ONSITE WASTEWATER REPORT

PROPOSED RURAL BOARDING KENNEL DEVELOPMENT AT 241 FISHERS HILL ROAD, VACY

GSL Environmental
Authored by: Simon Doberer B.Sc. (ENV)
Job Reference #: 43822
Date: 2nd September 2022

GSL Environmental
Environmental Consultants

Limitations

This report has been developed based on agreed requirements between the client and GSL Environmental as understood by GSL Environmental at the time of investigation. This report only applies to the subject scope of works undertaken at the subject site. Other interpretations should not be made, including changes of scope or application to other projects. The contents of this report are based on a professional appraisal of the conditions that existed onsite at the time of this investigation. Where a subsurface soil investigation has been undertaken the results are only applicable to the specific sampling locations and the depths undertaken. Because of natural geological variability and possible anthropogenic influences, the subsurface conditions reported can change abruptly. Such changes can also occur after the site investigation has been undertaken. The accuracy of the results provided in this assessment is limited by these possible variations along with limitations by budget constraints imposed by others and by inadequate site accessibility.

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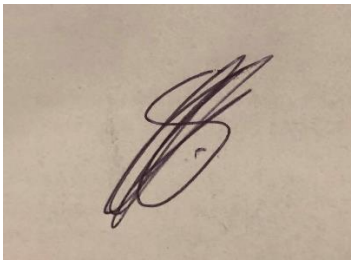

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Contents

1. Introduction

GSL Environmental has been commissioned by Perception Planning to assess the suitability of an on-site sewage management system for a proposed rural dog kennel development at 241 Fishers Hill Road, VACY NSW. This report will be submitted to Dungog Council in accordance with the relevant details in the 'Dungog Council Onsite Sewage DAF 2015'. Other guiding documents include,

- Australian Standard AS1547: 2012"On-site Domestic Wastewater Management"
- Dept. Local Government 1998, On-site Sewage Management for Single Households
- Water NSW, "Designing and Installing Onsite Wastewater Systems", 2019

This assessment is required to show that treated wastewater generated by the proposed kennels can be sustainably managed on the site.

2. Site Description

The subject allotment is irregular in shape and it approximately 40 hectares in size. The proposed kennels and associated EDA are within the south western third of the site. The proposed EDA is within a very gently inclined waning mid slope landform. The closest significant waterbody, The Paterson River meanders along the western and northern property boundaries. There are a couple of farm dams and overland flowpaths traversing the large property.

According to the Dungog 1:100 000 Soil Map the proposed dispersal area onsite is underlain by "Brecon" residual soils. The Brecon Soil Landscape Unit generally consists of undulating rises to low hills on Carboniferous sediments and ignimbrites of the Paterson Mountains and Clarencetown Hills regions. Slopes are generally between 2 - 10%. Underlying soils generally consist of brown sandy loams traversing to reddish brown strongly structured clays.

The proposal is for the construction of five kennel blocks and a whelping dog kitchen. The proposed WC attached to the side of the whelping kennel will need to disperse into the residence septic system. As per NSW Health recommendations, human and animal waste streams are not to interact and be treated separately.

The proposed EDA does not cross over with the existing septic system for the current residence onsite.

Figure 1: Subject Site, care of six maps showing existing property boundaries.

3. Site Information

Site Address: 241 Fishers Hill Road, VACY

Water Supply: Tank

Proposed Development: dog kennel development

Wastewater Flow Calculations: 100L/kennel block/day
50L/day - whelping dog kitchen

Design Flowrate: 550L per day

Proposed Effluent Dispersal Type: Absorption Bed

System Design: Septic Tank

Most restrictive Soil Texture: reddish brown strongly structured clays

Minimum Dispersal Area Required: 110m2

Buffer Distances: All required buffer distances can be achieved without any variation required.

Flowrate Calculation Discussion

There are two waste water sources for the proposed kennels. The hardstand wash down with a pressure dosed hose of the kenneled area and the whelping dog kitchen.

Whelping Dog Kitchen

The wastewater nodes within the whelping kitchen are two sinks. A very conservative flowrate of 50L/day has been estimated.

Kennel Washdown Wastewater

It is recommended that a 'dry' cleaning approach is used for cleaning the kennel areas, in line with industry standards. This would include disposal of feaces, with mop down and pressure wash of each kennel to minimise unnecessary additional wastewater production. It is important that solids are

removed from the waste stream before entering the septic tank. All waste water must be directed through an appropriate collector or trap to keep these pollutants out of the proposed OSSM system including an S bend pipe to limit backed up odors.

The 100L/kennel calculation assumes that each kenneled area will be washed down in approximately 30 minutes which is a conservative time figure.

A solids management plan is to be utilized for boarding kennel developments.

4. Physical Site Assessment

A site inspection was undertaken on the 9th August 2022. The fieldwork included an assessment of the site's physical parameters as well as hand excavation of boreholes to determine the underlying soil structures. This was undertaken to delineate the most suitable location for the proposed dispersal area. Potential onsite limitations have been investigated and are discussed below.

4.1 Landform

Varying landforms pose differing potential limitations to an effluent dispersal area. Risk of run-on and runoff may be enhanced dependent on the site's landform.

The proposed EDA is within a very gently inclined waning mid slope landform.

Limitation: **LOW**

4.2 Slope Gradient

Excessive slope within an EDA can potentially lead to effluent leaching away from the EDA.

The proposed EDA is within a very gently inclined waning mid slope landform. The Slope percentage is approximately 4%.

Limitation: **LOW**

4.3 Exposure

Providing the EDA with maximum wind and sun exposure is preferable. This will enhance the evapotranspiration properties of the EDA and should add to the life of the EDA.

The proposed EDA is within an open area with very high levels of exposure.

Limitation: **LOW**

4.4 Flood Potential

All effluent dispersal areas are to be above the 1:20 flood level. In addition all electrical components, vents and inspection holes form the treatment system should be located above the 1:100-year flood level. Effluent dispersal areas being inundated via flood waters can become a public health issue during times of high rain.

The proposed EDA and proposed septic tank are above the 1:100 flood level.

Limitation: **LOW**

4.5 Vegetation

All effluent dispersal areas should be covered with vegetation or mulch-based covers. A vegetated EDA provides the possibility of that area in enhancing nutrient uptake and evapotranspiration. Low vegetation cover can cause effluent runoff and low nutrient and evapotranspiration uptake rates.

A good cover of grassland vegetation is currently within the proposed EDA. The proposed EDA will need to be regularly mowed.

Limitation: **LOW**

4.6 Stormwater Run-on

All upslope stormwater nodes should be diverted around the EDA and not run through an EDA. Stormwater runoff through the EDA has the potential to transport effluent away from the EDA to more sensitive receivers.

No visible signs of stormwater entering the existing EDA were observed during site inspection. The proposed EDA is within a very gently inclined waning mid slope landform. The Slope percentage is approximately 4%.

Limitation: **LOW**

4.7 Site Drainage

Damp and wet areas should be avoided for EDAs. These areas indicate seepage of waters and could become a transport option for effluent if placed in these areas.

Site appears to be well drained with semi-permeable soils. No visible signs of wet/damp areas in the proposed EDA. The soil profile did not show evidence of significant water logging.

Limitation: **LOW**

4.8 Erosion Potential

Areas of visible soil movement and erosion should be avoided.

No visible signs of erosion within the existing EDA. Existing EDA is well vegetated and very gently inclined.

Limitation: **LOW**

4.9 Evidence of Fill

No evidence of fill was seen onsite or in the excavated boreholes. Soil logs are consistent of the description for underlying soils within the Brecon Soil Area.

Limitation: **LOW**

4.10 Groundwater Depth

Groundwater not observed in bore holes.

Limitation: **LOW**

4.11 Surface Rock

No surface boulders or rock outcrops were observed within the proposed EDA. Whilst depth was found in boreholes excavated within the proposed EDA, if during installation a “floater” is found it is to be removed from the proposed EDA.

Limitation: **LOW**

4.12 Groundwater Bores

A search of Water’s all groundwater mapping was undertaken to determine the proximity of any bores to the EDA. There are no domestic bores within 250m of the existing EDA.

Limitation: **LOW**

4.13 Watercourse Proximity

The closest significant waterbody, The Paterson River meanders along the western and northern property boundaries. There are a couple of farm dams and overland flowpaths traversing the large property. All recommended setbacks area adhered to.

Limitation: **LOW**

4.14 Stock Present

Stock can cause damage to irrigation systems and must be kept out of the EDA by fencing or other physical barrier.

4.15 Buffer Distances

All buffer distances in accordance with the required buffer distances within AS 1547:2012 will be achieved.

Limitation: **LOW**

Buffer distances from the EDA are required to minimise risk to public health, maintain public amenity and protect sensitive environments. Table below from 'Dungog Council Onsite Sewage DAF'.

Table 6-8 Minimum Buffer Distances for On-site System Land Application Systems

System / Land Application Type	Limiting Factor	Minimum Buffer Distance (m)
All Land Application Systems	Permanent surface waters such as: Lakes, rivers, creeks and streams	➢ 100m
	Domestic groundwater wells and bores	➢ 250m
	Other waters such as: Farm dams, intermittent waterways and drainage channels	➢ 40m
	Retaining wall, embankments, escarpments and cuttings.	➢ 15
Surface Spray Irrigation (Standard Spray Heads)	Driveways and property boundaries	➢ 6m if area up gradient ➢ 3m if area down gradient
	Dwellings and buildings	➢ 15m
	Paths and walkways	➢ 3m
	Swimming pools	➢ 6m
	Retaining wall, embankments, escarpments and cuttings.	➢ 12m if area up gradient ➢ 3m if down gradient
Surface Drip and Trickle Irrigation	Dwellings and buildings, swimming pools, property boundaries and driveways. Retaining wall, embankments, escarpments and cuttings.	➢ 6m if area up gradient ➢ 3m if area down gradient
Subsurface Irrigation	Dwellings and buildings, swimming pools, property boundaries and driveways Retaining wall, embankments, escarpments and cuttings.	➢ 6m if area up gradient[1] ➢ 3m if area down gradient[1]
	Depth to Hardpan or Bedrock	➢ 0.6m below level of pipework[2]
Absorption System	*Property boundary* *Retaining wall, embankments, escarpments and cuttings.*	➢ 12m if area up gradient ➢ 6m if area down gradient
	Dwellings and buildings, swimming pools and driveways	➢ 6m if area up gradient ➢ 3m if area down gradient
	Depth to Hardpan or Bedrock	➢ 0.6m below base of trench/bed

Permanent Watercourse: *Any river, creek, stream or chain of ponds, whether artificially modified or not, in which water usually flows, either continuously or intermittently, in a defined bed or channel*
Intermittent Watercourse: *A low point with no or little defined bed or channel that carries water during rainfall events, but dries out quickly when rainfall stops. A gully or incised drainage depression is considered to be an intermittent watercourse.*

Figure 2: Proposed EDA onsite

5. Onsite Soil Assessment

During the site inspection 2 boreholes were hand excavated to 1m with a 100mm auger within the proximity of the onsite EDA. The following are the results from the excavation. The auger holes were used to determine the underlying soil properties. No groundwater was observed in the excavated boreholes.

According to the Dungog 1:100 000 Soil Map the proposed dispersal area onsite is underlain by "Brecon" residual soils. The Brecon Soil Landscape Unit generally consists of undulating rises to low hills on Carboniferous sediments and ignimbrites of the Paterson Mountains and Clarencetown Hills regions. Slopes are generally between 2 - 10%. Underlying soils generally consist of brown sandy loams traversing to reddish brown strongly structured clays.

Borehole 1

0 – 250mm – brown sandy loams
250 – 500mm – Brown sandy clay loams
500 – 1000mm – reddish brown strongly structured clays

Borehole 2

0 – 200mm – brown sandy loams
200 – 450mm – Brown sandy clay loams
450 – 1000mm – reddish brown strongly structured clays

An insitu probe, tested the soil layers for pH and EC, results as below.

Borehole 1

Depth	pH	EC_e (µS/cm)
0 – 250mm	5.3	2125
250 – 500mm	5.2	1572
500 – 1000mm	5.0	1914

Borehole 2

Depth	pH	EC_e (µS/cm)
0 – 200mm	5.4	1717
200 – 450mm	5.3	1189
450 – 1000mm	5.1	1486

The pH of a soil influences its ability to supply nutrients to vegetation. If the soil is too acidic vegetative growth is inhibited. The electrical conductivity of the soil relates to the amount of salts present. A high salt concentration inhibits vegetative growth.

The electrical conductivity of the soils is less than 4 dS/m. This will not inhibit vegetative growth. The pH of the soil is between 5.0 and 5.4. A regular application of lime is recommended to maintain healthy vegetation growth.

A Sample was sent to ALS Australia, a NATA accredited laboratory to determine the insitu reliability as well as the testing of further parameters. Results below and in appendix.

The sample tested at the laboratory was from borehole 1, 0-250mm.

Coarse fragments

Coarse fragments are those over 2 mm in diameter. They can pose limitations to vegetative growth by lowering the soil's ability to supply water and nutrients.

Less than 5% course fragments present. Some peds can be easily crushed using fingers.

Limitation: **LOW**

Exchangeable Sodium Percentage

The exchangeable sodium percentage (ESP) measures the proportion of cation exchange sites occupied by sodium. Soils are considered sodic when the ESP is greater than 6, and highly sodic when the ESP is greater than 15.

ESP 21%, suggesting highly sodic soils within the proposed EDA.

It is recommended that gypsum and lime be added to the proposed EDA before use. This will neutralise the underlying soils to recommended levels. The following application rates apply.

Lime 1.5t/Ha – Subject site calculation = A minimum 20kg across the proposed 110m2 EDA.
Gypsum 3t/Ha – Subject site calculation = A Minimum 40kg across the proposed 110m2 EDA.

Cation Exchange Capacity

Cation exchange capacity (CEC) is a measure of the soil's ability to hold positively charged ions. It is a very important soil property influencing soil structure stability, nutrient availability, soil pH and the soil's reaction to fertilisers and other ameliorants. A figure above 10 meq/100g is preferred for plant production. You can improve CEC in weathered soils by adding lime and raising the ph.

CEC = 13.3 meq/100g

Phosphorus Sorption Index

The capacity of a soil to adsorb phosphorus is expressed as its phosphorus sorption capacity.

P sorb = 1325 mg P sorbed/kg

Emerson Aggregate Test

The combination of slaking and dispersion caused a reduction in macroporosity and, therefore, lower infiltration rates and hydraulic conductivities as well as an increase in soil strength and other undesirable soil physical properties. This test classifies the behavior of soil aggregates, when immersed, on their coherence in water. This test was competed inhouse. Soils are divided into seven classes on the basis of their coherence in water, with one further class being distinguished by the presence of calcium-rich minerals.'

EAT Class = 2(2). Some slight dispersion potential within underlying soils.

6. System Design/Selection

Proposed Treatment Node

The proposal is to install a NSW Health Accredited Septic tank onsite. Allowing for a three-year sludge allowance and the capability to service the calculated daily flowrate of 550L/day, a septic tank with a minimum capacity of 3000L is to be installed. This will provide enough volume to treat the daily flowrate and provide enough volume for the sludge allowance.

A correctly sized septic tank can remove approximately 25 to 35% of the Biochemical Oxygen Demand (BOD5) load and more than 60% of the suspended solids load from raw wastewater. Solids are stored in the base of the primary tank and liquids are discharged for further treatment and/or disposal. Floating material (scum) typically accumulates on the surface providing an airtight seal creating anaerobic conditions.

Proposed Effluent Dispersal

The proposal is to install a absorption beds onsite. The effluent is typically distributed along the length of the trench or bed through slotted or drilled 100 millimetre distribution pipes, and then filtered through the gravel and sand to the underlying soil. A clogging layer or biomat develops along the bottom and sides of the trench and acts as a further filter. This filtering process helps remove pathogens, toxins and other pollutants. Nutrients in the effluent are taken up by vegetation (normally grass) planted across the absorption trench area, incorporated in the biomat, and, in the case of phosphorus, adsorbed onto clay particles in the soil.

The following calculation was undertaken to determine the minimize sizing required for effluent dispersal.

Minimum Dispersal Size Calculation

Reddish brown strongly structured clays: Loading rate of 5mm/day. (AS1547:2012 – Table L1)

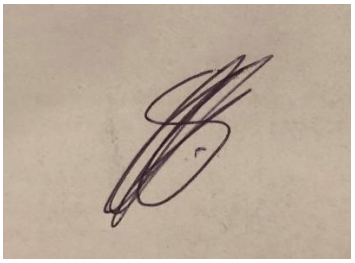
Total flowrate dispersing into adsorption beds 550L/day.

Area of bed(s): 550/5 = 110m2

Maintain a 100% reserve area

7. Recommendations

- Installation of a NSW Health accredited minimum 3000L septic tank which will treat the daily flowrate of 550L/day.
- The proposed effluent dispersal is to be an absorption dispersal field of a minimum 110m2.
- Stock must be kept out of the EDA by fencing or other physical barrier.
- This design assumes at least three-star rated plumbing fixtures are used in any new development.



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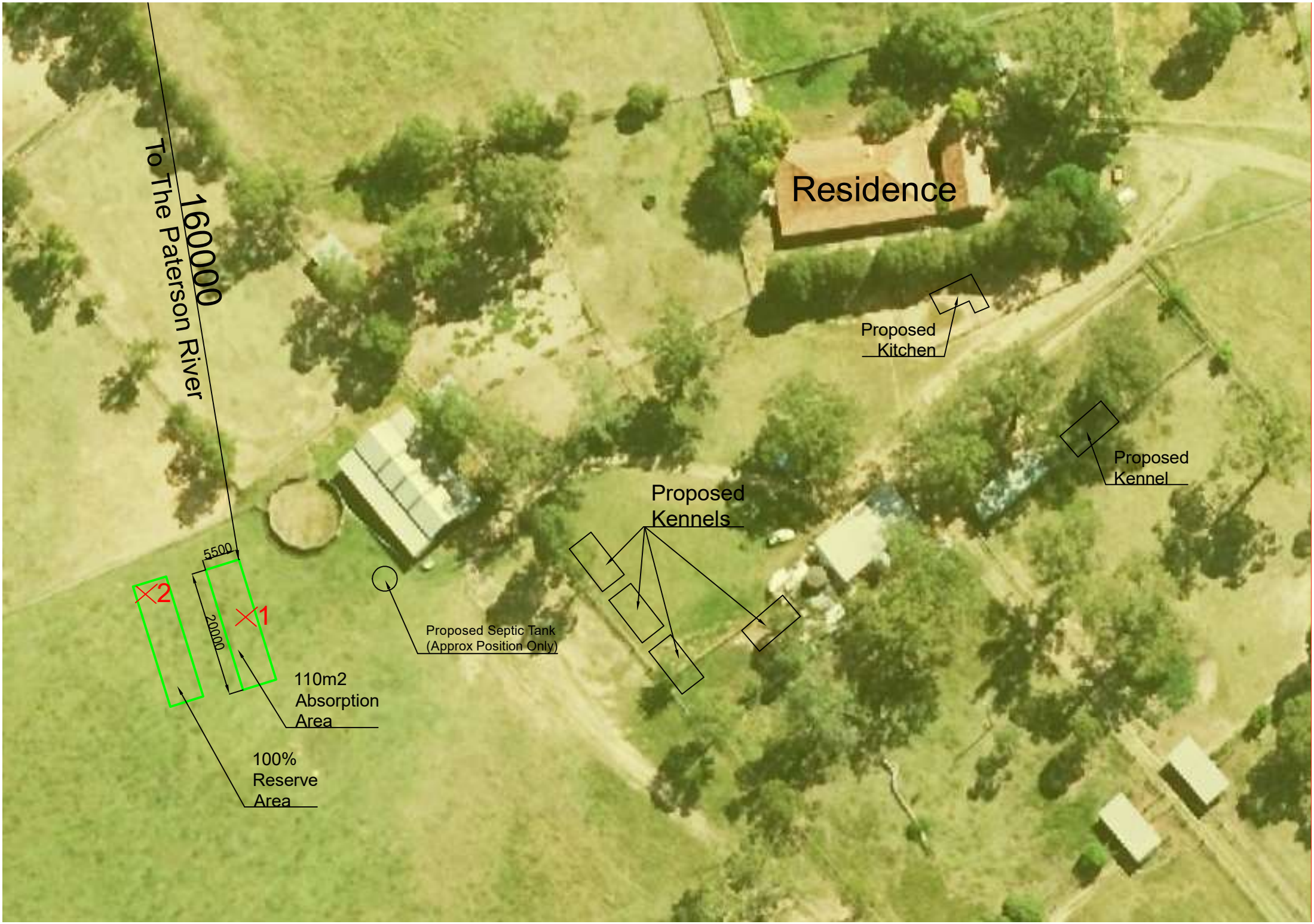
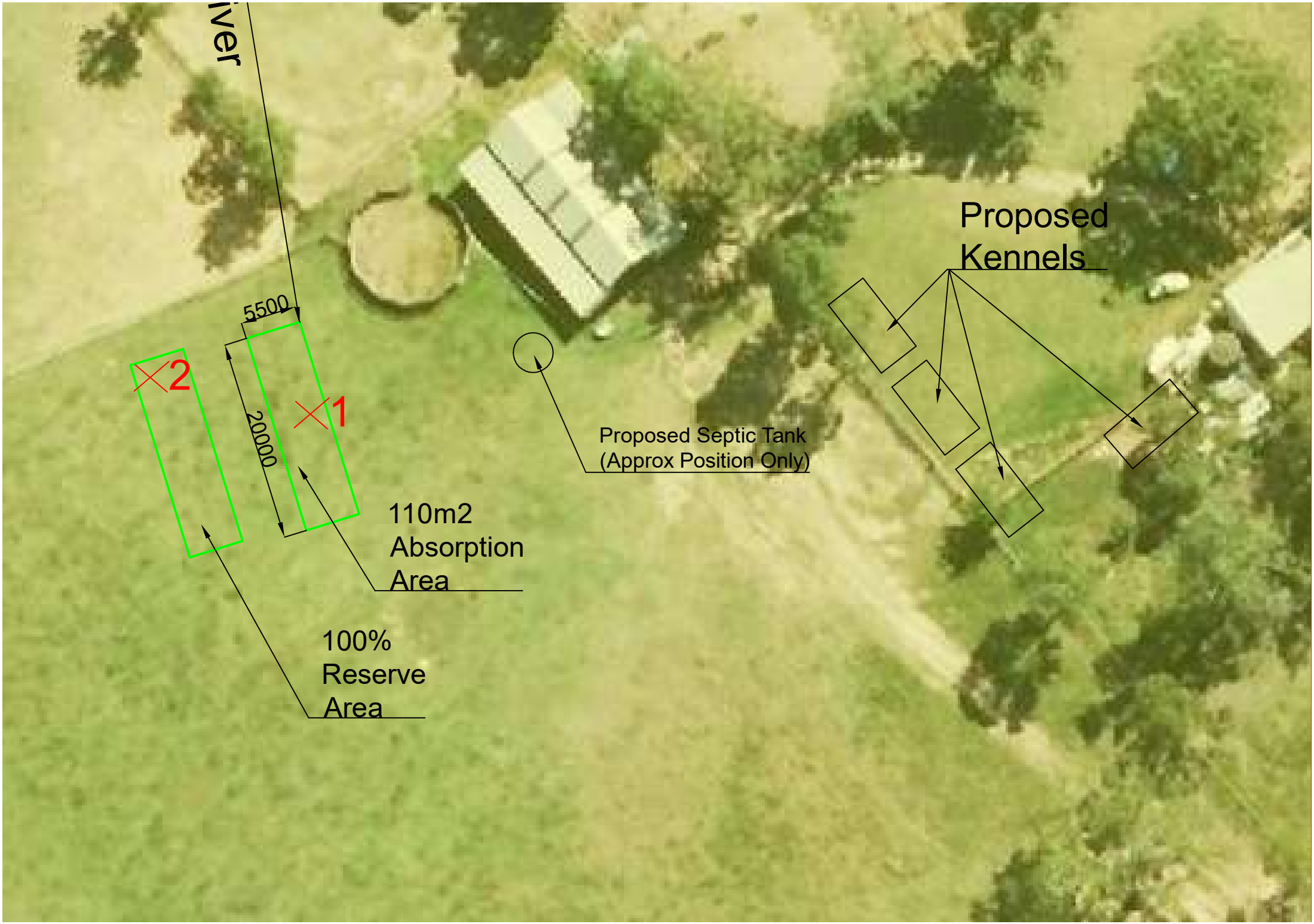
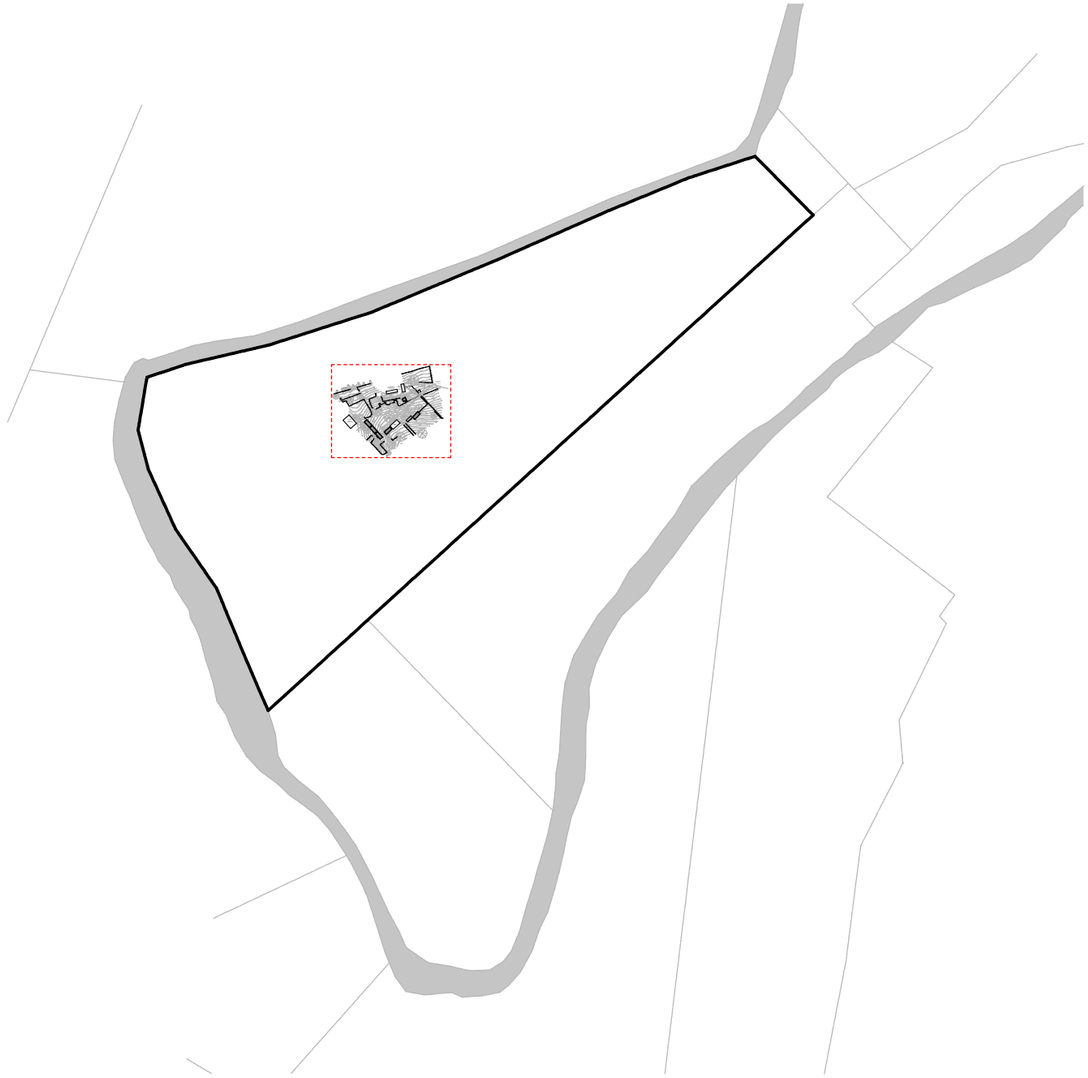
Appendix A – Site Plan


160000
To The Paterson River
Residence
Proposed
Kitchen
Proposed
Kennel
Proposed
Kennels
5500
20000
2
1
Proposed Septic Tank
(Approx Position Only)
110m2
Absorption
Area
100%
Reserve
Area


iver
5500
20000
2
1
Proposed Septic Tank
(Approx Position Only)
Proposed
Kennels
110m2
Absorption
Area
100%
Reserve
Area

Appendix B – Proposed Plans



LOCATION PLAN
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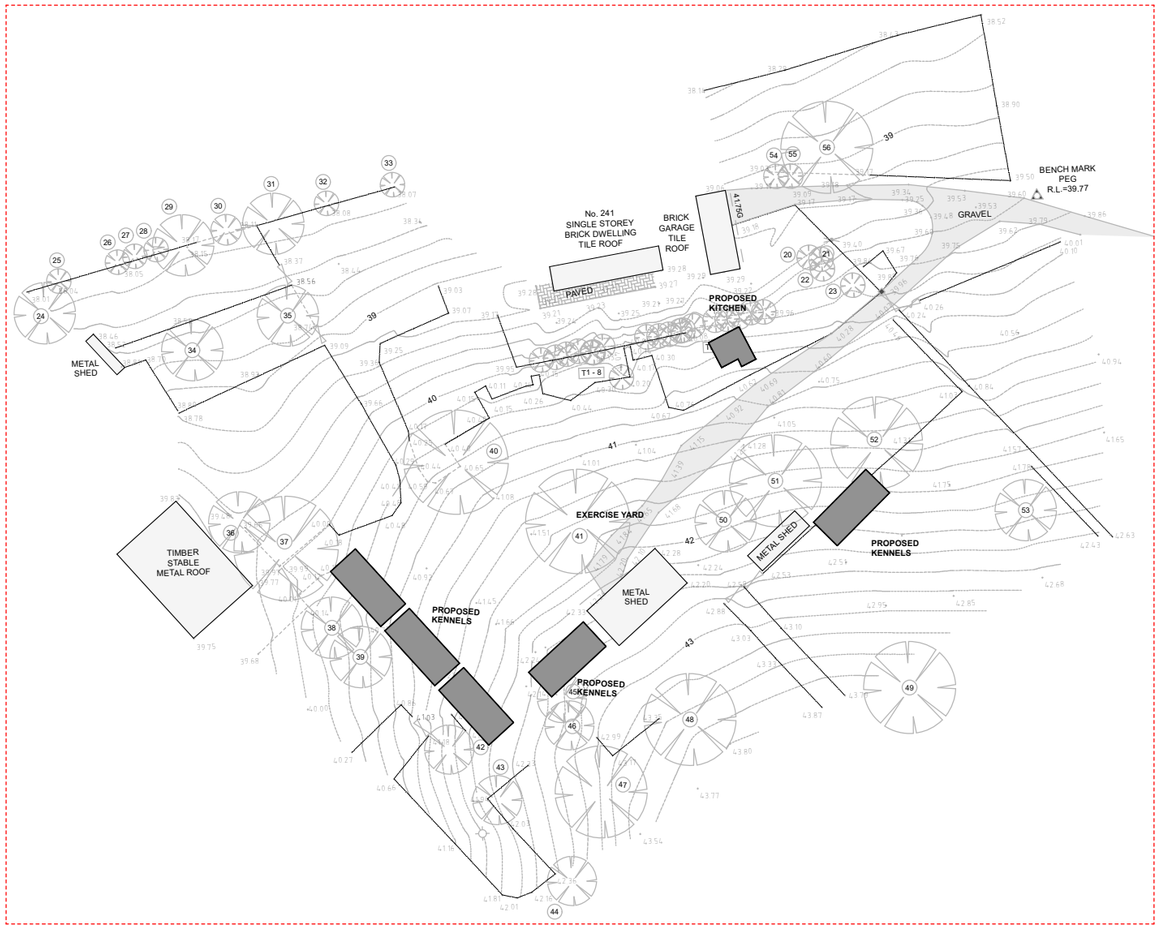

SITE PLAN
1:1000

CONTOUR
FENCE
TEL TELSTRA PIT
S SEWER
E ELECTRICITY
W WATER MAIN
T TELCOMUNICATIONS

EXISTING SHRUB/ TREE TO REMAIN
EXISTING SHRUB/ TREE TO BE REMOVED

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PROJECT: **PROPOSED KENNELS AT 241 FISHERS HILL ROAD, VACY**
CLIENT: **BLACKMAN**
TITLE: **SITE PLAN**
FILE: **2203315** DATE: **01/09/2022** SHEET: **1** OF **4**

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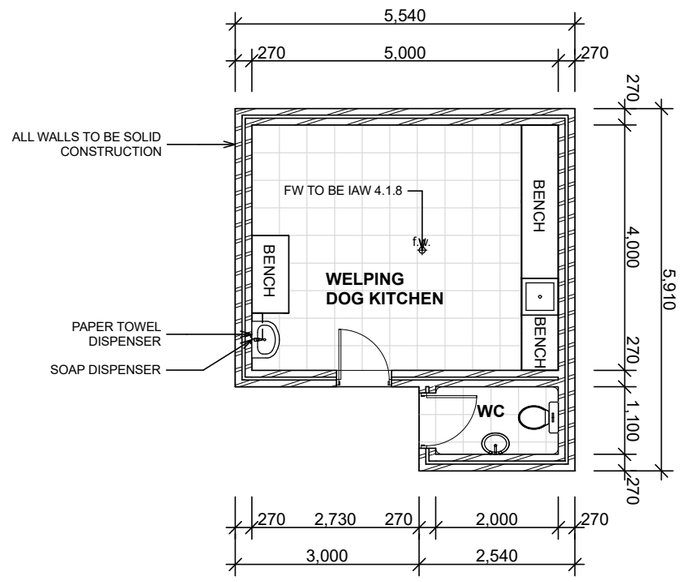
KITCHEN NOTES

ALL WORK TO COMPLY WITH AS4674-2004, DESIGN, CONSTRUCTION & FIT-OUT OF FOOD PREMISES.

1. CEILINGS ARE TO BE SMOOTH FINISHED.
2. WALL AND FLOOR JUNCTIONS ARE TO BE COVED WITH A MINIMUM RADIUS OF 25mm.
3. LIGHTING IS TO BE EASILY CLEANED, FLUSH FITTING TO CEILING AND COVERED TO CONTAIN TUBES IF THEY SHATTER.
4. ALL EQUIPMENT IS TO BE MOVABLE FOR CLEANING OR BUILT IN & VERMIN PROOFED.
5. SINKS ARE TO BE PROVIDED WITH HOT WATER.
6. WALLS & CEILINGS TO BE SEALED TO PREVENT ACCESS TO DIRT, DUST & PESTS.
7. WALL FINISHES IN FOOD PREP AREAS & OPEN FOOD AREAS SHALL BE GLAZED CERAMIC TILES, STAINLESS STEEL, WELDED VINYL SHEETING & ADHERED DIRECTLY TO WALL.
8. A DEDICATED HAND WASHING BASIN MUST BE PROVIDED & A SIGN AFFIXED TO THE WALL STATING 'HAND WASHING ONLY'.



FLOOR PLAN

1:100

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PROJECT: **PROPOSED KENNELS AT 241 FISHERS HILL ROAD, VACY**

CLIENT: **BLACKMAN**

TITLE: **KITCHEN FLOOR PLAN**

FILE: **2203315** DATE: **01/09/2022** SHEET: **2** OF **4**

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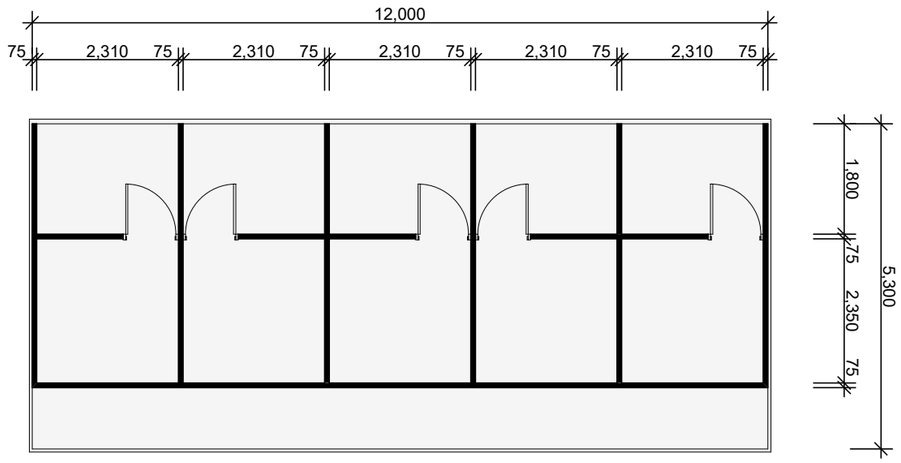

KENNEL BLOCK FLOOR PLAN

1:100

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CLIENT: **BLACKMAN**

TITLE: **KENNEL BLOCK FLOOR PLAN**

FILE: **2203315** DATE: **01/09/2022** SHEET: **3** OF **4**

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Appendix C – Laboratory Results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2228474**	Page	: 1 of 2
Client	: **GSL Environmental**	Laboratory	: Environmental Division Sydney
Contact	: Simon Doberer	Contact	: Customer Services ES
Address	: 71 Moona Creek Road Vincentia	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: Fishers HILL ROAD, VACY	Date Samples Received	: 10-Aug-2022 14:52
Order number	: 43822	Date Analysis Commenced	: 16-Aug-2022
C-O-C number	: ----	Issue Date	: 22-Aug-2022 11:06
Sampler	: Simon Doberer		
Site	: ----		
Quote number	: SY/175/20		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for the analysis.
~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Sample ID	**TP1**	**----**	**----**	**----**	**----**
			Sampling date / time	09-Aug-2022 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES2228474-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**5.3**	**----**	**----**	**----**	**----**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**125**	**----**	**----**	**----**	**----**
ED007: Exchangeable Cations								
Exchangeable Sodium	----	0.1	meq/100g	**2.6**	**----**	**----**	**----**	**----**
Cation Exchange Capacity	----	0.1	meq/100g	**13.3**	**----**	**----**	**----**	**----**
Exchangeable Sodium Percent	----	0.1	%	**21.0**	**----**	**----**	**----**	**----**
EK072: Phosphate Sorption Capacity								
Phosphate Sorption Index	----	1	mgkg-1/log10 ugL-1	**53**	**----**	**----**	**----**	**----**

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: GSL Environmental	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 71 Moona Creek Road, VINCENTIA		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Fishers Hill Road, VACY	ALS QUOTE NO.: SY/175/20	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:43822		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Simon Doberer	CONTACT PH: 0416935868	OF: 1 2 3 4 5 6 7	Other comment: 21-5
SAMPLER: Simon Doberer	SAMPLER MOBILE: 0416935868		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): gslenvironmental@outlook.com			
Email Invoice to (will default to PM if no other addresses are listed): gslenvironmental@outlook.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Simon Doberer			
DATE/TIME: 10/08/2022	DATE/TIME: 10.8.22 2:52	DATE/TIME: 10-8-22 5	DATE/TIME: 10.8.22 7:30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	IN-4S	ED006	EK072						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	TP1	9/08/2022	s		1	1	1	1						
SHIPMENT TOTALS					1	1	1	1						

Environmental Division
Sydney
Work Order Reference
ES2228474

Telephone : + 61-2-8784 8555

Appendix D – Operation and Maintenance Guideline

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.

C

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.

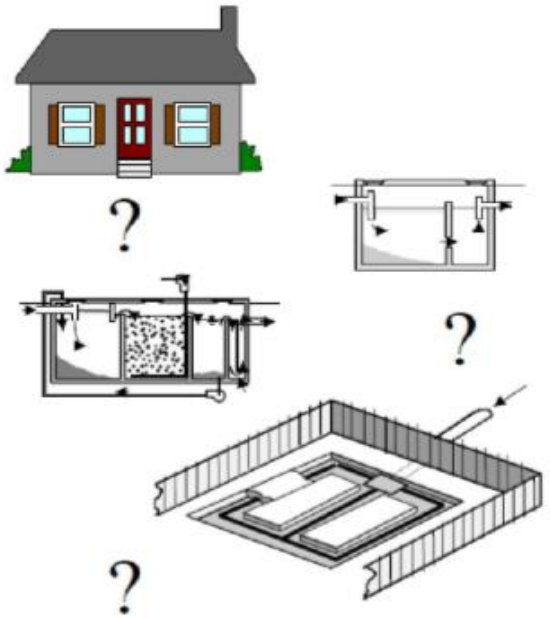
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

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



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).

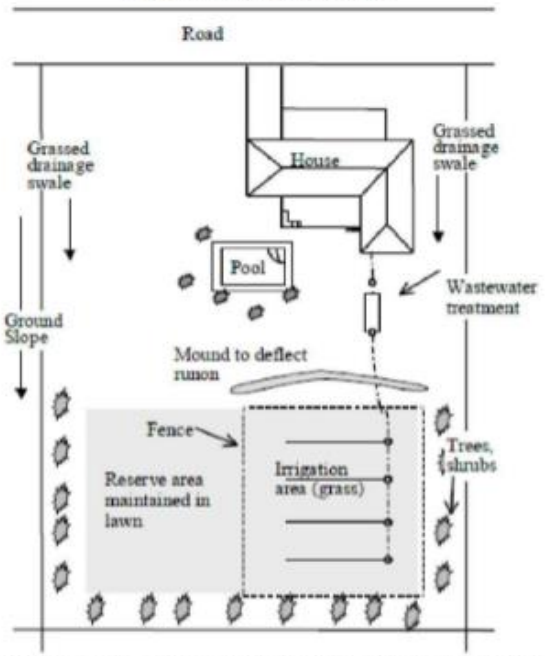
Soil absorption systems do not require highly treated effluent, and wastewater treated by a septic tank is reasonable as the solids content in the effluent has been reduced. Absorption systems release the effluent into the soil at a depth that cannot be reached by the roots of most small shrubs and grasses. 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.

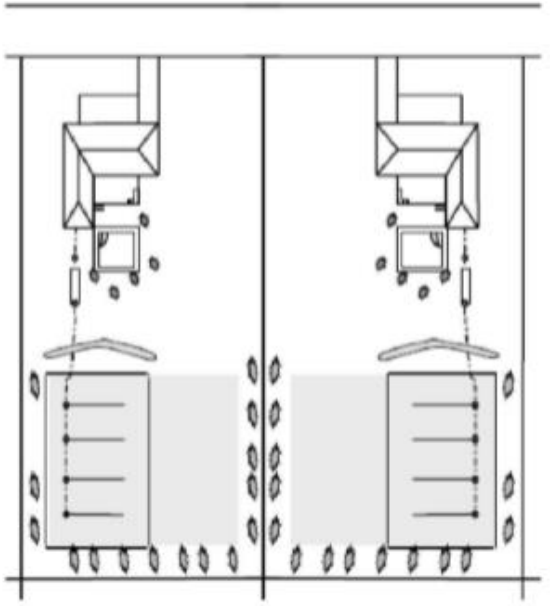
HELP PROTECT YOUR HEALTH AND THE ENVIRONMENT

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.

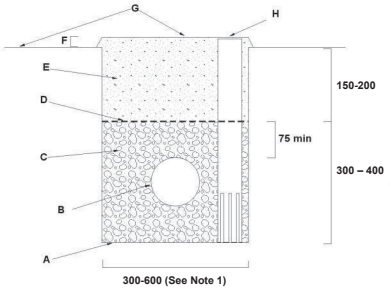
For more information please contact:

Your Land Application Area

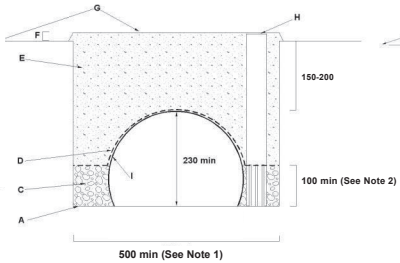


Appendix E – Absorption Bed Schematic

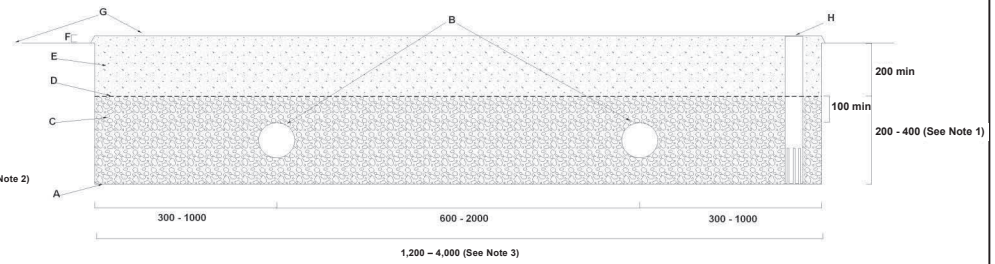
Cross Section: Piped Trench



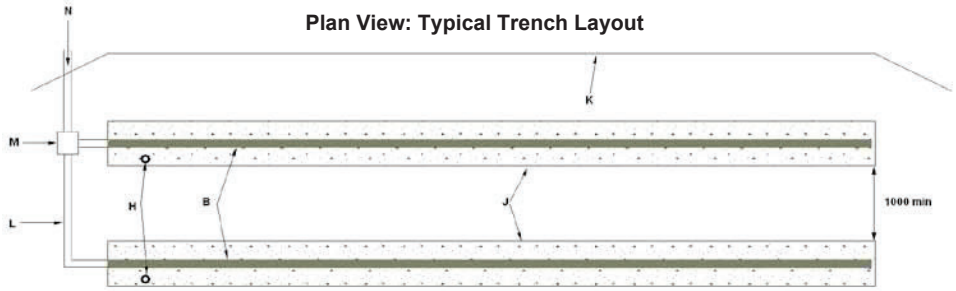
Cross Section: Arch



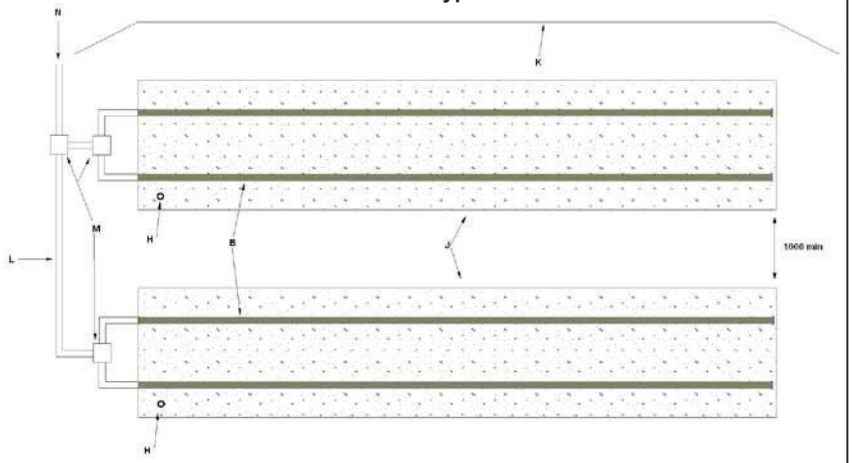
Cross Section: Conventional Piped Bed



Plan View: Typical Trench Layout



Plan View: Typical Bed



Absorption Trench / Bed

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 90-100 mm slotted PVC pipe.

C 20-40 mm distribution aggregate.

D Geotextile filter cloth.

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

F Allowance for settling after backfilling.

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

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

I Self supporting arch trench that complies with AS/NZS1547:2012.

J Trench / bed dimensions are an example only. The basal area of the land application area must be determined according to the procedures set out in AS/NZS1547:2012 and this document. 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. It is essential that effluent is distributed evenly to all units on a daily basis.

K Upslope stormwater diversion drain (see Standard Drawing No.9A for design detail). Subsoil drainage may be necessary on particular sites.

L 90-100 mm PVC gravity dosing pipe.

M Gravity splitter box to distribute effluent evenly between two to four separate trenches / beds. Should also be used to evenly dose multiple pipework within a single trench / bed.

N Gravity or pump fed effluent from treatment system.

Notes

1 Trenches should be a maximum of 600 mm (piped trench) or 1,000 mm (arch trench) wide. Optimum width will balance storage requirements against footprint and required trench length.

2 100 mm of aggregate is the minimum depth. Depth can be increased to provide more storage if required, however, a minimum 150-200 mm of topsoil must exist above the top of the arch trench material. Alternative proprietary void / support materials are available to provide a substitute for both aggregate and arch trench.

3 Consideration should be given to maintaining a level base when determining an appropriate width.

Gravity-fed beds are generally not suitable for sites with highly permeable soils due to difficulties in maintaining even distribution. Primary-treated effluent should not be dosed; effluent should at least be secondary-treated. Pressure dosing should be used in such soils.

Standard Drawing 10B - Absorption Trench / Bed

(not to scale)