barnson.
DESIGN . PLAN . MANAGE

Site and Soil Assessment for On-site Effluent Management System

Client: Parkview Capital
c/- Wild Modular
Site Address: 85 Rocky Waterhole Road
Mudgee, NSW 2850

5 June 2025

Our Reference: 46561-ER01_C

CONTENTS

TABLES

FIGURES

APPENDICIES

DISCLAIMER

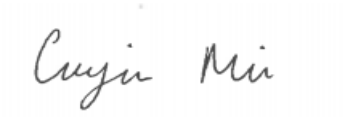
This report has been prepared solely for Wild Modular in accordance with the scope provided by the client and for the purpose(s) as outlined throughout this report.

Installation must be by a licensed plumber and Barnson will not be liable for the incorrect installation and/or construction of the system. Installation and construction of the system must hold true to the design recommendations presented in this report. Installation should be in accordance with the prescriptions within AS 1547:2012.

Unless otherwise stated in this report, Barnson has not verified the accuracy or completeness of the data retrieved from online databases and guidance documents. The recommendations for the proposed system as presented in this report are based on historical data obtained for the area. Barnson will not be liable in relation to incorrect recommendations should any information provided by the client be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed.

The accuracy of the advice provided in this report may be limited by unobserved variations in ground conditions across the site in areas between and beyond test locations and by any restrictions in the sampling and testing which was able to be carried out, as well as by the amount of data that could be collected given the project and site constraints. These factors may lead to the possibility that actual ground conditions and materials behaviour observed at the test locations may differ from those which may be encountered elsewhere on the site. If the sub-surface conditions are found to differ from those described in this report, we should be informed immediately to evaluate whether recommendations should be reviewed and amended if necessary.

Project:	Lot 2 DP1283989, 85 Rocky Waterhole Road, Mudgee NSW 2850
Client:	Parkview Capital c/- Wild Modular
Project Number:	46561
Report Reference:	46561-ER01_C
Date:	5/06/2025

Prepared by:	Reviewed by:
	
Georgina Moir **BEnvSc** Environmental Scientist	**Andrew Ruming** **BSc** Senior Environmental Geologist

1.0 SYSTEM OVERVIEW

The following table provides a summary of the information for a sustainable onsite effluent management system proposed at Lot 2 DP1283989, 85 Rocky Waterhole Road, Mudgee NSW 2850. The exiting onsite wastewater management systems are failing and require upgrading to accommodate additional wastewater flows. The sections of this report that follow, provide site specific details justifying the recommended system.

Table 1: System Overview

Site Assessor	Georgina Moir
Client	Parkview Capital c/- Wild Modular
Site Location	Lot 2 DP1283989 85 Rocky Waterhole Road, Mudgee NSW
Proposed Development	The proposed onsite development includes the extension and remodelling of the existing Cellar Door/Restaurant, demolition of the existing Residence and development of the proposed Bath House as well as the development of sixteen Luxury Villas (Appendix D).
Number of Occupants	Cellar Door/Restaurant: 120 person restaurant capacity 4 person staff quarters 120 guests per large event (large events are expected to occur twice a month) Residence/Bath House: 80 guests per day Luxury Villas: 15 people per night in the Super Lux 2 Bedroom Villas 6 people per night in the Lux 2 Bedroom Villas 18 people in the Lux 1 Bedroom Villas
Water Source	Rainwater roof collection
Estimated Daily Flow (L/day)	Wastewater produced from the Cellar Door/Restaurant, Residence/Bath House and sixteen Luxury Villas will consolidate and flow into one onsite effluent management system. The daily flow for the Cellar Door/Restaurant is expected to be 3,343litres/day based on 120 restaurant occupants at 20litres/person/day, 4 Cellar Door Staff

	Members at 150litres/person/day and 120 people per large event base on 20 litres/person/event. Large events are expected to occur twice per month. The daily rate of sludge/scum accumulation is expected to be approximately 14litres/day based on 120 resturant occupants, 4 staff members and 120 event guests as per SA Onsite Wastewater System Code. The daily flow for the Residence/Bath House is expected to be 3,200litres/day based on 80 guests at 40litres/person/day. The daily rate of sludge/scum accumulation is expected to be approximately 5.5litres/day based on 80 guests as per SA Onsite Wastewater System Code. The daily flow for the sixteen Luxury Villas is expected to be 3,900litres/day based on 39 guests at 100litres/person/day. The daily rate of sludge/scum accumulation is expected to be approximately 5.1litres/day based on 39 guests as per SA Onsite Wastewater System Code. The total expected system output is 10,443 litres per day.
Proposed System	Aerated Wastewater Treatment System (AWTS) dispersed into Wisconsin Mounds.
Sub Soil Assessment Class	Field assessment and subsequent laboratory tests have classed the subsoil as category 4, as shown in section 3.7.
Sub Soil Recommended Hydraulic Loading mm/day (DIR/DLR)	Wisconsin Mounds in category 4 soils have a design loading rate of 16mm/day (refer to Table 7).
Recommended Effluent Application Type	Due to the presence of category 4 soil (Clay Loams) and limited suitable accessible area onsite, it is recommended to disperse of AWTS secondary treated effluent onsite to absorption mounds. The suitability of the Option C recommended application area is preliminary and dependent on a formal investigation and analysis of the site and soil. The proposed application area, Option C, is outlined in Figure 3.
Effluent Design Criteria	As per section 6.0, the tank system must accommodate a minimum of 10,443litres/day.

	As per section 7.0, 4 x mounds 29.82m long, 13.15m wide and 1.275m high with a side slope of 1V:3H is required to dispose of the secondary treated effluent.
Additional Notes	1. It should also be noted that the AWTS requires a continuous power supply – and the system should not be switched off when not in use. 2. In the event the AWTS is powered down for more than 1-2 days, recommissioning will normally take between 2-4 weeks to establish a stable treatment process. 3. Appropriate subsurface irrigation components are to be selected. 4. AWTS's are particularly sensitive to cleaning products containing disinfectants and bleaches. They are also sensitive to herbicides, weedicides and pharmaceuticals such as antibiotics. 5. The wastewater calculations should be revised and a new system recommended if there is an increase in the occupancy. 6. Minor drainage lines exist within the allotment. It is recommended that an upslope diversion bank is installed above the application area to ensure flow is diverted around the area. Care should be taken to ensure the propsoed system is not within the drainage lines. 7. The proposed application area should be terraced due to the significant slope and proximity to drainage lines. Terracing will assist in increasing evapotranspiration and deep infiltration and decrease runoff.

2.0 INTRODUCTION

2.1 Overview

Barnson Pty Ltd on behalf of Wild Modular have prepared this report for submission to Mid-Western Regional Council. This report provides direction for sustainable on-site effluent management for a proposed development, on Lot 2 DP1283989, at 85 Rocky Waterhole Road, Mudgee NSW (refer Figure 1).

The client has indicated the existing Cellar Door and existing Residence are each serviced by separate failing trench/bed systems on the site. Both failing systems are easily identifiable by the overgrown aquatic vegetation surrounding the system (Plate 1 and Plate 2). Both systems are unsuitable for the proposed development based on the increased in wastewater loading, soil conditions and current state of both application areas. The existing systems will require decommissioning in accordance with NSW Health Advisory Note 3 *Destruction, Removal or reuse of Septic Tanks, Collection Wells, Aerated Wastewater Treatment Systems and Other Sewerage Management Facility Vessels*. The existing trench/bed application areas should be remediated by application of lime, cultivation and aeration.

2.2 Key References

The following key references were utilised as part of this assessment:

- AS/NZS 1547:2012. *On-site Domestic Wastewater Management;*
- NSW Government 1998. *On site Sewerage Management for Single Households* (The Silver Book/OSMSH);
- NSW Government 2000. *The Easy Septic Tank Guide*. Developed by Social Change Media for the NSW Department of Local Government;
- NSW Health, 2016. 'Septic Tank and Collection Well Accreditation Guidelines";
- Mid-Western Regional Council Local Environment Plan, 2012;
- Mid-Western Regional Council 'On-Site Sewage Management Plan' (2008);
- Murphy B.W. & Lawrie J.W. 1998. Soil Landscapes of the Dubbo 1:250 000 Sheet Report, DLWC.
- Sydney Catchment Management Authority, 2023. *Designing and Installing On-Site Wastewater Systems;*
- SA Onsite Wastewater System Code, April 2013

2.3 Onsite Effluent Management System

The proposed onsite effluent management system for this site consists of a AWTS and areas for dispersion of treated effluent onsite. Figure 1 and 2 illustrates the site location. Figure 3 illustrates the borehole locations, buffer plan and proposed application areas.

The suitability of the Option C recommended application area is preliminary and dependent on a formal investigation and analysis of the site and soil. The proposed application area, Option C, is outlined in Figure 3.

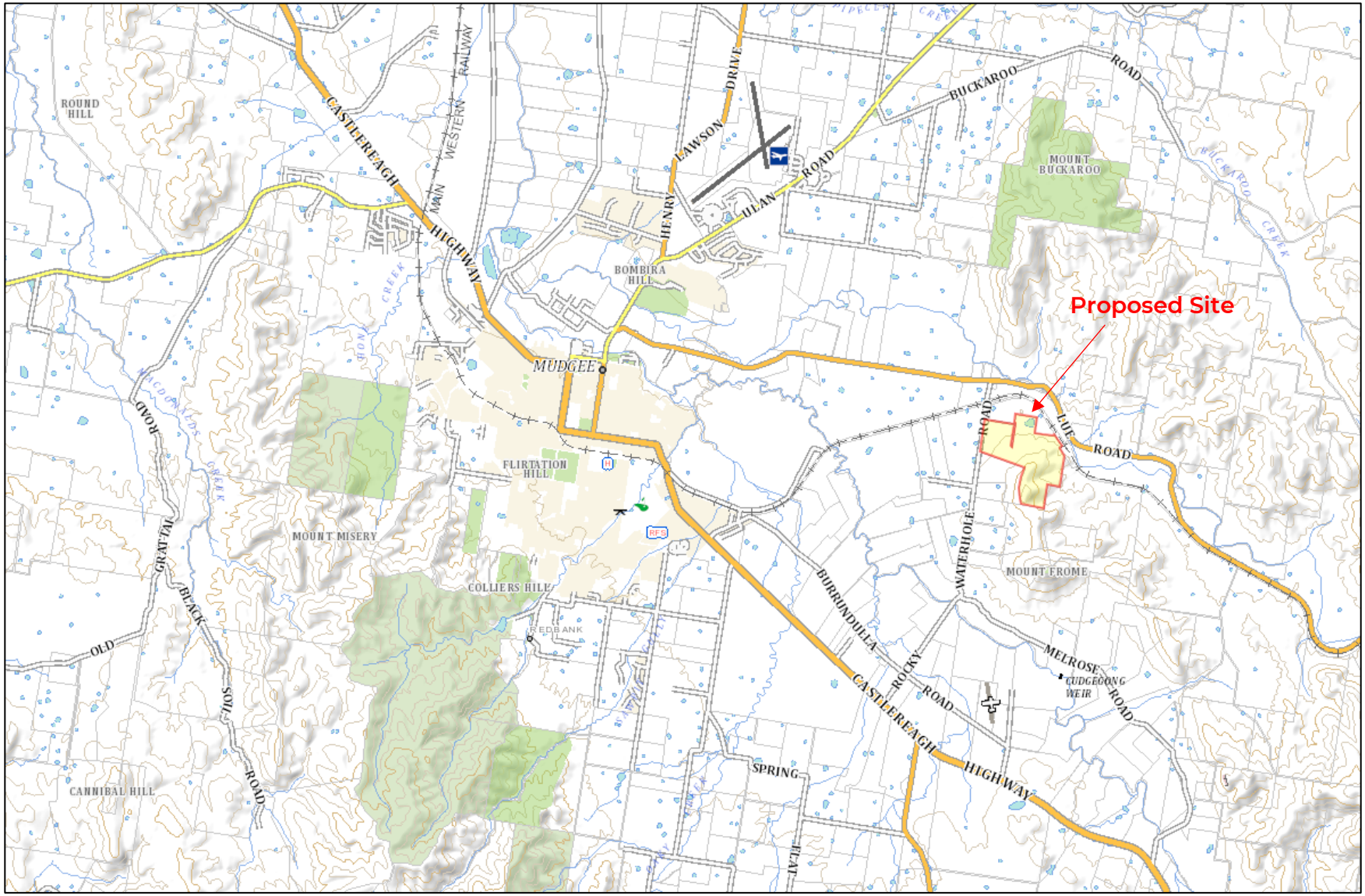
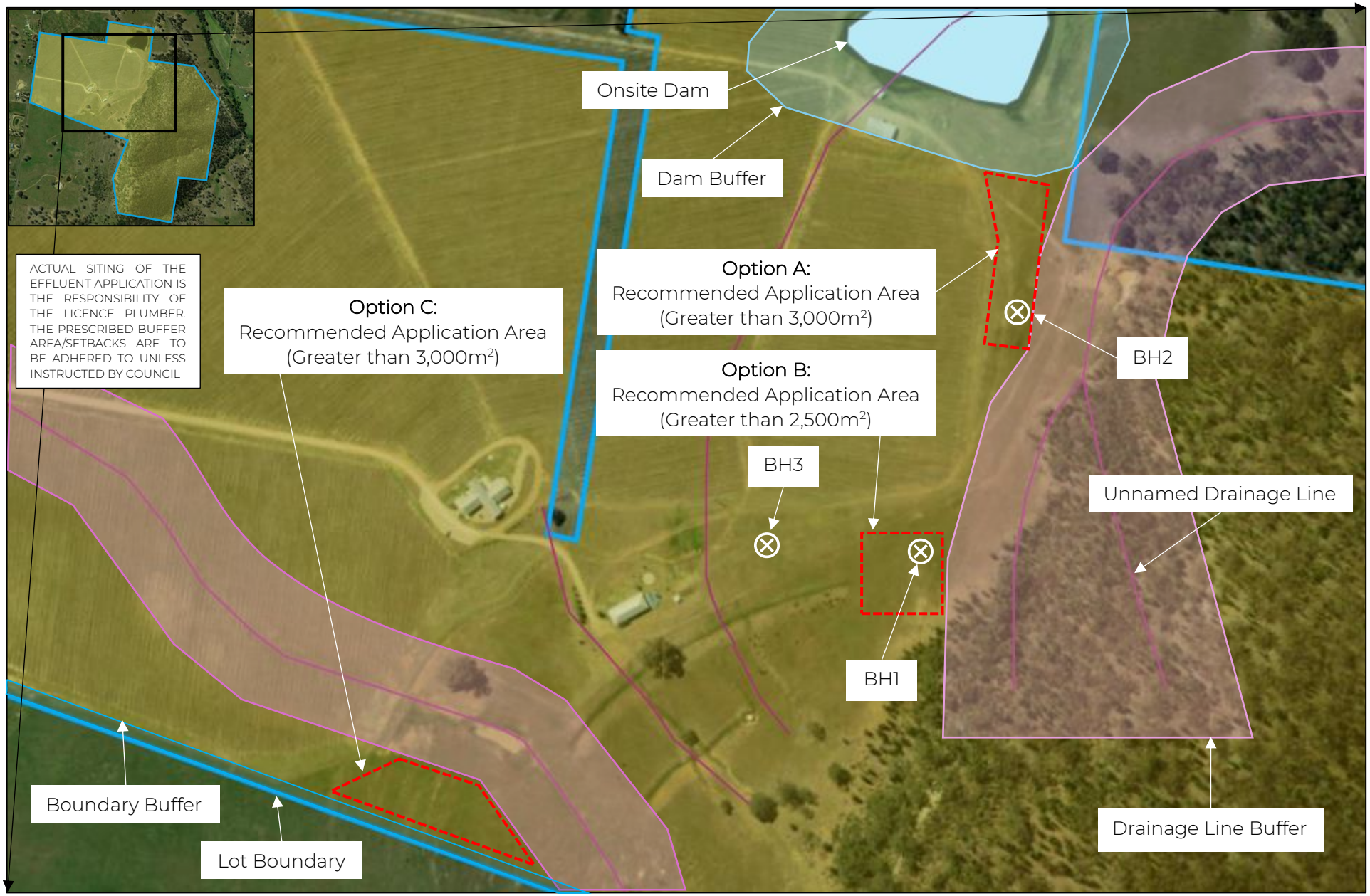


Figure 1: Site Locality

Figure 2: Site Location Plan



barnson.
DESIGN . PLAN . MANAGE

BARNSON PTY LTD
t 1300 BARNSON (1300 227 676)
e generalenquiry@barnson.com.au
w www.barnson.com.au
Bathurst I Coffs Harbour I Dubbo I Mudgee I Orange I Sydney I Tamworth

Scale: Approximate Scale 1: 3,500
0 35 70 140m

Client: Wild Modular

Figure 3: Buffer and Setback Map

Project:	46561
Drawn:	GM
Check:	AR
Revision:	A
Date:	5.6.2025

3.0 SITE AND SOIL EVALUATION

3.1 Site Evaluators Details

The following table provides an overview of the evaluator's particulars.

Table 2: Details

Name/Role	Georgina Moir
Role/Qualifications	Environmental Scientist
Company	Barnson Pty Ltd
Company Address	9 Cameron Place, Orange NSW 2800
Contact Details	1300 BARNSON
Date of Assessment	21/02/2025

3.2 Site Information

The following table provides an overview of the site information.

Table 3: Site Particulars

Address/Locality	Lot 2 DP1283989 85 Rocky Waterhole Road, Mudgee NSW
Local Government Area	Mid-Western Regional Council
Owner	Parkview Capital
Client Representative	Wild Modular
Block Configuration	Approximately 85ha
Intended Water Supply	Rainwater roof collection
Intended Power Supply	Supplied
Local Experience	Care needs to be taken to minimise runoff and erosion. Systems commonly malfunction due to lack of ongoing maintenance. The system is to be inspected and maintained regularly in accordance with manufacturer details, Council requirements, and prescriptions identified in this report.

3.3 Desktop Assessment

The following information was obtained via desktop review of the site.

Table 4: Desktop Assessment Details

Climate Overview[1]	Annual Average Rainfall for Mudgee is 666.6mm. Warm summers with large evaporative deficit, cool winters with small evaporative deficit. The mean summer monthly rainfall (January) is 67.3mm. The mean winter rainfall (July) is 46.7mm.	
Soil Landscape Reference[2]	Area has been mapped within the 'Buckeroo" Landscape Group. This soil landscape comprises undulating to rolling low hills. Grey-green shale, felspathic arenite, conglomerate, some dolomitic limestone. Shallow, stony Non-calcic Brown Soils mid-slope grading upslope into skeletal fine sandy loams and loams. Non-calcic Brown Soils on lower footslopes. Some Yellow Podzolic Soils along with Yellow Podzolic-Solodic Soils in depressions. Terra Rossa Soils are associated with limestone outcrops.	
	Surface Conditions	Gravelly, friable to hardsetting
	Drainage	Moderately well-drained
	Available water holding capability	Low
	Water table depth	>profile depth
	Depth to bedrock	40 to 60cm
	Flood hazard	Nil
	Expected Nutrient deficiencies	Nitrogen, Phosphorus
	Soil Salinity	Low
	Erosion Hazard	Low
Underlying Geology[3]	*"Crystal-rich feldspathic-lithic sandstone, shale, pebbly sandstone and conglomerate".*	
Groundwater Review	One water bore was found within 500m of the proposed site, as illustrated in **Figure 4.** The area is partially mapped as being groundwater vulnerable as per the Mid-Western Regional Council LEP map GRV_006 **Figure 5.**	

[1]Bureau of Meteorology online Climate Data website

[2]NSW Soil and Land Information System

[3]Dubbo 1:250000

3.4 Groundwater Review

One water bore was identified as occurring within the general area of the allotment. Information relating to historic groundwater report details on water bearing zones and standing water levels is provided in the table below.

Table 5: Groundwater Review

Groundwater Bore Reference	Total Depth (m)	Water Bearing Zones (m)	Standing Water Level (m)	Yield (L/s)	Salinity Description
GW808053 Stock, Domestic	66.00	63.00-63.20	36.00	5.00	N/a

No groundwater was encounter during the site investigation. From this information it can be determined that in this locality, subsequent contamination by secondary treated effluent is not a risk factor.

3.5 Surface Water Review

The proposed application area drains to the northwest. The Cudgegong River is located approximately 3km west of the proposed application area. One dam is located on the site, approximately 40m north of the proposed application area. The Lawson Creek is located approximately 400m east of the proposed application area. Six unnamed tributaries run through the site, located approximately 40m east, 180m west, 350m southwest, 450m southwest, 450m southeast and 600m southeast. There are various dams located on neighbouring lots.

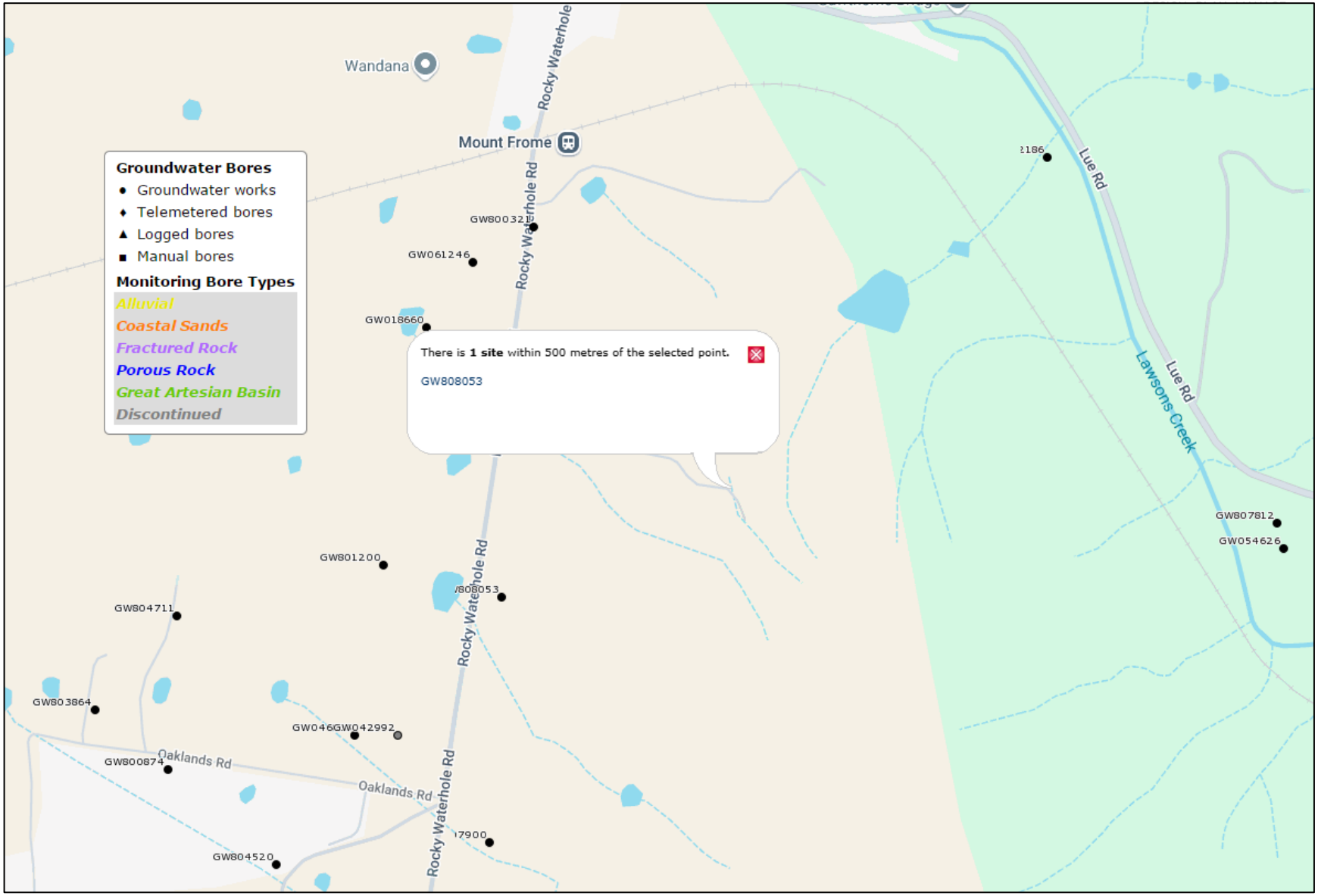


Figure 4: Groundwater Bores within the Locality

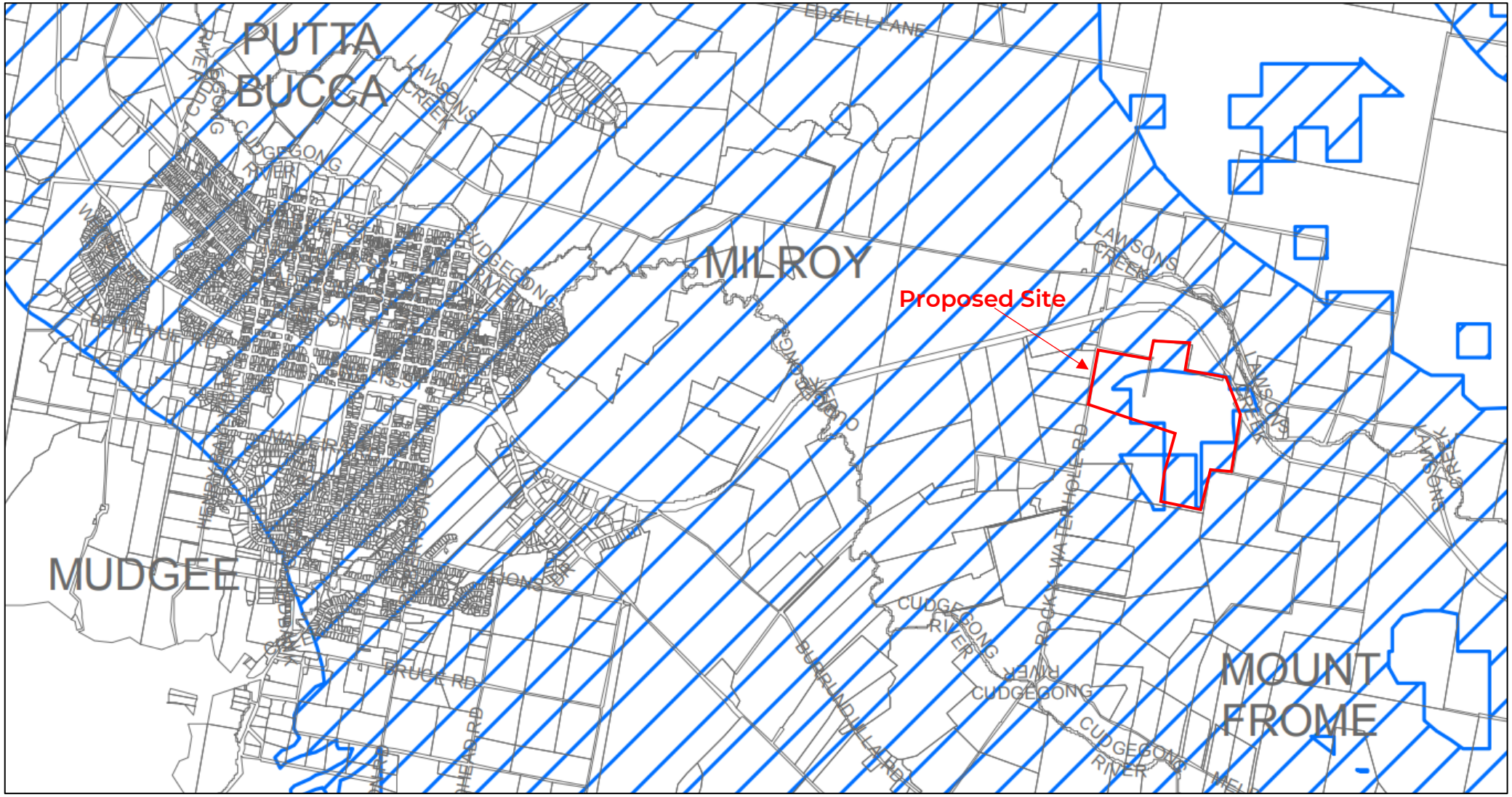


Figure 5: Mid-Western Regional LEP Groundwater Vulnerability Map GRV_006

3.6 Field Assessment Information

A field inspection was conducted on 21/03/2025. The following table provides detail on the site assessment as well as the field and laboratory results.

Table 6: Site Assessment Details

Exposure	Good exposure. Grasses and sedges dominate the groundcover. Groundcover is good with 95% coverage.	
Slope	The site is has a moderate slope to the west	
Elevation	Approximately 520m	
Run-On	Low	
Seepage	None	
Erosion Potential	Low due to vegetation cover	
Site Drainage	Moderate. Drainage towards the west.	
Fill	None encountered	
Surface rock/Outcrops	None encountered	
Is there sufficient land area for:	Application system, including buffers	Yes
	Reserve application system	Yes

3.7 Soil Assessment

Three boreholes were drilled to 1.5m or refusal and nine soil samples were collected and returned to Barnson Pty Ltd for analysis on 21/02/2025. The samples were collected at varying depths from the borehole and analysed for physical and chemical properties. Borelogs with results are provided at Table 7. Field assessment parameters were also obtained. The following table provides detail on both field and laboratory assessment results.

Table 7: Soil Assessment Details

Depth to bedrock or hardpan via field assessment		>1.0m
Depth to high soil water table via field assessment		>1.5m
Soil Analysis	Estimated Soil Category – topsoil, subsoil A, subsoil B	3, 3, 2
	Structure massive, weak, high, moderate, strong (Field)	High/Moderate Structured
	Sub soil Permeability (from table 5.2 of AS 1547:2012)	0.5-1.5(k_{sat}) (m/d) 20.8-62.5 (mm/hr) (Infiltration is moderate)
	Recommended Hydraulic Loading for disposal system (from Table 5.2 of AS 1547:2012)	16mm per day (For effluent disposal mounds)

Table 8: Soil Profile Description and Results

Depth	Description	Sampled (mm)	Texture Group	Moisture	Emerson Aggregate Test*	pH (1:5 Water)	ECe dS/m
Test Hole 1							
0-700	Strong brown fine sandy clay loam	100	FSCL	D	3	6.03	0.03
700-1000	Pale yellowish brown gravelly clayey sand (weathered rock)	700 1000	GCS GCS	D D	3 2	6.28 6.44	0.02 0.01
1000	End of hole due to refusal on weathered rock						
Test Hole 2							
0-1000	Dark brown fine sandy clay loam	100	FSCL	D	3	6.03	0.03
300-1000	Dark brown sandy clay loam with weathered rock	700	SCL	D	3	6.19	0.02
1000-1400	Light brown clayey sand (weathered rock)	1000	CS	D	2	6.08	0.01
1400	End of hole due to refusal on weathered rock						
Test Hole 3							
0-400	Dark brown fine sandy clay loam	100	FSCL	D	2	7.0	0.43
400-600	Dark brown sandy silty clay with coarse weathered rock	600	SZC	D	2	7.0	0.08
600-800	Light brown sandy clay						
800-1300	Light brown silty clay	1000	SC	D	5	7.1	0.15
1300-1500	Pale brown sandy clay						
1500	End of hole at target depth						

M=Moist, D=Dry, W=Wet *1= highly dispersive (slakes, complete dispersion), 2= moderately dispersive (slakes, some dispersion), 3= slightly dispersive (slakes, some dispersion after remoulding), 4= non-dispersive (slakes, carbonate or gypsum present), 5= non-dispersive (slakes, dispersion in shaken suspension) 6= non-dispersive (slakes, flocculates in shaken suspension), 7= non-dispersive (no slaking, swells in water), 8= non-dispersive (no slaking, does not swell in water).

4.0 SITE AND SOIL LIMITATION ASSESSMENT

The following two limitation tables are a standardised guide to the site and soil characteristics which may limit the suitability of the site for effluent disposal and which require attention through specific management practises. The tables have been reproduced from the NSW Government endorsed '*On-Site Sewerage Management for Single Households*' (1998), Tables 9 and 10. The highlighted categories represent site and soil conditions of the land covered in this report.

Table 9: Site Limitation Assessment

Site Feature	Relevant System	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Flood Potential	All land application systems	> 1 in 20 years		Frequent below 1 in 20 years	Transport in wastewater off site
	All treatment application systems	Components above 1 in 100 years		Components below 1 in 100 years	Transport in wastewater off site system failure
Exposure	All land application systems	High sun and wind exposure		Low sun and wind exposure	Poor evaporation transpiration
Slope %	Surface Irrigation	0-6	6-12	>12	Runoff, erosion potential
	Sub-surface irrigation	0-10	10-20	>20	Runoff, erosion potential
	Absorption	0-10	10-20	>20	Runoff, erosion potential
Landform	All systems	Hillcrests, convex side slopes and plains	Concave side slopes and foot slopes	Drainage plains and incised channels	Groundwater pollution hazard, resurfacing hazard
Run-on and upslope seepage	All land Application Areas	None-low	Moderate	High, diversion not practical	Transport of wastewater off site
Erosion potential	All land application systems	No sign of erosion potential		Indications of erosion e.g. rils, mass failure	Soil degradation and off-site impact
Site drainage	All land application systems	No visible signs of surface dampness		Visible signs of surface dampness, such as moisture-tolerant veg	Groundwater pollution hazard, resurfacing hazard
Fill	All systems	No fill	Fill present		Subsidence
Land area	All systems	Area available		Area not available	Health and pollution risk
Rock and rock outcrop	All land application systems	<10%	10-20%	>20%	Limits system performance
Geology	All land application systems	None		Major geological discontinuities, fractured or highly porous regolith	Groundwater pollution hazard

Table 10: Soil Limitation Assessment

Soil Feature	Relevant System	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Depth to bedrock or hardpan (m)	Surface and sub-surface irrigation	> 1.0	0.5-1.0	< 0.5	Restricts plant growth
	Absorption	> 1.5	1.0-1.5	< 1.0	Groundwater pollution hazard
Depth to seasonal water table (m)	Surface and sub-surface irrigation	> 1.0	0.5-1.0	< 0.5	Groundwater pollution hazard
	Absorption	> 1.5	1.0-1.5	< 1.0	Groundwater pollution hazard
Permeability Category	Surface and sub-surface irrigation	2b, 3 and 4	2a, 5	1 and 6	Excessive runoff and waterlogging
	Absorption	3, 4		1, 2, 5 and 6	Percolation
Coarse fragments %	All systems	0-20	20-45	>40	Restricts plant growth, affects trench installation
Bulk density (g/cc) **SL** **L, CL** **C**	All land application systems	 < 1.8 < 1.6 < 1.4		 > 1.8 > 1.6 >1.4	Restricts plant growth, indicator of permeability
pH	All land application systems	> 6.0	4.5-6.0	-	Reduces plant growth
Electrical conductivity (dS/m)	All land application systems	<4	4-8	>8	Restricts plant growth
Sodicity (ESP)	Irrigation 0-0.4m; absorption 0-1.2mtr	0-5	5-10	> 10	Potential for structural degradation
CEC mequiv/100g	Irrigation systems	> 15	5-15	< 5	Nutrient leaching
P sorption kg/ha	All land application systems	> 6000	2000-6000	< 2000	Capacity to immobilise P
Modified Emerson Aggregate Test – (dispersiveness)	All land application systems	Class 3, 4	Class 2	Class 1	Potential for Structural degradation.

5.0 SYSTEM REQUIREMENTS

5.1 Mid-Western Regional Council Setback Requirements

The Mid-Western Regional Council 'On-Site Sewage Management Plan' (2008), provides recommended buffer distances. For this design, the following must be taken into consideration.

5.1.1. All Land Application Systems

- 80m to permanent surface waters (e.g. river, streams, lakes, etc.);
- 50m to domestic groundwater well on applicant's property and 200m to any groundwater well located on a neighbouring property;
- 40m to other waters (e.g. farm dams, intermittent waterways and drainage channels, etc.)

5.1.2. Absorption Systems

- 12m if area up-gradient and 6m if area down-gradient of property boundaries;
- 6m if area up-gradient and 3m if area down-gradient of swimming pools, property boundaries, driveways and buildings;

Other site setback requirement as per AS/NZS 1547:2012 are provided in *Appendix A*.

The prescribed buffer areas/setbacks are to be adhered to unless specified by council otherwise.

Minor drainage lines exist within the allotment. It is recommended that an upslope diversion bank is installed above the application area to ensure flow is diverted around the area. Care should be taken to ensure the propsoed system is not within the drainage lines.

The proposed application area should be terraced due to the significant slope and proximity to drainage lines. Terracing will assist in increasing evapotranspiration and deep infiltration and decrease runoff.

An assessment of the area has indicated that the proposed treatment system adheres to the above buffer requirements.

5.2 Design Allowances – SA Onsite Wastewater System Code

In accordance with South Australian Onsite Wastewater System Code, the appropriate premises category for the facilities onsite are as follows:

Cellar Door/Restaurant

Under the SA Onsite Wastewater System Code, the Cellar Door/Restaurant is categorised as Wine Tasting Including Meals and Restaurants with Liquor Licence. The recommended daily flow for Wine Tasting including Meals or Restaurants with Liquor Licence is 20Litres/person/day with a sludge/scum rate of 35Litres/person/year (Table 11).

The onsite Cellar Door/Restaurant building also contains 3 bedrooms, presumably for live in staff. These bedrooms are categorised as Hotels/Motels/Live in Conference Centres - residential staff. The recommended daily flow for Hotels/Motels/Live in Conference Centres, residential staff, is 150Litres/person/day with a sludge/scum rate of 80Litres/person/year (Table 11).

The client has indicated the restaurant/cafe/tasting room will seat 120 people. Four live in staff members will occupy the 3-bedroom staff accommodation within the Cellar Door building. Large events, with a capacity of 120 people, will also be held in the Cellar Door/Restaurant twice a month.

Bath House

Under the SA Onsite Wastewater System Code, the Bath House is categorised as a Sports Centre. The recommended daily flow for Sports Centres is 40Litres/person/day with a sludge/scum rate of 25Litres/person/year (Table 11).

The client has indicated the Bath House will accommodate 80 people per day and therefore the calculation of the design flow will be based on 80 occupants.

Villas

Under the SA Onsite Wastewater System Code, the sixteen proposed Luxury Villas are categorised as Hotels/Motels/Live in Conference Centres - accommodation. The recommended daily flow for Hotels/Motels/Live in Conference Centres, accommodation, is 100Litres/person/day with a sludge/scum rate of 48Litres/person/year (Table 11).

The client has indicated, the onsite Super Luxury 2 Bed Villas will accommodate approximately 15 people per day, the onsite Luxury 2 Bed Villas will house approximately 6 people per day and the onsite Luxury 1 Bed Villas will accommodate approximately 18 people per day. The number of persons accommodating the onsite Luxury Villas is therefore assumed, for the calculation of the design flow, to be 39 occupants.

Table 11: SA Onsite Wastewater System Code

Premises	Fixtures	Sludge/scum rate		Daily flow rate		BOD_5 loading
		Number of persons (P1)	Rate: L/p/y (S)	Number of persons (P2)	Rate: L/p/d (DF)	Rate: g/p/d
RESTAURANTS						
No liquor licence	W.C./urinal, basin, kitchen, sink, dishwasher	average daily number over a 7 day period plus staff	35	highest daily number over a 7 day period plus staff	15	10
With liquor licence	W.C./urinal, basin, kitchen, sink, dishwasher, glass washer	average daily number over a 7 day period plus staff	35	highest daily number over a 7 day period plus staff	20	15
WINE TASTING						
No meals	W.C./urinal, basin, kitchen sink, glass washer	average daily number over a 7 day period plus staff	5	highest daily number over a 7 day period plus staff	8	8
Meals	W.C. /urinal, basin, kitchen sink, glass washer, dishwasher	average daily number over a 7 day period plus staff	35	highest daily number over a 7 day period plus staff	20	15
SPORTS CENTRES						
e.g. health and fitness clubs, squash courts, indoor cricket, basketball	W.C./urinal, basin, shower, kitchen sink (tea service area only)	average daily number over a 7 day period plus staff	25	highest daily number over a 7 day period plus staff	40	20
HOTELS / MOTELS / LIVE IN CONFERENCE CENTRES						
Accommodation	W.C./urinal, basin, bath/shower, laundry, kitchen sink	total number of beds (single equivalents)	48	total number of beds (single equivalents)	100	40
Resident staff	W.C./urinal, basin, bath/shower, laundry, kitchen sink	total number of live in staff	80	total number of live in staff	150	50
Bar trade	W.C./urinal, basin, kitchen sink, glass washer	average daily number over a 7 day period	5	highest daily number over a 7 day period	10	10
Dining room lounge area non-resident use	W.C./urinal, basin, kitchen sink, dishwasher	average daily number over a 7 day period	10	highest daily number over a 7 day period	15	10
						20
Non-resident staff	W.C./urinal, basin, kitchen sink (tea service area only)	number of staff per shift x number of shifts	25	number of staff per shift x number of shifts	30	20
	shower			number of staff per shift x number of shifts	10	5

6.0 SEPTIC TANK SELECTION AND CALCULATION

6.1 SA On-site Wastewater System Code Guidelines

Using the SA On-Site Wastewater Systems Code guidelines, calculations to determine the tank capacity can be conducted.

Maximum Effective Capacity (L) = [(DF x P) + ((S ÷ 365) x P)] x 8

P = Number of persons using the system

S = Rate of sludge/scum accumulation in litres per person per year (L/P/y)

DF = Daily flow in litres per person per day (L/P/d)

Cellar Door/Restaurant

Restaurant	Staff Housing	Large Events
P = 120	P = 4	P = 120
S = 35L/P/y	S = 80L/P/y	S = 35L/P/y
DF= 20L/P/day	DF= 150L/P/day	DF= 20L/P/day

Daily Flow Rate

Daily wastewater flow rate = DF x P

Restaurant: 20L/p/d x 120p = 2,400L/d

Staff Housing: 150L/p/d x 4p = 600L/d

Large Events: 20L/p/event x 120p = 2,400L/event

Large events are expected to occur twice a month. Conservative calculations have been conducted to allow for peak periods where a large event may occur once a week.

2,400L/event ÷ 7 days = 343L/d

Therefore, the expected daily wastewater flow rate is 3,343 litres per day.

Rate of Sludge/Scum Accumulation

Scum accumulation per day = (S ÷ 365 days) x P

Restaurant: (35L/p/y ÷ 365 days) x 120 = 11.51L/d

Staff Housing: (80L/p/y ÷ 365 days) x 4p = 0.88L/d

Large Events: ((35L/p/y ÷ 365 days) x 120) ÷ 7 = 1.64L/d

Therefore, the expected rate of sludge is approximately 14 litres per day.

Bath House

P = 80

S = 25L/P/y

DF= 40L/P/day

Daily Flow Rate
Daily wastewater flow rate = DF x P
40L/p/d x 80 = 3,200L/d
Therefore, the expected daily wastewater flow rate is 3,200 litres per day.

Rate of Sludge/Scum Accumulation
Scum accumulation per day = (S ÷ 365 days) x P
(25L/p/y ÷ 365 days) x 80 = 5.48L/d
Therefore, the expected rate of sludge is approximately 5.5 litres per day.

Luxury Villas

P = 39

S = 48L/P/y

DF= 100L/P/day

Daily Flow Rate
Daily wastewater flow rate = DF x P
100L/p/d x 39 = 3,900L/d
Therefore, the expected daily wastewater flow rate is 3,900 litres per day.

Rate of Sludge/Scum Accumulation
Scum accumulation per day = (S ÷ 365 days) x P
(48L/p/y ÷ 365 days) x 39 = 5.13L/d
Therefore, the expected rate of sludge is approximately 5.1 litres per day.

Total Expected Daily Flow Rate

Cellar Door/Restaurant: 3,343L/d

Bath House: 3,200L/d

Luxury Villas: 3,900L/d

Therefore, the expected system output is 10,443 litres per day.

6.2 System Selection

Table 12: System Selection

Application System	Treatment System	Site Limitations	Suitability
Absorption system	Septic Tank	Shallow bedrock Existing trench systems onsite are failing significantly Category 4 Soils (clay loams)	No
Surface Irrigation	AWTS	Limited application area	No
Sub-surface Irrigation	AWTS	Limited application area	No
Wisconsin Mound	AWTS	Nil	Yes

6.3 System Recommendation

The following table provides details on the system selection.

Table 13: System Recommendation Details

Consideration of connection to centralised sewerage system	**Distance to sewer**	>2km
	Potential for future connection?	None planned
	Potential for reticulated water?	None planned
Expected Wastewater volume (litres/day)	Wastewater produced from the Cellar Door/Restaurant, Residence/Bath House and sixteen Luxury Villas will consolidate and flow into one onsite effluent management system. Total wastewater daily flow is expected to be 10,443litres/day based on SA Onsite Wastewater System Code. Total daily rate of sludge/scum accumulation is expected to be approximately 24.6litres/day as per SA Onsite Wastewater System Code.	
Type of Treatment system best suited	Accredited AWTS to accommodate a wastewater flow of 10,443L/d (Appendix E), as per NSW Health accredited system, dosed to absorption mounds (Section 7.0).	

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

7.0 EFFLUENT MANAGEMENT

Barnson Pty Ltd has analysed the proposed onsite waste management system in accordance with the NSW Government endorsed *'Silver Book'* (1998) and AS/NZS1547:2012 On-site Domestic Wastewater Management', with additional advice sought from the Sydney Catchment Management Authority '*Designing and installing On-site Wastewater Systems'* 2023 guideline. For this site, given the climate and soil constraints, Wisconsin Mound is considered the most appropriate effluent management device.

7.1 Mound Size Calculation

The mound size depends upon the loading rate and site-specific soil condition. Mound is sized according to the loading rate for sand fill, on the underlying soil basal-area, and when slopes are involved, on the vertical or horizontal linear loading rate of the soil below the toe area of the mound.

Hydraulic loading is the amount of liquid applied to mounds over a specified time interval. The hydraulic loading rate must be such that the movement of applied effluent from the distribution media into the sandfill for treatment is not disturbed.

The required bed area shall be determined from the following relationship:

Total loading rate = 10,443L/day

Proposed number of mounds = 4

Loading rate per mound – 2,611L/day

$$A = Q/BLR$$

Where Q = 2,611L/day/mound and the Bed Loading Rate, BLR = 40mm/day (as per *Section N2.2 AS 1547:2012*)

Therefore,

$$Area\ of\ Distribution\ Bed = \left(\frac{2611}{40}\right)$$

$$Area,\ Ar = 65.3\ m^2$$

The width of the aggregate bed should be in the range of 1.2m-2.0m. For this site, the width is taken as A = 2m.

$$Length\ of\ Distribution\ Bed, B = \left(\frac{65.3}{2m}\right)$$

$$B = \mathbf{32.6m}$$

Therefore, the distribution aggregate bed should be 32.6m long and 2m wide in the mound.

7.2 Mound Sizing

As specified in Section 7.1,
Design Flow Rate (DFR) = 2,611L/d (per mound)

As specified in AS/NZS1457:2012,
Mound Face Slope = 1 in 3

Distribution bed thickness (F) = 225mm minimum

Sand cover over distribution bed (G) = 300mm minimum

Topsoil cover over mound (S) = 150mm minimum

Sand depth below distribution bed (D) = 600mm minimum

Sand Loading Rate (SLR) = 40mm/day

Linear Loading Rate (LLR) = 125L/m/day

Basal Loading Rate (BLR) = 16mm/day

AS/NZS 1457:2012 for Strongly Structured Clay Loams.

Gravel Bed Width (A):
A = LLR ÷ SLR
A = 125 ÷ 40
A = 3.13

Gravel Bed Length (B):
B = DFR ÷ LLR
B = 2611 ÷ 125
B = 20.9

Final Depth of Fill Over Gravel (H):
H = G + S
H = 0.45

Total Height of Mound (M):
M = H + D + F
M = 0.45 + 0.6 + 0.225

M = 1.275

Minimum Sand Depth Downslope (E):

E = D + Slope x (A)

E = 0.6 + 0.13 x 3.13

E = 1.01

Downslope Mound Width (J):

J = 3(D + F + G)(upslope correction factor)

J = 3 x (0.6 + 0.23 + 0.3) x (0.72)

J = 2.44

End Slope Mound Width (K):

K = 3((D + E) ÷ 2 + F + H)

K = 3 x((0.6 + 1.01) ÷ 2 + 0.23 + 0.45)

K = 4.46

Upslope Mound Width (I):

I = 3(E + F + G)(downslope correction factor)

I = 3 x (1.01 + 0.23 + 0.3) x (1.64)

I = 7.58

Mound Length (L):

L = B + 2K

L = 20.9 + 2 x 4.46

L = 29.82

Mound Width (W):

W = I + A + J

W = 7.58 + 3.13 + 2.44

W = 13.15

Basal Area = L x W

29.82 x 13.15 = 392.13m^2

Mound Base Loading Rate (BLR/DLR)

BLR = total hydraulic loading/basal area

= 2611 ÷ 392.13

= 6.7mm/day which is less than 16mm/day as specified in Table N1

Table 14: Design Parameters

Parameter (Per Mound)	Units	Design requirement
Max. Discharge	L/day	21611 – per mound
Hydraulic loading to aggregate bed	L/m/day	40
Design loading to Basal Area	mm/day	6.7 (16mm/day as per AS/NZS 1547:2012 for Clay Loams)
Basal Area	m	29.82m x 13.15m = 392.13m^2
Distribution bed area	m	32.6m x 2m = 65.3m^2
Slope of mound face	V:H	1:3
Number of mounds	#	4
Sand cover over distribution bed	mm	300
Topsoil cover over mound	mm	150
Depth of sand fill	mm	600
Total Height of mound	m	1.275

8.0 EFFLUENT MANAGEMENT PRESCRIPTIONS

8.1 Effluent Treatment

For this property effluent will be treated by a NSW Health Accredited system capable of achieving secondary standards suitable for surface or sub-surface irrigation. The chosen tank should be operated and maintained in accordance with the manufacture's requirements. Records of maintenance carried out on the system should be kept by the property owners for at least 10 years.

8.2 Effluent Disposal- Mound

Effluent can be discharged on absorption mounds or mound system commonly referred to as Wisconsin mounds. Mounds are constructed on the surface of the soil from imported fill material, usually washed riverbed sand. The system can operate with a low-rate dosing pump to inject effluent into a distribution system buried on the mound. Timer dosing instead of demand dosing loading shall be used. Effluent receives further treatment as it percolates down through the mound and is then absorbed by the natural soils below the mound. The mounds are particularly useful for overcoming specific site and soil constraints such as limited available area, shallow depth to the water table or impermeable soil horizons.

The mound is built up of sand-fill media with a distribution bed of selected aggregate containing effluent distribution system covered with a fabric and topsoil. The sizing of the mound is based on the hydraulic loading calculated in Section 7 of this report. 4 x mounds 29.82m long, 13.15m wide and 1.275m high with a side slope of 1V : 3H has been assessed as being suitable for effluent disposal. It is essential that both the ground surface and the mound itself are properly prepared. The area in the mound perimeter shall be ploughed beforehand 18-20cm deep with minimum compaction of natural soil. The sand fill media shall be medium sand with a grain size of 0.25 – 1.0 mm, a uniformity coefficient less than 4, less than 3% fines passing a 200mm sieve (0.074mm), free of clay, limestone, and organic material. It should be carefully placed on to the ploughed area and moved into place either manually or by using a lightweight tracked tractor with a blade.

A gravel distribution bed 32.6m long, 2m wide should be formed on the top of the fill media at a height of 0.6m from base of the mound, with a level base. The distribution bed shall be filled with graded river run aggregate (20-60mm, non-crushed, rounded) and levelled at a depth of 0.225m. The effluent distribution network should consist of perforated pipe distribution laterals assembled and connected to the delivery pipe by a distribution manifold. The effluent distribution network should be assembled on the aggregate bed. The manifold should be placed so it will drain between doses, wither out of the lateral or back into the pumping main. The laterals should be laid level. The pipes used in the system should comply with AS2439.2, AS2698.2, AS/NZS 4130 or AS/NZS 1477.

- A suitable backfill barrier such as a filter cloth / geotextile syntenic fabric shall be installed over the aggregate.
- A fine-textured soil material such as silt loam shall be placed over the top of the distribution bed to a depth of 300mm followed by 150mm layer of good quality topsoil over the entire mound surface. The mound surface shall be grassed using grasses adapted to the area.
- The mound is designed for flat ground surface. On slopes, the construction of the mound is configured differently resulting in different base area to that for flat land to prevent seepage emerging at the toe of the fill and minimise the amount of fill.
- Final grade the mound area so surface water moves away from and does not accumulate on the upslope of the mound. The recommended side slopes ratio is 3 horizontal: 1 vertical for mowing safety.
- The mounds must be turfed immediately after finishing construction.
- The effluent disposal area should be protected by shallow rooting ground cover around the base and up the side slopes. Shrubs planted around the base of the mound should be tolerant of moisture, as the mound perimeter may become moist.
- Planting on top of the mound should be drought tolerant, as the upper portion for the mound can become dry.
- The area is to be protected from disturbances and will not be suitable for play areas and foot traffic.
- The area should be fenced off and protected from vehicles, animals (dogs, vermin, livestock) and pedestrians.
- It is critical to ensure an appropriate pump to adequately service the demands of the effluent application area is met.
- Dosing of the Wisconsin Sand Mound should be small frequent doses
- Gypsum should be applied to the application area during construction and annually, at the rate of 1kg per square metre of application area, to maintain permeability. During construction gypsum should be applied to the base of the application area and closed in as soon as possible to protect the gypsum from raindrop impact. Regular application of gypsum to the top of the mound is recommended annually.

9.0 RECOMMENDATIONS & CONCLUSIONS

Minor drainage lines exist within the allotment. It is recommended that an upslope diversion bank is installed above the application area to ensure flow is diverted around the area. Care should be taken to ensure the propsoed system is not within the drainage lines.

The proposed application area should be terraced due to the significant slope and proximity to drainage lines. Terracing will assist in increasing evapotranspiration and deep infiltration and decrease runoff.

The suitability of the Option C recommended application area is preliminary and dependent on a formal investigation and analysis of the site and soil. The proposed application area, Option C, is outlined in Figure 3.

As per the '*On-Site Sewerage Management for Single Households*' (1998) publication, stakeholders should be aware that all on site systems and components have a finite life and at some point, will require replacement. Septic tanks generally require replacement every 25 years, whereas effluent disposal systems can have an expected life between 5-15 years. The owner is encouraged to obtain a copy of the NSW Government "The Easy Septic Guide" (2000) available from - https://www.olg.nsw.gov.au/wp-content/uploads/Easy-septic-guide.pdf

The Wisconsin mound shall be designed to accept the discharge from the septic tank and convey it securely and evenly to the land application area. The aim is to ensure uniform distribution of the effluent over the design area to help effective treatment of wastewater as it percolates down the sand fill layer. Typical design sketches as per AS 1547:2012 are provided at Appendix B.

Installation instructions shall be provided by the manufacturer or designer. Barnson will not be liable for the incorrect installation and/or construction of the system unless when inspected by Barnson the installation and construction of the system holds true to the design featured in this report. Installation should be in accordance with the prescriptions within AS 1547:2012.

Barnson has not verified the accuracy or completeness of this data, except otherwise stated in this report. The recommendations for the proposed system as suggested in this report are based on historical data obtained for the area. Barnson will not be liable in relation to incorrect recommendations should any information provided by the client be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed.

The accuracy of geotechnical engineering advice provided in this report may be limited by unobserved variations in ground conditions across the site in areas between and beyond test locations and by any restrictions in the sampling and testing which was able to be carried out, as well as by the amount of data that could be collected given the project and site constraints. These factors may lead to the possibility that actual ground conditions and materials behaviour observed at the test locations may differ from those which may be encountered elsewhere on the site.

If the sub-surface conditions are found to differ from those described in this report, we should be informed immediately to evaluate whether recommendations should be reviewed and amended if necessary.

barnson.

APPENDIX A

Site Setback Requirements

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

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

NOTES:

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

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

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

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

TABLE R2
SITE CONSTRAINT SCALE FOR DEVELOPMENT OF SETBACK DISTANCES
(used as a guide in determining appropriate setback distances from ranges given in Table R1)

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

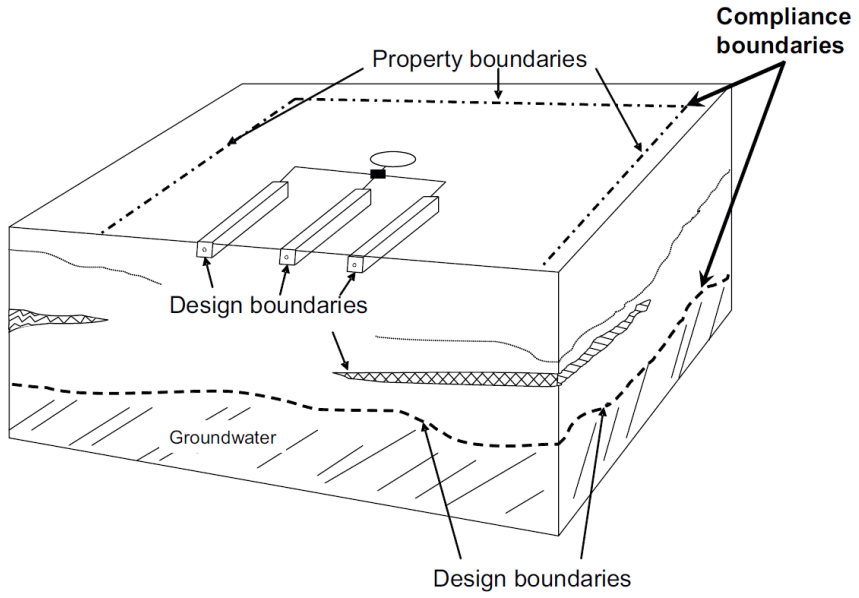
NOTES:

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

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

TABLE R2
SITE CONSTRAINT SCALE FOR DEVELOPMENT OF SETBACK DISTANCES
(used as a guide in determining appropriate setback distances from ranges given in Table R1) (continued)

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



(Adapted from USEPA 2002)

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

barnson.

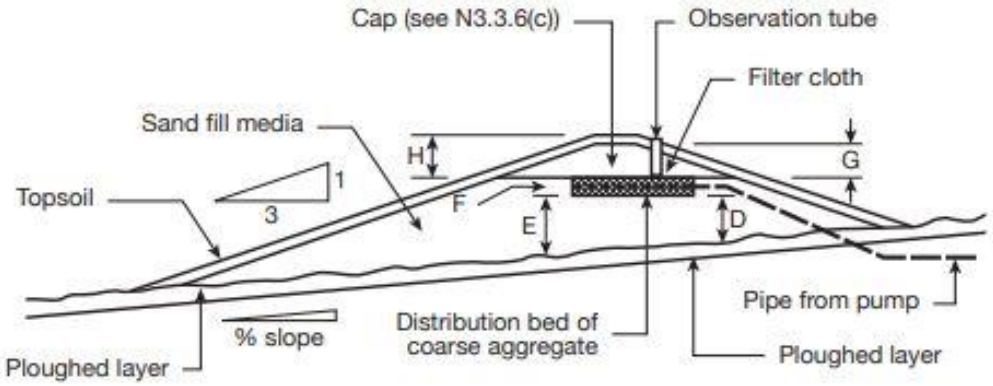
APPENDIX B

Concept Design Loading and Sketches – Wisconsin Mound System

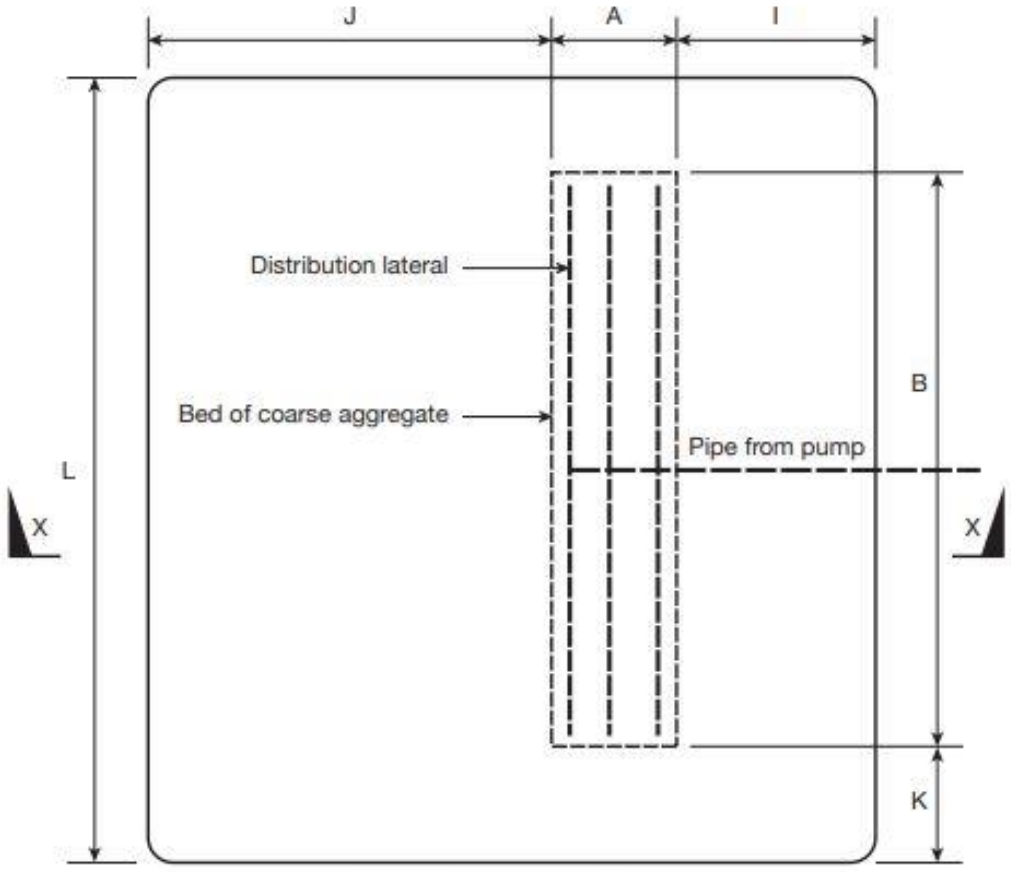
TABLE N1
RECOMMENDED MOUND DESIGN LOADING RATES

Soil Category	Soil texture	Structure	Indicative permeability (K_{sat})(m/d)	Design loading rate (DLR) (mm/d)
1	Gravels and sands	Structureless (massive)	> 3.0	32
2	Sandy loams	Weakly structured	> 3.0	24
		Massive	1.4 – 3.0	24
3	Loams	High/ moderate structured	1.5 – 3.0	24
		Weakly structured or massive	0.5 – 1.5	16
4	Clay loams	High/ moderate structured	0.5 – 1.5	16
		Weakly structured	0.12 – 0.5	8
		Massive	0.06 – 0.12	5 (see Note)
5	Light clays	Strongly structured	0.12 – 0.5	8
		Moderately structured	0.06 – 0.12	5 (see Note)
		Weakly structured or massive	< 0.06	
6	Medium to heavy clays	Strongly structured	0.06 – 0.5	
		Moderately structured	< 0.06	
		Weakly structured or massive	< 0.06	

NOTE: To enable use of such soils for on-site wastewater land application, special design requirements and distribution techniques or soil modification procedures will be necessary. For any system designed for these soils, the effluent absorption rate shall be based upon soil permeability testing. Specialist soils advice and special design techniques will be required for clay dominated soils having dispersive (sodic) or shrink/swell behaviour. Such soils shall be treated as Category 6 soils. In most situations, the design will need to rely on more processes than just absorption by the soil.



CROSS SECTION VIEW OF MOUND ON SLOPING LAND



PLAN VIEW OF DISTRIBUTION BED

LEGEND

Typical dimensions:

A	1200 to 2000 mm	H	450 mm
B	6 to 8 times A	I	Determined by ground slope and 1 in 3 mound face slope
D	600 mm	J	2000 mm minimum on sloping ground (equals I on flat ground)
E	600 mm on flat ground, > 600 mm on sloping ground	K	Determined by height of finished mound and 1 in 3 mound face slope
F	225 mm	L	B + 2K
G	300 mm		

FIGURE N1 WISCONSIN MOUND SYSTEM

barnson.

APPENDIX C
List of Plates

Plate 1: Existing Failing Onsite Residence Wastewater System

Plate 2: Existing Failing Onsite Cellar Door Wastewater System

Plate 3: Looking North Over Proposed Application Area

Plate 4: Looking South Over Proposed Application Area

barnson.

APPENDIX D

Proposed Development Plan

OVERHEAD POWER LINE TO BE RELOCATED BENEATH GROUND PER ENGINEER'S DETAILS

EX. BUILDING TO BE RENOVATED AND EXTENDED

ASSUMED EXISTING ELECTRICAL CONNECTION UNDERGROUND. CHECK ON SITE

EX. BUILDING TO BE RENOVATED

PROPOSED NEW ROAD WITH SMALL BRIDGE OVER EXISTING GULLY

EX. WATER TANK LOCATION

LEGEND

- 1 Bed Luxury Villa
- 2 Bed Luxury Villa
- 2 Bed Super Luxury Villa
- Boundary setback
- Setbacks per bushfire requirement
- Overhead power line
- Power pole
- Proposed electrical connection underground
- Sewer inspection point
- Storm water flow
- Service water
- On-site Sewage Management
- Sewage Holding Tank
- Existing tree
- Proposed tree/shrub

SITE PLAN

1 : 3000

WILD MODULAR

no.	date	ISSUE / revision	by
C	05/03/25	Proposed Site Plan	MD
B	04/02/25	Issue for Coordination	VG
A	13/12/24	Preliminary Consultant Issue	MD

PROJECT NO.	2408
PROJECT NAME	PEPPERTREE HILL ESTATE
PROJECT ADRESS	85 ROCKY WATERHOLE RD, MT FROME, NSW 2850
CLIENT	PARKVIEW CAPITAL

PRELIMINARY ISSUE

DRAWING NAME PROPOSED SITE PLAN

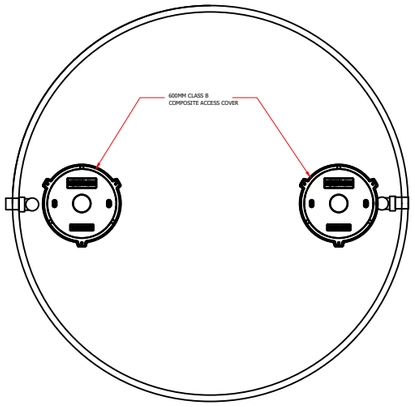
DRAWING NO.	SCALE at A3	ISSUE
DA110	As indicated	C

5/03/2025 6:37:34 PM

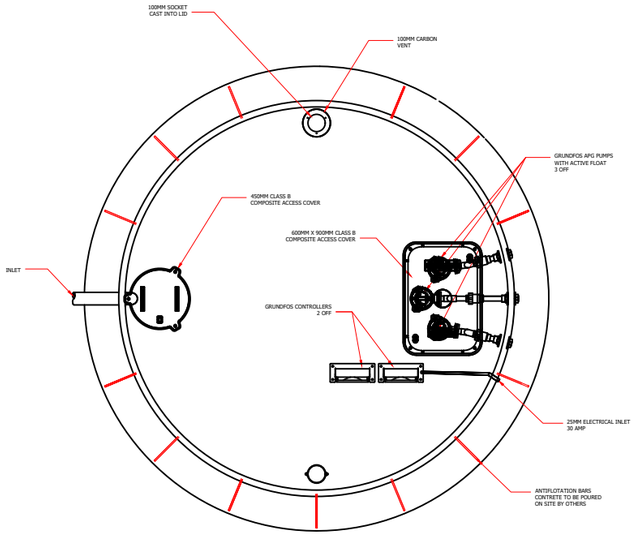
barnson.

APPENDIX E

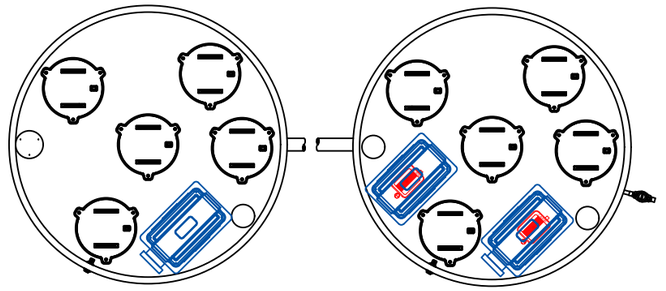
Tank Recommendations



Taylex 22,500lt Primary Tank
PT22000

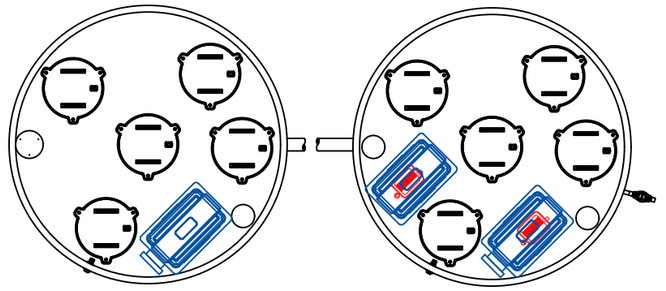


Taylex 22,500lt Balance Tank
BT22000-3



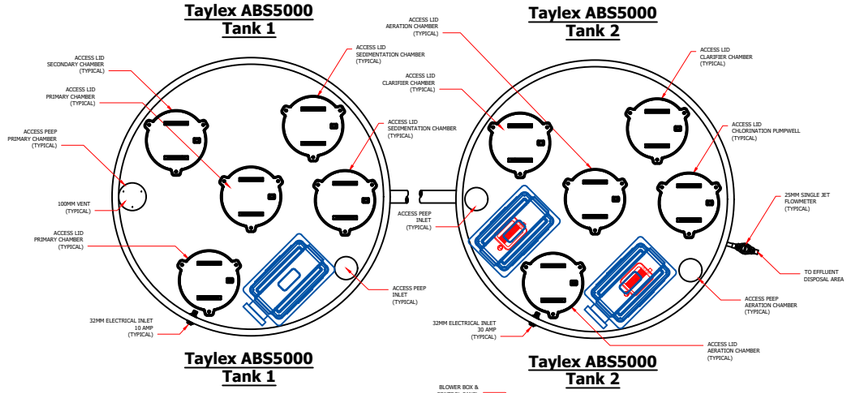
Taylex ABS5000
Tank 1

Taylex ABS5000
Tank 2



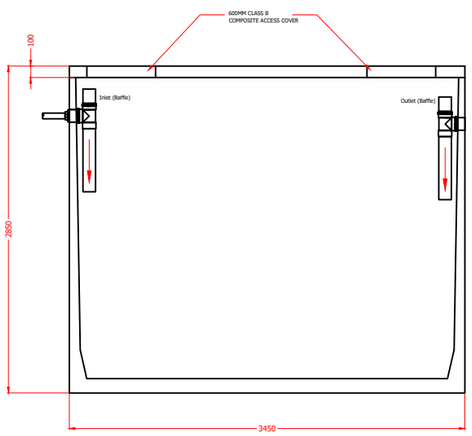
Taylex ABS5000
Tank 1

Taylex ABS5000
Tank 2

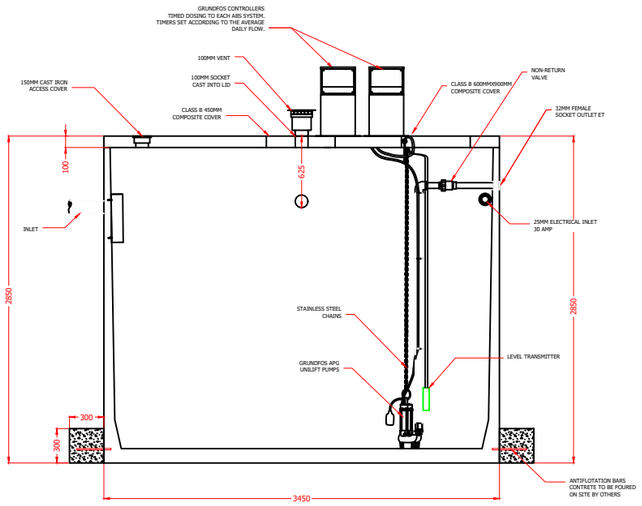


Taylex ABS5000
Tank 1

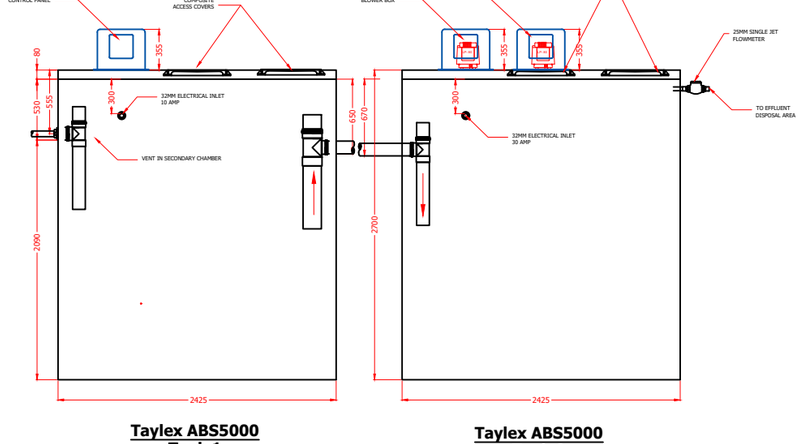
Taylex ABS5000
Tank 2



Taylex 22,500lt Primary Tank
PT22000



Taylex 22,500lt Balance Tank
BT22000-3



Taylex ABS5000
Tank 1

Taylex ABS5000
Tank 2

GENERAL NOTES:

1. EACH TANK SHOULD HAVE ITS OWN CIRCUIT BREAKER AT A CENTRALISED BOARD DEDICATED TO THE TREATMENT SYSTEM.
2. FOR LIFTING REQUIREMENTS, REFER TO THE LIFTING REQUIREMENT DOCUMENT FOR EACH TANK.
3. THIS DRAWING IS ISSUED FOR INITIAL REFERENCE ONLY. SOME DETAILS SUCH AS MANHOLE SIZE AND LOCATIONS, AMONG OTHERS, MAY VARY ON THE ACTUAL PRODUCT. ACTUAL DIMENSIONS AND DRAWINGS WILL BE PROVIDED AND FINALISED UPON RECEIPT OF ORDER.

TANK DETAILS

22,000L PRIMARY TANK (1 OFF)
PT22000

ITEM	QTY
600mm ROUND CLASS B COMPOSITE COVER	2

22,000L BALANCE TANK (1 OFF)
BT22000-3

ITEM	QTY
450mm ROUND CLASS B COMPOSITE COVER	1
900mmx600mm CLASS B COMPOSITE COVER	1
GRUNDFOS APG UNILIFT GRINDER PUMP	3
GRUNDFOS PUMP CONTROLLER WITH HIGH LEVEL INDICATOR IN POST	2
LEVEL TRANSMITTER	1
CARBON VENT	1
ANTI-FLOTATION FLANGE	1
EPOXY COATING	1

TAYLEX ABS5000 (3 OFF)
ABS5000-26M-CC

TANK 1	
ITEM	QTY
450mm ROUND CLASS B COMPOSITE COVER	5
D25VA TRANSFER PUMP	1

TANK 2	
ITEM	QTY
450mm ROUND CLASS B COMPOSITE COVER	5
DAV42 IRRIGATION PUMP	1
SINGLE JET FLOW METER	1

PACKAGE

ITEM	QTY
100mm CARBON VENT	4
100mm PVC CAPS	9
CONTROL BOX AND STAND	2
50mm DYNABOLTS	8
FLOWMETERS	3
ALLEN KEY FOR COVERS	1
LIFTING HANDLES FOR COVERS	2
32mm TO 100mm TANK FITTINGS	3

ELECTRICAL CONNECTIONS

BT22000-3 (30 amps)
3 x ABS5000 TANK 1 (10 amps EACH)
3 x ABS5000 TANK 2 (20 amps EACH)

REV	REVISION DETAILS	DATE
A	ISSUED FOR REFERENCE	08/04/25

	NAME	DATE	SIGN
DESIGNED	PE		
DRAWN	PE		
CHECKED			
APPROVED			

Taylex

TAYLEX AUSTRALIA
56 PRAIRIE RD, ORMEAU QLD 4208
TEL: 1300 829 539
www.taylex.com.au

CLIENT: PEPPERTREE HILL ESTATE
PROJECT: PEPPERTREE HILL ESTATE
DESCRIPTION: TAYLEX ONSITE WASTEWATER TREATMENT SYSTEM
DRG NO.:

SHEET NO.: 1 OF 1
SCALE: NTS
REV.: A

Taylex Australia Pty LTD
ABN: 43 646 051 989
56 Prairie Road, Ormeau, QLD 4208
07 3441 5200 1300TAYLEX
www.taylex.com.au

Commercial Assessment Form

Project Name: Peppertree Hill Estate **Date:** 08-April-2025

Client Details

Company: Barnson
Name: Georgina Moir
Mobile:
Email: gmoir@barnson.com.au

Site Details

Address: 85 Rocky Waterhole Road **Suburb:** Mudgee **State:** NSW **Post Code:** 2850
LGA: Mid-Western Regional Council

Is there an available Wastewater Report? ☐ YES

Source of Information for this Site Assessment

Environmental Scientist Barnson Orange

Hydraulic & Organic Load Calculations Liters/day & gBOD/day		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Totals Per Week	
		Liters/d	grams/d	Liters/d	grams/d	Liters/d	grams/d	Liters/d	grams/d	Liters/d	grams/d	Liters/d	grams/d	Liters/d	grams/d	Liters/d	grams/d
Restaurant	**Persons/day:**	**120**		**120**		**120**		**120**		**120**		**120**		**120**		**840**	
Select Source																	
Flowrate: ***20*** *L/p/d*	*BOD Load:* ***21*** *g/p/d*	2400	2520	2400	2520	2400	2520	2400	2520	2400	2520	2400	2520	2400	2520	16800	17640
Staff	**Persons/day:**	**4**		**4**		**4**		**4**		**4**		**4**		**4**		**28**	
Select Source																	
Flowrate: ***150*** *L/p/d*	*BOD Load:* ***70*** *g/p/d*	600	280	600	280	600	280	600	280	600	280	600	280	600	280	4200	1960
Large Event	**Persons/day:**											**120**				**120**	
Select Source																	
Flowrate: ***20*** *L/p/d*	*BOD Load:* ***21*** *g/p/d*											2400	2520			2,400	2,520
Lodge/Spa	**Persons/day:**	**80**		**80**		**80**		**80**		**80**		**80**		**80**		**560**	
Select Source																	
Flowrate: ***40*** *L/p/d*	*BOD Load:* ***28*** *g/p/d*	3200	2240	3200	2240	3200	2240	3200	2240	3200	2240	3200	2240	3200	2240	22400	15680
Villas	**Persons/day:**	**39**		**39**		**39**		**39**		**39**		**39**		**39**		**273**	
Select Source																	
Flowrate: ***100*** *L/p/d*	*BOD Load:* ***63*** *g/p/d*	3900	2457	3900	2457	3900	2457	3900	2457	3900	2457	3900	2457	3900	2457	27,300	17,199
	Persons/day:																
Flowrate: *L/p/d*	*BOD Load:* *g/p/d*																
	Persons/day:																
Flowrate: *L/p/d*	*BOD Load:* *g/p/d*																
Daily Total		**10,100**	**7,497**	**10,100**	**7,497**	**10,100**	**7,497**	**10,100**	**7,497**	**10,100**	**7,497**	**12,500**	**10,017**	**10,100**	**7,497**	**73,100**	**54,999**
		Average														**10,443**	**7,857**
		Average loading post-primary tank (where added)														**10,443**	**5,612**

	Type	Qty	Check
Primary Tank	**PT22000**	**1**	
Balance/Invert Tank	**BT22000**	**1**	
Emergency Storage Tank	**N/A**		
Treatment Plant	**ABS5000**	3	

Load per Treatment Plant	
L/d per unit	g/d per unit
3,481	1,493

Table 1. Influent Parameters

Characteristics	Units	Value
Weekly Average Flowrate	L/day	10443
BOD_5	mg/L	750
TSS	mg/L	450
Total Nitrogen	mg/L	70
Total Phosphorus	mg/L	10.8
Oil and Grease	mg/L	< 50
pH		6.0 - 9.0

Design Flow per unit	**3,500**	L/d per unit
Design BOD load per unit	**1,501**	g/d per unit

Additional Comments

- Wastewater from commercial kitchens need to flow through a properly sized grease trap before entering the onsite wastewater treatment system.
- This assessment is applicable only if the influent characteristics fall within the limits listed in Table 1 and the maximum BOD load to each ABS5000 is 2,331g/day.
- The process design assumed that thare are no inhibitory or toxic substances in the wastewater that will impair the biological performance of the system.
- Daily loadings are based on breakdown provided in the e-mail from Georgina Moir, dated 7 April 2025.

Revision	Revision Details	Date
A	Issued for reference	14/04/2025