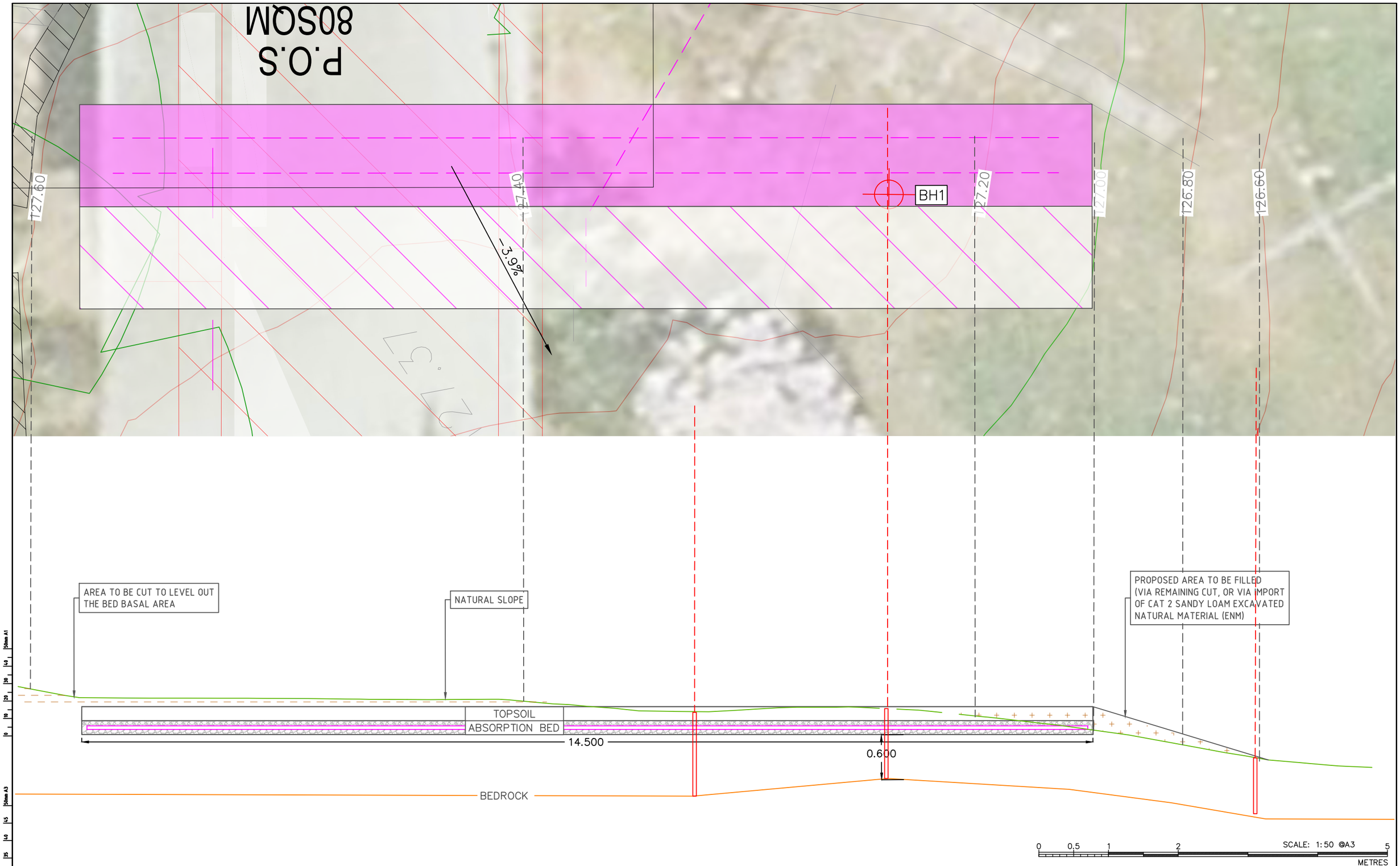
ENVIRONMENTAL FLOOD STORMWATER GEOTECHNICAL ACOUSTICS WASTEWATER
BROADCREST CONSULTING PTY LTD | ACN 622 508 187

PROJECT DESCRIPTION: PROPOSED SINGLE DWELLING (KDR)	SHEET: APPENDIX A - SITE LAYOUT PLAN
PROJECT SITE: 22 CICADA GLEN ROAD, INGLESIDE NSW	PLAN: ON-SITE WASTEWATER MANAGEMENT PLAN
LGA: NORTHERN BEACHES COUNCIL	CLIENT: AMY ELIAS OF ELCOM HOMES

PROJECT ID: 3931-WW
SCALE: 1:400 @ A3 - @ A1
SHEET NO.: 1 OF 1



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BROADCREST CONSULTING PTY LTD | ACN 622 508 187

PROJECT DESCRIPTION: PROPOSED SINGLE DWELLING (KDR)	SHEET: APPENDIX A - INDICATIVE CROSS SECTION OF PROPOSED EMA
PROJECT SITE: 22 CICADA GLEN ROAD, INGLESIDE NSW	PLAN: ON-SITE WASTEWATER MANAGEMENT PLAN
LGA: NORTHERN BEACHES COUNCIL	CLIENT: AMY ELIAS OF ELCOM HOMES

PROJECT ID	3931-WW
SCALE	1:400 @ A3 - @ A1
SHEET NO.	2 OF 1

APPENDIX B: CLIMATE DATA

B1. - Climate Statistics

Table B1.1. Weather Stations

Statistic	Station No.	Station Name	Distance from site [km]
Temperature	67105	RICHMOND RAAF	4.28
Precipitation	67105	RICHMOND RAAF	4.28
Evaporation	67033	RICHMOND RAAF	4.58

Figure B.1 - Monthly Cimate Statistics

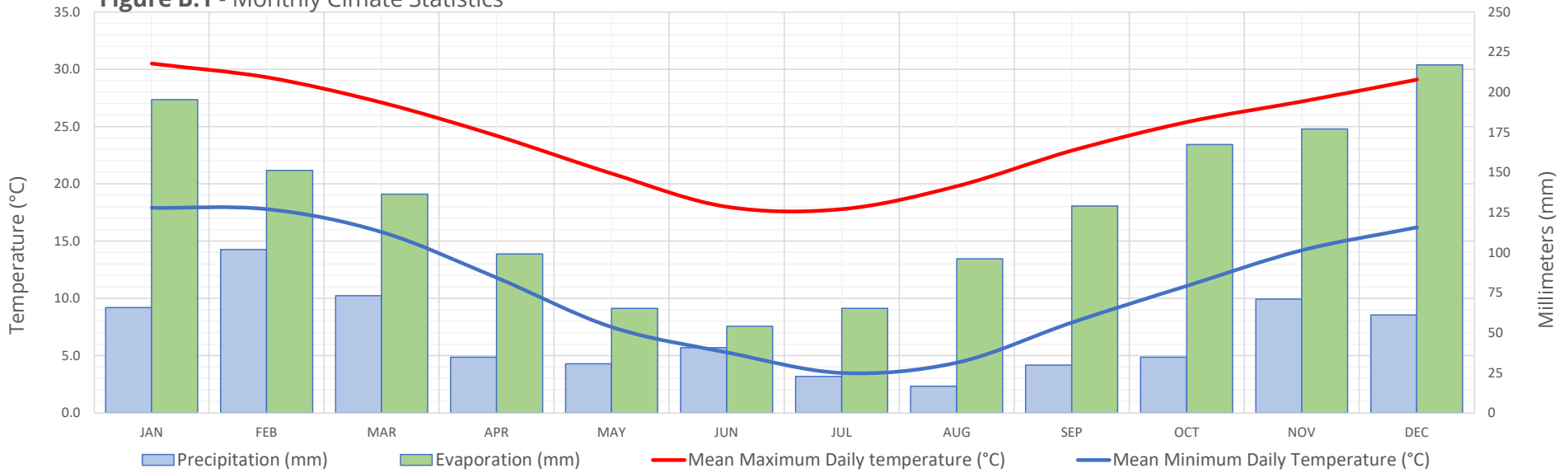


Table B1.2. Site Climate Statistics

Site Factors	Symbol	Units	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Mean Max. Temperature	[T]	[°C]	30.5	29.3	27.1	24.2	20.9	18.0	17.8	19.8	22.9	25.4	27.2	29.1	24.3
Mean Min. Temperature	[T]	[°C]	17.9	17.8	15.8	11.8	7.5	5.3	3.5	4.4	7.9	11.1	14.2	16.2	11.1
Days	[D]		31	28	31	30	31	30	31	31	30	31	30	31	365
Precipitation[1]	[P]	[mm/month]	65.7	101.8	73.1	34.7	30.6	40.6	22.8	16.6	29.8	34.8	71	61.1	693.8
Evaporation	[E]	[mm/day]	6.3	5.4	4.4	3.3	2.1	1.8	2.1	3.1	4.3	5.4	5.9	7	4.3
		[mm/month]	195.3	151.2	136.4	99	65.1	54	65.1	96.1	129	167.4	177	217	1569.5
Natural Site Balance[2]	[P-E]	[mm/month]	-129.6	-49.4	-63.3	-64.3	-34.5	-13.4	-42.3	-79.5	-99.2	-132.6	-106	-155.9	

[1] Median historic precipitation. Note: total is not equivalent to annual median.

[2] Negative value indicates monthly mean evaporation > precipitation

APPENDIX C: INFORMATION FOR THE PROPERTY OWNER

ON-SITE SEWAGE MANAGEMENT SYSTEMS

If you live in or rent a house that is not connected to the main sewer then chances are that your yard contains an on-site sewage management system. If this is the case then you have a special responsibility to ensure that it is working as well as it can.

The aim of this pamphlet is to introduce you to some of the most popular types of on-site sewage management systems and provide some general information to help you maintain your system effectively. You should find out what type of system you have and how it works.

More information can be obtained from the pamphlets:

Your Septic System
Your Aerated Wastewater Treatment System
Your Composting Toilet
Your Land Application Area

You can get a copy of these pamphlets from your local council or the address marked on the back of this pamphlet.

It is important to keep in mind that maintenance needs to be performed properly and regularly. Poorly maintained on-site sewage management systems can significantly affect you and your family's health as well as the local environment.

What is an on-site sewage management system?

A domestic on-site sewage management system is made up of various components which - if properly designed, installed and maintained - allow the treatment and utilisation of wastewater from a house, completely within the boundary of the property.

Wastewater may be blackwater (toilet waste), or greywater (water from showers, sinks, and washing machines), or a combination of both.

Partial on-site systems - eg. pump out and common effluent systems (CES) - also exist. These usually involve the preliminary on-site treatment of wastewater in a septic tank, followed by collection and transport of the treated wastewater to an off-site management facility. Pump out systems use road tankers to transport the effluent, and CES use a network of small diameter pipes.

How does an on-site sewage management system work?

For complete on-site systems there are two main processes:

1. treatment of wastewater to a certain standard
2. its application to a dedicated area of land.

The type of application permitted depends on the quality of treatment, although you should try to avoid contact with all treated and untreated wastewater, and thoroughly wash affected areas if contact does occur.

Treatment and application can be carried out using various methods:

Septic Tank
Septic tanks treat both greywater and blackwater, but they provide only limited treatment through the settling of solids and the flotation of fats and greases. Bacteria in the tank break down the solids over a period of time. Wastewater that has been treated in a septic tank can only be applied to land through a covered soil absorption system, as the effluent is still too contaminated for above ground or near surface irrigation.

AWTS
Aerated wastewater treatment systems (AWTS) treat all household wastewater and have several treatment compartments. The first is like a septic tank, but in the second compartment air is mixed with the wastewater to assist bacteria to break down solids. A third compartment allows settling of more solids and a final chlorination contact chamber allows disinfection. Some AWTS are constructed with all the compartments inside a single tank. The effluent produced may be surface or sub-surface irrigated in a dedicated area.

Composting Toilets
Composting toilets collect and treat toilet waste only. Water from the shower, sinks and the washing machine needs to be treated separately (for example in a septic tank or AWTS as above). The compost produced by a composting toilet has special requirements but is usually buried on-site.

These are just some of the treatment and application methods available, and there are many other types such as sand filter beds, wetlands, and amended earth mounds. Your local council or the NSW Department of Health have more information on these systems if you need it.

Regulations and recommendations

The NSW Department of Health determines the design and structural requirements for treatment systems for single households. Local councils are primarily responsible for approving the installation of smaller domestic septic tank systems, composting toilets and AWTSs in their area, and are also responsible for approving land application areas. The NSW Environment Protection Authority approves larger systems.

The design and installation of on-site sewage management systems, including plumbing and drainage, should only be carried out by suitably qualified or experienced people. Care is needed to ensure correct sizing of the treatment system and application area.

Heavy fines may be imposed under the Clean Waters Act if wastewater is not managed properly.

Keeping your on-site sewage management system operating well

What you put down your drains and toilets has a lot to do with how well your system performs. Maintenance of your sewage management system also needs to be done well and on-time. The following is a guide to the types of things you should and should not do with your system.

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.

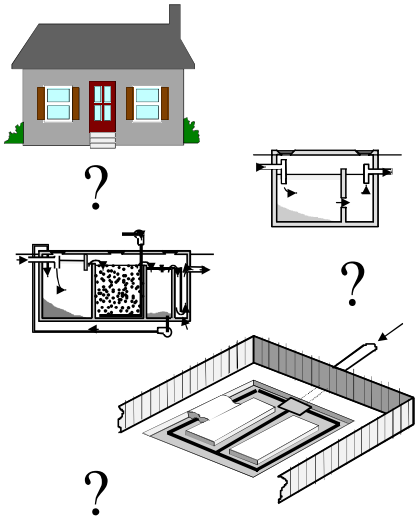
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

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



Aerated Wastewater Treatment Systems (AWTS)

In unsewered areas, the proper treatment and utilisation of household wastewater on-site is critical in preserving the health of the public and the environment. AWTS have been developed as a way of achieving this.

What is an AWTS?

An AWTS is a purpose built system used for the treatment of sewage and liquid wastes from a single household or multiple dwellings.

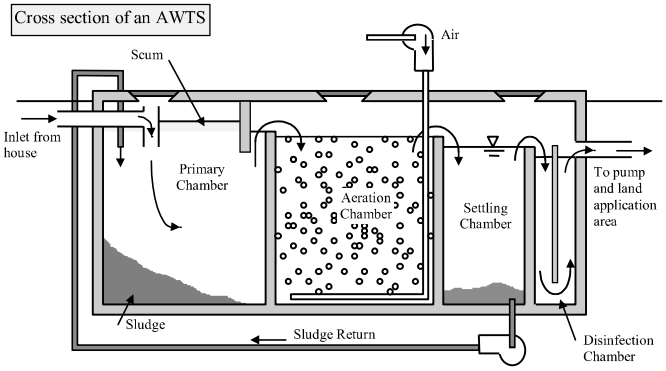
It consists of a series of treatment chambers combined with an irrigation system. An AWTS enables people living in unsewered areas to treat and utilise their wastewater.

How does an AWTS work?

Wastewater from a household is treated in stages in several separate chambers. The first chamber is similar to a conventional septic tank. The wastewater enters the chamber where the solids settle to the bottom and are retained in the tank forming a sludge layer. Scum collects at the top, and the partially clarified wastewater flows into a second chamber. Here the wastewater is mixed with air to assist bacteria to further treat it. A third chamber allows additional clarification through the settling of solids, which are returned for further treatment to either the septic chamber (as shown) or to the aeration chamber. The clarified effluent is disinfected in another chamber (usually by chlorination) before irrigation can take place.

Bacteria in the first chamber break down the solid matter in the sludge and scum layers. Material that cannot be fully broken down gradually builds up in the chamber and must be pumped out periodically.

Cross section of an AWTS



Regulations and recommendations

Local councils are primarily responsible for approving the smaller, domestic AWTSs in their area. The Environment Protection Authority (EPA) approves larger units, whilst the NSW Department of Health determines the design and structural requirements for all AWTSs.

At present AWTSs need to be serviced quarterly by an approved contractor at a cost to the owner. Local councils should also maintain a register of the servicing of each system within their area.

AWTSs should be fitted with an alarm having visual and audible components to indicate mechanical and electrical equipment malfunctions. The alarm should provide a signal adjacent to the alarm and at a relevant position inside the house. The alarm should incorporate a warning lamp which may only be reset by the service agent.

Maintaining your AWTS

The effectiveness of the system will, in part, depend on how it is used and maintained. The following is a guide on good maintenance procedures that you should follow:

DO

- ✓ Have your AWTS inspected and serviced four times per year by an approved contractor. Assessment should be applicable to the system design.
- ✓ Have your system service include assessment of sludge and scum levels in all tanks, and performance of irrigation areas.
- ✓ Have all your tanks desludged at least every three years.
- ✓ Have your disinfection chamber inspected and tested quarterly to ensure correct disinfectant levels.
- ✓ Have your grease trap (if installed) cleaned out at least every two months.
- ✓ Keep a record of pumping, inspections, and other maintenance.
- ✓ Learn the location and layout of your AWTS and land application area.
- ✓ Use biodegradable liquid detergents such as concentrates with low sodium and phosphorous levels.
- ✓ Conserve water.

DON'T

- ✗ Don't put bleaches, disinfectants, whiteners, nappy soakers and spot removers in large quantities into your AWTS 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 use more than the recommended amounts of detergents.
- ✗ Don't put fats and oils down the drain and keep food waste out of your system.
- ✗ Don't switch off power to the AWTS, even if you are going on holidays

Reducing water usage

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

Conservative water use around the house will reduce the amount of wastewater which is produced and needs to be treated.

Your AWTS 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.

Warning signs

You can look out for a few warning signs that signal to you that there are troubles with your AWTS. Ensure that these problems are attended to immediately to protect your health and the environment.

Look out for the following warning signs:

- Water that drains too slowly.
- Drain pipes that gurgle or make noises when air bubbles are forced back through the system.
- Sewage smells, this indicates a serious problem.
- Water backing up into your sink which may indicate that your system is already failing.
- Wastewater pooling over the land application area.
- Black coloured effluent in the aerated tank.
- Excess noise from the blower or pumping equipment
- Poor vegetation growth in irrigated area.

Odour problems from a vent on the AWTS can be a result of slow or inadequate breakdown of solids. Call a technician to service the system.

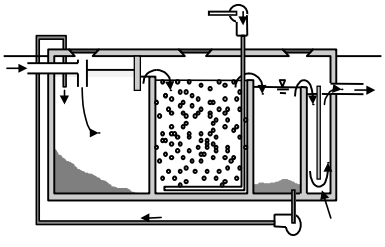
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

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

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

If you would like more information please contact:

Your Aerated Wastewater Treatment System



LAND APPLICATION AREAS

The reuse of domestic wastewater on-site can be an economical and environmentally sound use of resources.

What are land application areas?

These are areas that allow treated domestic wastewater to be managed entirely on-site.

The area must be able to utilise the wastewater and treat any organic matter and wastes it may contain. The wastewater is rich in nutrients, and can provide excellent nourishment for flower gardens, lawns, certain shrubs and trees. The vegetation should be suitably tolerant of high water and nutrient loads.

How does a land application area work?

Treated wastewater applied to a land application area may be utilised or simply disposed, depending on the type of application system that is used. The application of the wastewater can be through a soil absorption system (based on disposal) or through an irrigation system (based on utilisation).

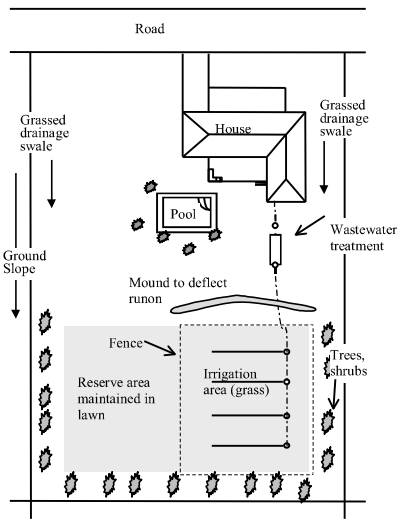
Soil absorption systems do not require highly treated effluent, and wastewater treated by a septic tank is reasonable as the solids content in the effluent has been reduced. Absorption systems release the effluent into the soil at a depth that cannot be reached by the roots of most small shrubs and grasses. They rely mainly on the processes of soil treatment and then transmission to the water table, with minimal evaporation and up-take by plants. **These systems are not recommended in sensitive areas as they may lead to contamination of surface water and groundwater.**

Irrigation systems may be classed as either subsurface or surface irrigation. If an irrigation system is to be used, wastewater needs to be pre-treated to at least the quality produced by an aerated wastewater treatment system (AWTS).

Subsurface irrigation requires highly treated effluent that is introduced into the soil close to the surface. The effluent is utilised mainly by plants and evaporation.

Surface irrigation requires highly treated effluent that has undergone aeration and disinfection treatments, so as to reduce the possibility of bacteria and virus contamination.

Typical Site Layout (not to scale)



The effluent is then applied to the land area through a series of drip, trickle, or spray points which are designed to eliminate airborne drift and run-off into neighbouring properties.

There are some public health and environmental concerns about surface irrigation. There is the risk of contact with treated effluent and the potential for surface run-off. Given these problems, subsurface irrigation is arguably the safest, most efficient and effective method of effluent utilisation.

Regulations and recommendations

The design and installation of land application areas should only be carried out by suitably qualified or experienced people, and only after a site and soil evaluation is done by a soil scientist. Care should be taken to ensure correct buffer distances are left between the application area and bores, waterways, buildings, and neighbouring properties.

Heavy fines may be imposed under the Clean Waters Act if effluent is managed improperly.

At least two warning signs should be installed along the boundary of a land application area. The signs should comprise of 20mm high Series C lettering in black or white on a green background with the words:

RECLAIMED EFFLUENT
NOT FOR DRINKING
AVOID CONTACT

Depending on the requirements of your local council, wet weather storage and soil moisture sensors may need to be installed to ensure that effluent is only irrigated when the soil is not saturated.

Regular checks should be undertaken of any mechanical equipment to ensure that it is operating correctly. Local councils may require periodic analysis of soil or groundwater characteristics

Humans and animals should be excluded from land application areas during and immediately after the application of treated wastewater. The longer the period of exclusion from an area, the lower the risk to public health.

The householder is required to enter into a service contract with the installation company, its agent or the manufacturer of their sewage management system, this will ensure that the system operates efficiently.

Location of the application area

Treated wastewater has the potential to have negative impacts on public health and the environment. For this reason the application area must be located in accordance with the results of a site evaluation, and approved landscaping must be completed prior to occupation of the building. Sandy soil and clayey soils may present special problems.

The system must allow even distribution of treated wastewater over the land application area.

Maintaining your land application area

The effectiveness of the application area is governed by the activities of the owner.

DO

- ✓ Construct and maintain diversion drains around the top side of the application area to divert surface water.
- ✓ Ensure that your application area is kept level by filling any depressions with good quality top soil (not clay).
- ✓ Keep the grass regularly mowed and plant small trees around the perimeter to aid absorption and transpiration of the effluent.
- ✓ Ensure that any run off from the roof, driveway and other impermeable surfaces is directed away from the application area.
- ✓ Fence irrigation areas.
- ✓ Ensure appropriate warning signs are visible at all times in the vicinity of a spray irrigation area.
- ✓ Have your irrigation system checked by the service agent when they are carrying out service on the treatment system.

DON'T

- × Don't erect any structures, construct paths, graze animals or drive over the land application area.
- × Don't plant large trees that shade the land application area, as the area needs sunlight to aid in the evaporation and transpiration of the effluent.
- × Don't plant trees or shrubs near or on house drains.
- × Don't alter stormwater lines to discharge into or near the land application area.
- × Don't flood the land application area through the use of hoses or sprinklers.
- × Don't let children or pets play on land application areas.
- × Don't water fruit and vegetables with the effluent.
- × Don't extract untreated groundwater for potable use.

Warning signs

Regular visual checking of the system will ensure that problems are located and fixed early.

The visual signs of system failure include:

- surface ponding and run-off of treated wastewater
- soil quality deterioration
- poor vegetation growth
- unusual odours

Volume of water

Land application areas and systems for on-site application are designed and constructed in anticipation of the volume of waste to be discharged. Uncontrolled use of water may lead to poorly treated effluent being released from the system.

If the land application area is waterlogged and soggy the following are possible reasons:

- ∧ Overloading the treatment system with wastewater.
- ∧ The clogging of the trench with solids not trapped by the septic tank. The tank may require desludging.
- ∧ The application area has been poorly designed.
- ∧ Stormwater is running onto the area.

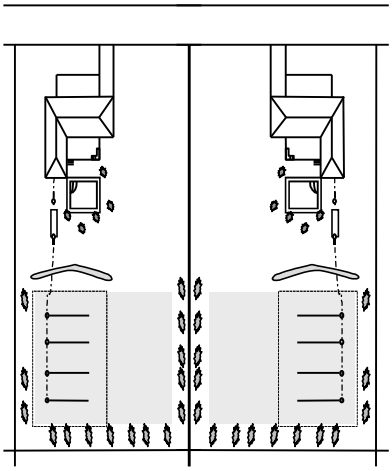
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

Poorly maintained land application areas are a serious source of water pollution and may present health risks, cause odours and attract vermin and insects.

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

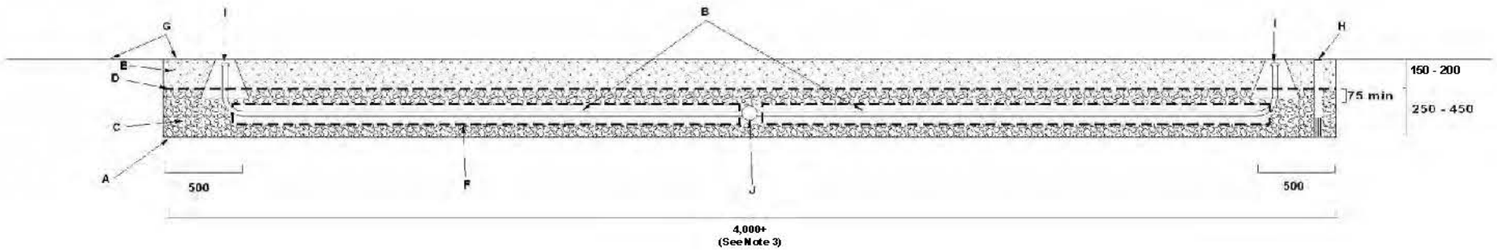
For more information please contact:

Your Land Application Area

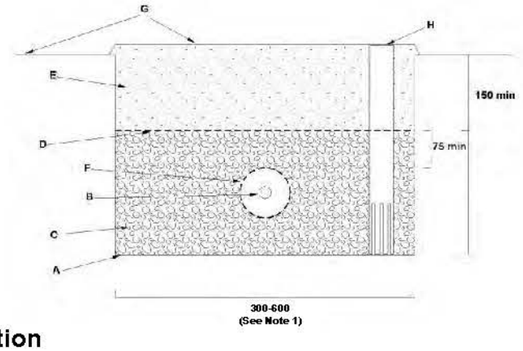


APPENDIX D: SD10-C: PRESSURE-DOSED ABSORPTION BEDS

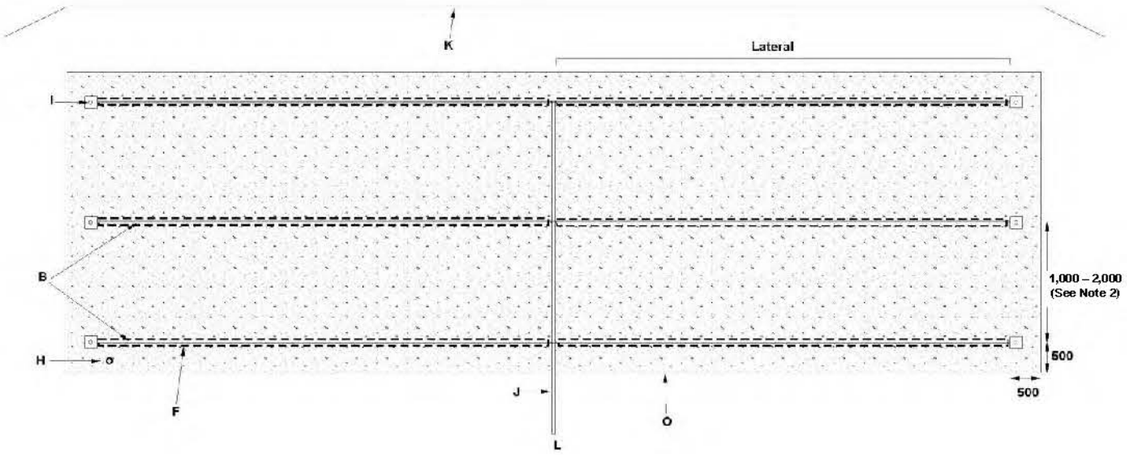
Cross Section: Pressure-dosed Bed



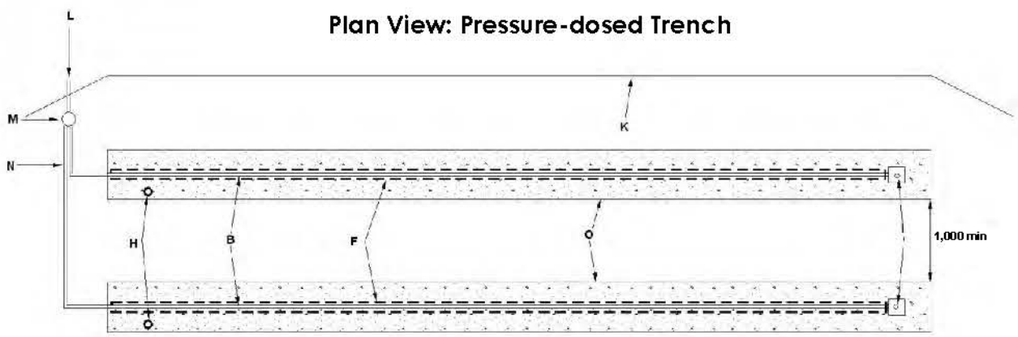
Cross Section: Pressure-dosed Trench



Plan View: Pressure-dosed Bed



Plan View: Pressure-dosed Trench



Pressure-dosed Trench / Bed Construction

A The base of the trench / bed must be level to ensure even distribution of effluent. Base levels should be checked with a dumpy / laser level.

B Pressure-dosing manifold consisting of 25mm PVC pipe with 3mm holes drilled (deburred) at 400mm centres facing upwards. Where a dosing device is used in place of a pump, holes will need to be 4-5mm depending on flow rate achieved. The total number and length of laterals will be determined by the required bed size (m²) and the lateral spacings shown in this drawing.

C 20-40mm distribution aggregate.

D Geotextile filter cloth.

E Clean local or imported topsoil (sandy loam to clay loam).

F 90mm slotted PVC or agricultural pipe over manifold laterals.

G Grass must be established across the construction area as soon as possible. Trench / bed surface should be level or slightly mounded.

H Inspection port on downhill side of trench / bed. Made from 50mm PVC pipe with perforations in the aggregate level of the trench / bed.

I Individual flush points for each lateral. May be a screw cap fitting on a 90 degree elbow level with the bed surface or a pressure controlled flush valve (such as those used for subsurface irrigation systems) inside an irrigation control box. Manual flushing should be carried out at least every 12 months.

J 40mm PVC dosing manifold. Larger systems may require different pipe sizes and orifice reducers at lateral connection points.

K Upslope stormwater diversion drain (see Standard Drawing 9A for design detail). Sub-soil drainage may be necessary on particular sites.

L Pump dosed effluent from treatment system. The pump must be capable of delivering the total flow rate required for all laterals whilst providing a 1.5m residual head (i.e. squirt height) at the highest orifice (with no more than 10% variation in squirt height across the whole bed). For beds with individual laterals no more than 10m long, it is acceptable to adopt a flow rate of 3.5-4L/min/lineal metre. Total dynamic head (including friction loss) will need to be determined on a site-specific basis.

M Hydraulically operated indexing valve that delivers effluent to a different trench / bed or set of laterals at each pump cut-in.

N 25mm polyethylene or PVC dosing manifold.

O Trench / bed dimensions are an example only. The basal area of the land application area must be determined according to the procedures in AS/NZS 1547:2012 and this Manual. A minimum bed length to width ratio of 3:1 must be adopted when developing individual designs and beds must be installed parallel to the site contours. The location and orientation of the area should be based on a site and soil assessment by a suitably qualified person. The system may comprise a single trench / bed or multiple smaller trenches / beds.

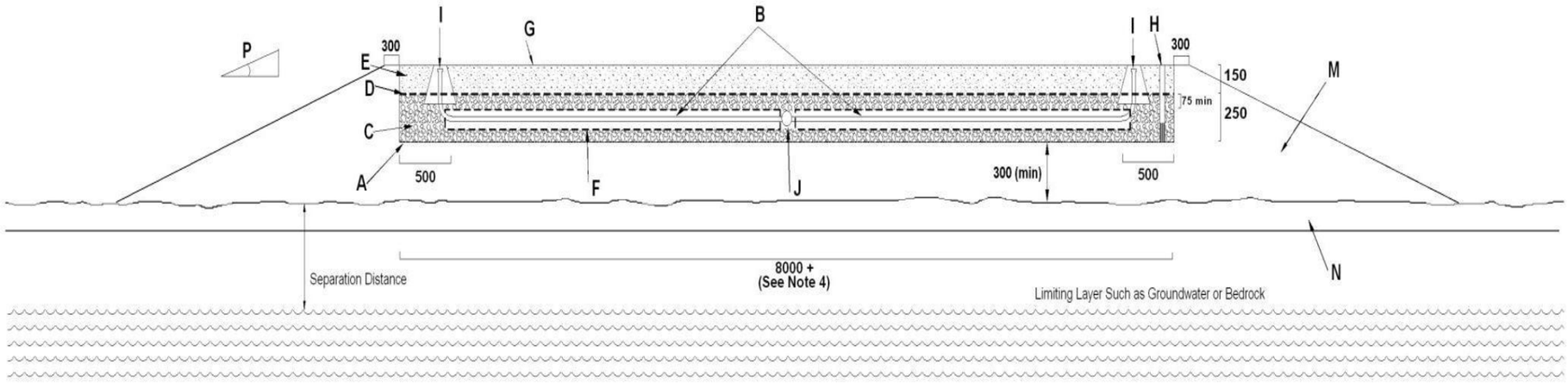
Notes

1. Trenches should optimally be 600mm wide. Optimum width will balance storage requirements against footprint and required trench length.
2. Nominal lateral spacing of 2,000mm for clay loams to light clays. 1,000mm for sandy loams to sands.
3. Consideration should be given to ensuring all beds have a level base when determining an appropriate width. The distribution manifold must also be level. Beds longer than 30m will require specialist hydraulic design.
4. WaterNSW notes that drilling holes within PVC pipe makes them non-compliant with the AS/NZS 3500, as it impacts the structural integrity of the pipe.

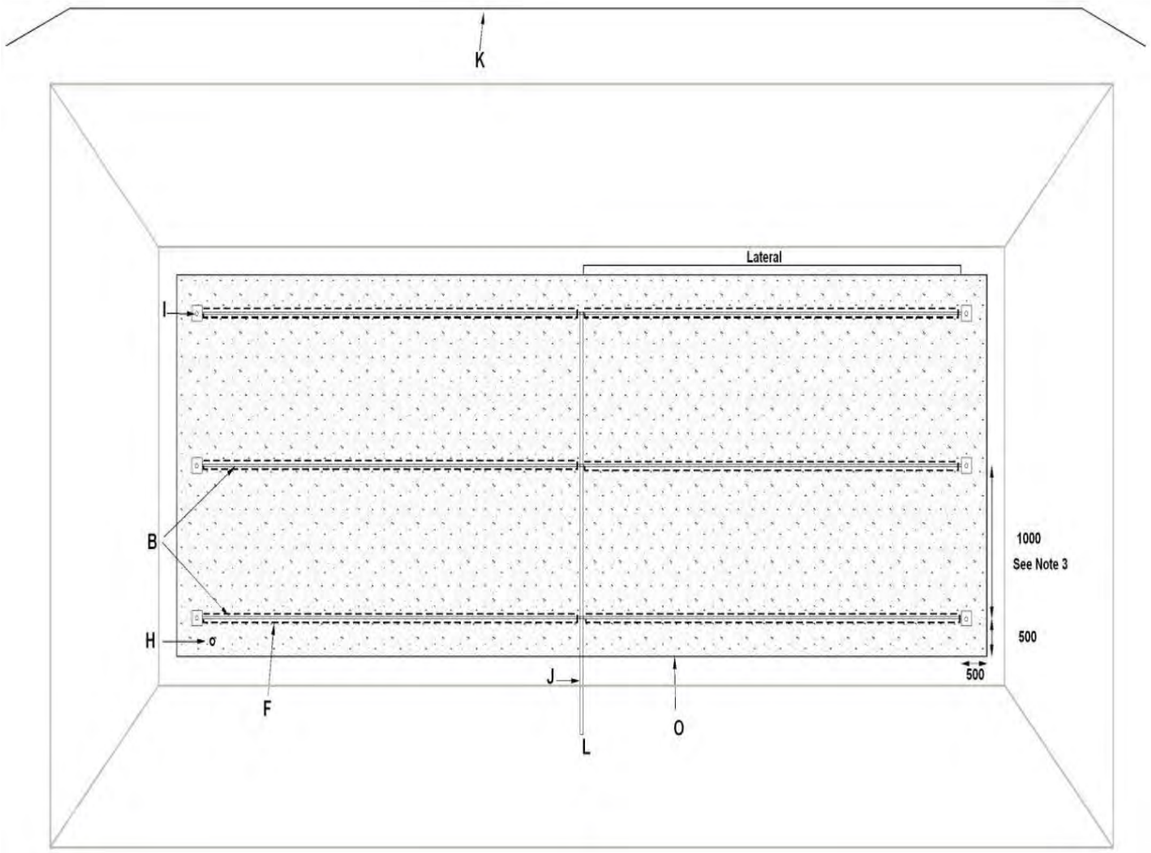
Standard Drawing 10C – Pressure-dosed Bed / Trench

(not to scale)

Cross Section View



Plan View



Notes

1 The layout and dimensions used in these drawings are for general guidance only. The location, configuration and layout of individual beds will need to be determined on a site-specific basis. The purpose of this drawing is to illustrate a typical configuration and specify minimum system components.

2 Consideration should be given to ensuring all beds have a level base when determining an appropriate width. The distribution manifold must also be level. Beds longer than 30m will require specialist hydraulic design.

3 WaterNSW notes that drilling holes within PVC pipe makes them non-compliant with the AS/NZS 3500, as it impacts the structural integrity of the pipe.

Standard Drawing 10D – Raised Pressure Dosed Absorption Bed Construction

(not to scale)

Standard Drawing 10D (cont.)
Raised Pressure-Dosed Absorption Bed Construction

A The base of the trench must be level to ensure even distribution of effluent. Base levels should be checked with a dumpy / laser level.

B Pressurised dosing laterals consisting of 25mm PVC pipe with 3mm holes drilled (deburred) at 400mm centres facing upwards. The total number and length of laterals will be determined by the required bed size (m^2) and the lateral spacings shown in this drawing. It is essential that effluent is distributed evenly across the distribution bed. A residual head (or squirt height) of 1.5m should be achieved across the distribution laterals. The squirt height across the laterals must be tested prior to covering with agricultural / slotted pipe, with no more than 10% variation in height observed. Consideration must also be given to static head and friction loss when sizing pumps. A full hydraulic design must be carried out.

C 20-40mm distribution aggregate.

D Geotextile filter cloth.

E Clean local or imported topsoil (sandy loam to loam).

F 90mm slotted PVC or agricultural pipe over manifold laterals.

G Grass must be established across the construction area as soon as possible. The bed surface should be slightly mounded.

H Inspection port on downhill side of trench / bed. Made from 50mm PVC pipe with perforations in the aggregate level of the trench / bed.

I Individual flush points for each lateral. May be a screw cap fitting on a 90 degree elbow level with the bed surface or a pressure controlled flush valve (such as those used for subsurface irrigation systems) inside an irrigation control box. Manual flushing should be carried out at least every twelve months.

J PVC or polyethylene dosing manifold. Larger systems may require different pipe sizes and orifice reducers at lateral connection points.

K Upslope stormwater diversion drain. Subsoil drainage may be necessary on particular sites.

L Pump dosed effluent from treatment system (minimum primary treatment with an outlet filter).

M The base of each absorption bed is to be raised to a height of 300mm above the final ground surface (total bed height 700mm). Compaction should be minimised when installing the bed. The fill must be a loam to sandy loam with minimal clay content.

N Prepare the site by clearing all shrubs, trees and boulders. Cut trees to ground level and then grind the stump out to a depth of 300mm and backfill with permeable material such as the natural topsoil or sand (definitely not clay). Scarify the natural soils across the entire basal area to a minimum depth of 200mm taking care not to compact the basal area in the process. This should extend to at least 1m beyond the perimeter.

O The bed dimensions shown are an example only. The basal area of the land application area must be determined based on the load and soil characteristics of the site. **A minimum bed length to width ratio of 3:1 must be adopted when developing individual designs and beds must be installed parallel to the site contours.** The location and orientation of the area should be based on a site by a suitably qualified person. The system may comprise a single bed or preferably multiple smaller beds.

P Batter slope 1(vertical):3(horizontal) maximum.

APPENDIX E: NSW HEALTH 2017 DECOMMISSIONING SEPTIC TANKS

Advisory Note 3 — Revised January 2017

Destruction, Removal or Reuse of Septic Tanks, Collection Wells, Aerated Wastewater Treatment Systems (AWTS) and other Sewage Management Facilities (SMF)

This advisory note has been developed to assist local councils when dealing with applications to reuse septic tanks, collection wells and or aerated wastewater treatment systems (AWTS). It should be read in conjunction with the Local Government (General) Regulation 2005.

UNDER NO CIRCUMSTANCES ARE SEPTIC TANKS, COLLECTION WELLS, AWTS, ETC TO BE REUSED AS VESSELS FOR HOLDING WATER FOR DRINKING PURPOSES, OR FOR ANY INTERNAL HOUSEHOLD DOMESTIC PURPOSE.

Existing septic tanks, collection wells and AWTS become redundant where reticulated sewerage progresses through an area and premises connect. Questions are asked periodically by the public about the fate of the redundant SMF. These onsite SMF may be demolished or potentially reused onsite as a storm water storage vessel. There is also potential for these systems to be sold second hand and reinstalled. The existing septic tank, where suitable, potentially may also be used when the premises is upgraded to an AWTS installation.

Where it is feasible to reuse a septic tank, collection well, or AWTS there are several precautions that need to be observed to ensure that public health risk is minimised. The reuse and/or removal of a septic tank, collection well or AWTS shall only be carried out after the premises are connected to sewer or to an alternative form of SMF.

During times of water restrictions the water supply authority should be contacted to determine if it is a permissible use of water to hose out a SMF prior to its reuse or relocation.

This guideline considers the following circumstances.

1. Septic Tanks / Collection Wells
1.1 Demolition
1.2 Reuse for Stormwater Storage
1.3 Upgrade to AWTS
1.4 Removed and Relocated

2. AWTS
2.1 Demolition
2.2 Used as Domestic Greywater Treatment System
2.3 Removed and Relocated

If reuse of a different type of SMF is under consideration then the intent of these guidelines should be met.

1. Septic Tank / Collection Well:

1.1 Demolition On-Site

1.1.1 The contents of the septic tank / collection well are to be removed by a method acceptable to the local council, either by tanker removal to an appropriate authorised site or pumped into the existing disposal trench if of sufficient capacity and which then should be sealed. The contents of a septic tank or collection well must not be broadcast or discharged above ground.

1.1.2 The sides, lid, baffle or partition (if fitted) and square junctions of the tank should be hosed down as the waste is being removed.

1.1.3 The tank is to be treated by liberally broadcasting “Builders' (hydrated) Lime” over the exposed surfaces. It is advisable to wear personal protective equipment.

1.1.4 Several holes should be punched or drilled into the base of the tank. The lid and those parts of the walls baffle and square junctions above the ground should be demolished and collapsed into the tank and the tank filled with clean soil or rubble and topped with clean soil. This should be performed to ensure that voids cannot develop which would allow collapse and injury in the future.

1.2 Reused On Site as a Storm Water Storage and Irrigation Tank

1.2.1 The water from such a stormwater or irrigation tank may be used for garden purposes but not for topping up swimming pools. Nor should the water be used for internal household purposes such

as for toilet flushing, or in laundry tubs, washing machines, bathrooms or kitchen.

1.2.2 For reuse on site as a non-domestic water containing vessel the contents are to be removed either to a site acceptable to the local council or pumped into the existing disposal trench if of sufficient capacity which then should be sealed. The contents of a septic tank or collection well must not be broadcast or discharged above ground.

1.2.3 The sides, lid, baffle or partition (if fitted) and square junctions of the tank should be hosed down as the waste is being removed.

1.2.4 The tank should be filled with fresh water and disinfected to a minimum level of 5 mg/L of free residual chlorine with a half hour contact time. The chlorine should be allowed to dissipate naturally at least overnight and not be neutralised.

1.2.5 The inlet(s) and outlet(s) of the vessel should be sealed. Pumps and other accessories may then be installed and connected to an irrigation system. The tank is to be mosquito proofed and fitted with a strainer or first flush device to prevent the introduction of coarse particles and materials.

1.2.6 The tank is to be labelled as containing water unfit for human consumption.

1.2.7 Pipes, fittings or fixtures in accordance with the water supply authority requirements may only be used. No cross connection is to be made with any potable water supply, nor should the vessel be likely to contaminate any potable water supply. Backflow prevention devices may need to be installed in accordance with the water supply authority directions.

1.2.8 Any overflow is to be directed to the storm water discharge or as specified by the local council.

1.3 Upgrading to AWTS

An existing septic tank may be used in conjunction with an AWTS on the same site provided:

1.3.1 The existing septic tank is of at least the same size and capacity of the septic tank of the accredited AWTS and the existing septic tank is not to be relocated elsewhere on the same site;

1.3.2 The contents of the septic tank are to be removed either to a site acceptable to the local council or pumped into the existing disposal trench if of sufficient capacity which then should be sealed. The contents of a septic tank or collection well must not be broadcast or discharged above ground.

1.3.3 The septic tank when inspected by a competent person such as the installer of the AWTS or a plumber / drainer is found to be in a suitable condition and in conformity with AS/NZS 1546.1:2008.

1.3.4 Written approval under section 68 of the Local Government Act from the local council to alter the SMF must be obtained prior to the upgrade and the approval to operate must be reassessed.

1.4 Removed and Relocated

1.4.1 Septic tanks and collection wells may only be removed, relocated and reused as such where the septic tank or collection well is subject to a current "Certificate of Accreditation" issued by the NSW Ministry of Health.

1.4.2 The contents of the septic tank and/or collection well are to be removed either to a site acceptable to the local authority or pumped into the existing disposal trench if of sufficient capacity which then should be sealed. The contents of a septic tank or collection well must not be broadcast or discharged above ground.

1.4.3 The sides, lid, baffle or partition (if fitted) and square junctions of the tank should be hosed down as the waste is being removed.

1.4.4 The inlets and outlets should be plugged and the tank should then be filled with clean water and disinfected to a minimum level of 5 mg/L of free residual chlorine, with a minimum one half hour contact time. The lid should be exposed to the chlorine solution. The chlorine should be allowed to dissipate naturally at least overnight and not be neutralised.

1.4.5 The contents of the tank and/or well may be then emptied as stated above in 1d.2 and the trench should be sealed. The septic tank and/or collection well may be removed if the structural integrity of the tank and/or well can be maintained.

1.4.6 Approval of the local council under section 68 of the Local Government Act is to be obtained before the vessel(s) is reinstalled.

2. AWTS

2.1 Demolition On-Site

2.1.1 The waste contents of the AWTS are to be removed by a method acceptable to the local council, either by tanker removal to an appropriate site or pumped into a disposal trench (if one exists) and sealed. The liquid content of the AWTS is not to

be irrigated using the land application system and is not to be discharged to the environment.

2.1.2 The sides, lid, baffles or partitions, components and square junctions of the AWTS should be hosed down as the waste is being removed.

2.1.3 The pumps, blowers and internal components of the AWTS may be either collapsed into the AWTS or selectively removed by the owner/occupier, an AWTS manufacturer or service agent for proper disposal to landfill. The owner/occupier, manufacturer or service agent must remove such parts in a manner which will not contaminate the environment or compromise the health and safety of themselves or others. Un-retrieved components must be left in the AWTS.

2.1.4 The AWTS and remaining components are to be disinfected by broadcasting "Builders' (hydrated) Lime" over the exposed surfaces. It is advisable to wear personal protective equipment.

2.1.5 Several holes should be punched or drilled into the base of the tank. The lid and those parts of the walls, baffle and square junctions above the ground should be demolished and also collapsed into the tank and the tank filled with clean soil or rubble and topped with clean soil.

2.1.6 All irrigation lines and spray head, sprinklers, drippers and the like are to be flushed with potable water for 5 minutes. If the irrigation lines are to be connected to the reticulated water supply the installation shall comply with the water supply authority requirements and a backflow prevention device installed.

2.2 Used as a Domestic Greywater Treatment System (DGTS)

The AWTS may be used as a domestic greywater treatment system provided:

2.2.1 The premises is connected to the sewer and the proposal is acceptable to the local council under its wastewater management strategy or policy;

2.2.2 The AWTS is subject to a current "Certificate of Accreditation" issued by the NSW Ministry of Health;

2.2.3 Only greywater is discharged to the AWTS, ie blackwater from any toilet, bidette or bidet is not connected;

2.2.4 Excess treated greywater or untreated greywater is discharged to the sewer when the land application system is overloaded;

2.2.5 The land application system has been reassessed by the owner/occupier to the local council's satisfaction as being suitable for the land application system management of treated greywater;

2.2.6 Prior approval is obtained from the local council to alter and to operate the AWTS as an DGTS; and

2.2.7 The maintenance of the AWTS is carried out by a service contractor suitable to the local council.

***NOTE**: It is not necessary to pump out or recommission the AWTS unless maintenance such as desludging is required.*

2.3 Removed and Relocated

2.3.1 AWTS may only be reused where the AWTS is subject to a current "Certificate of Accreditation" by the NSW Ministry of Health.

2.3.2 The removal and relocation of an AWTS shall be performed by an AWTS manufacturer, installer or service agent familiar with the AWTS brand.

2.3.3 The waste contents of the AWTS are to be removed by a method acceptable to the local council, either by tanker removal to an approved site or pumped to a disposal trench if of sufficient capacity which then should be sealed. The contents of a septic tank or collection well must not be broadcast or discharged above ground.

2.3.4 The sides, lid, baffles or partitions, components and square junctions of the AWTS should be hosed down as the waste is being removed.

2.3.5 The tank should then be filled with clean water and disinfected to a minimum level of 5 mg/L of free residual chlorine, with a minimum one half hour contact time.

2.3.6 All irrigation lines and spray head, sprinklers, drippers and the like are to be flushed with potable water for 5 minutes. If the irrigation lines are to be connected to the reticulated water supply the installation shall comply with the water supply authority requirements and a backflow prevention device installed.

2.3.7 The tank may then be emptied and removed. Tanks of reinforced concrete may only be removed

where the structural integrity of the tank can be maintained.

2.3.8 The pumps, blowers and internal components of the AWTS must be removed by an AWTS manufacturer or service agent for use only as spare parts. The manufacturer or service agent must remove such parts in a manner which will not contaminate the environment or compromise the occupational health and safety of themselves or others.

2.3.9 All mechanical and electrical items such as pumps and blowers must be renewed (not reconditioned), and covered by warranty. Valve diffusers and media may be reused and are to be cleaned and serviced.

2.3.10 Maintenance of the re-installed AWTS must be carried out by service contractor to the satisfaction of the local council.

2.3.11 Installation approval of the local council is to be obtained before the AWTS is reinstalled.