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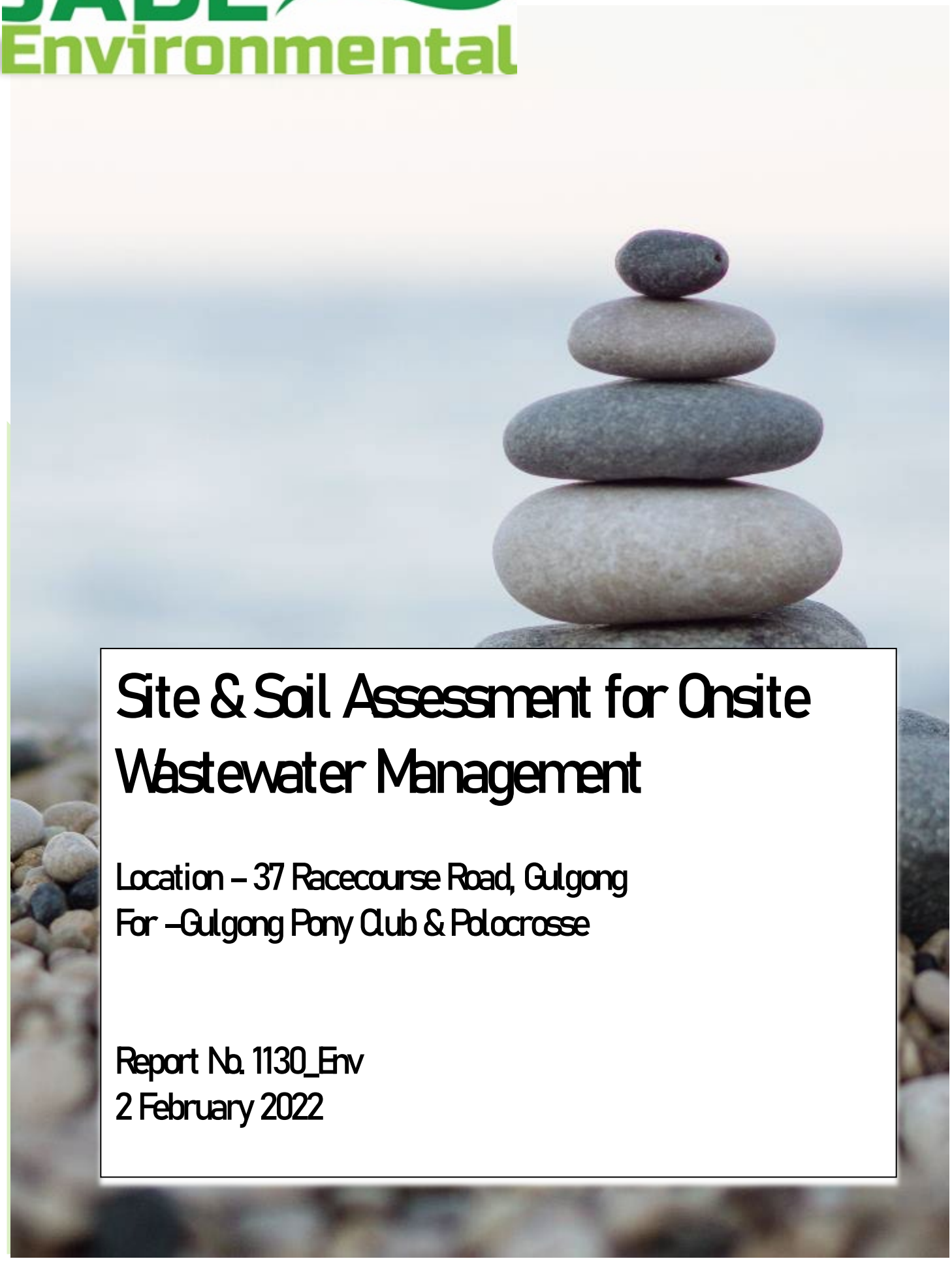

Site & Soil Assessment for Onsite Wastewater Management

Location – 37 Racecourse Road, Gulgong
For –Gulgong Pony Club & Polocrosse

Report No. 1130_Env
2 February 2022

Report Particulars

Project Number:	ENV_1130
Project client:	Gulgong Pony Club & Polocrosse
Document description:	On-site Wastewater Management Report
Project Manager:	Kristy Bennetts
Document status:	Final
Document address:	Y://Projects/1130/Reports
Local Government Area:	Mid-Western Regional Council

Document Revision Status

Author	Revision number	Internal review	Date issued
Kristy Bennetts	01_Draft	KB	26/01/2022
Kristy Bennetts	02_Final	KB	02/02/2022

Disclaimer

Jade Environmental Pty Ltd ABN: 57 621 991 375

Site Evaluators Details

Site Assessor Company	Kristy Bennetts, Senior Environmental Scientist Jade Environmental Pty Ltd
Contact Details	[redacted]
Credentials	Bachelor of Applied Science, Resource & Environmental Science) Graduate Diploma in Environmental Law
Professional Membership	Australian Society of Soil Science Inc. Membership No. S16242
Signature	[redacted]
Date of Site Inspection	31/12/2021

Report Limitations

Supplied Information	The recommendations for the proposed system as suggested in this report are based on limited site assessment and historical data obtained for the area. Jade Environmental 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.
Ground Conditions	The accuracy of geotechnical advice provided in this report may be limited by unobserved variations in ground conditions across the site. Soil landscapes are subject to variation beyond the bore hole sites. These factors may lead to the possibility that actual sub surface conditions and materials behave differently to what was observed at the bore hole locations and may differ from those which may be encountered elsewhere on the site. If groundwater is encountered during excavation, all earthworks should cease until advice is sought from Council. If it is found that the sub-surface conditions do differ greatly than those described in this report, Jade Environmental Pty Ltd should be informed immediately to evaluate if there are design issues or new constraints.
Installation	Installation instructions shall be provided by the manufacturer/supplier. Jade Environmental will not be liable for the incorrect installation and/or construction of the system installed. Installation should be in accordance with the prescriptions within AS 1547:2012 and this report.

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1 PROJECT SUMMARY TABLE

The following table provides a system summary based on the site and soil assessment undertaken for this project. The following sections of this report provide site specific details justifying the selection, process and assessment results.

Table 1 : System Overview

Site Assessor	Kristy Bennetts, Environmental Scientist
Client	Gulgong Pony Club & Polocrosse
Address	37 Racecourse Road, Gulgong
Legal Description	Lot 450 DP 755434
Proposed Development	New Club House and Amenities (**Plate 1**)
Estimated flow rate (L/day)	Estimated maximum flow rate of 14,525L for **a 1-day event**
Water Source	Tank Water
Proposed Septic Tanks System	As per the NSW Department of Health Septic Tank and Collection Well Accreditation Guidelines, Annexure 3 – Capacity Calculation Criteria – Commercial Installations – tank capacity = Sludge Allowance (S) + Daily Flow. Sludge allowance of 2,050 (as per the Silver Book). Therefore, Septic Tank Capacity = 14,525+2,050 =**16,575L.** They system will consist of a **7,000L Primary treatment tank with a 10,000L overflow holding tank.**
Recommended New Effluent Application Design & Criteria	Conventional Absorption Trenches– (as per Section 6) **4 x 20 m long by 2m wide absorption trench/bed (multi- distribution piped) – depth 450mm** Care should be taken to ensure area is surveyed and effluent can be allowed adequately to the area. A submersible pump and switch system will be utilized to disperse up to 2,500L of the proposed maximum 14,525L (around 17%) of effluent alternately and evenly to 4 x absorption trenches during the 1-day large event. The pump and control switch will be designed to ensure that distribution is alternated between trenches. Therefore, neither the primary treatment tank nor overflow holding tank will reach full capacity. The system will also be alarmed in the event of pump failure.

Key Recommendations	The septic tank and holding tank are to be pumped out prior to any 1 – day major events to ensure there is capacity within the system. Additional facilities for waste management and showing is to be provided for major events beyond the estimated capacity for the designed system. The owner is encouraged to obtain a copy of the NSW Government "The Easy Septic Guide" (2000) available from –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

2 PROJECT BACKGROUND

2.1 PROJECT DEFINITION

This section provides an overview of the project and key documentation used in the assessment of the site, and preparation of this report.

Table 2 : Project Definition

Overview	This report provides direction for sustainable on-site effluent management for a new club house and amenities building at 37 Racecourse Road, Gulgong. **Plate 1** illustrates the existing dwelling site. **Figure 1** provides the site location.
General References	AS/NZS 1547:2012. On-site Domestic Wastewater Management Landfax Laboratories. 2015. Technical Note T14-1. Emerson Aggregate Stability Test for Wastewater; NSW Govt, 1998. On site Sewerage Management for Single Households (The Silver Book/OSMSH). Referred to as the 'Silver Book' in this report NSW Govt. 2000. The Easy Septic Tank Guide. Developed by Social Change Media for the NSW Department of Local Government NSW Health, 2001. 'Septic Tank and Collection Well Accreditation Guidelines"; Sydney Catchment Management Authority, 2019. Designing and Installing On-Site Wastewater Systems V.2
Location specific References	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.
Reporting	This report assesses the land within the vicinity of the proposed development to determine the suitability for effluent management. This plan is presented generally in accordance with the 'Silver Book', including a site plan, photographs, assessment of design loading rate (DLR) and limitation tables. This report assesses the adequacy of the site in light of the development. Calculation of daily flow rate is based on the NSW Department of Health Septic Tank and Collection Well Accreditation Guidelines, Annexure 3 – Capacity Calculation Criteria – Commercial Installations and on the proposed number of patrons estimated at the time of writing.

1 **SITE LOCALITY PLAN**

0m 140m 280m 420m 560m 700m

VISUAL SCALE 1:7000 @ A3

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CLIENT: GULGONG PONY CLUB & POLOCROSSE

DETAILS:

SEPTIC DRAWINGS AT
37 RACECOURSE ROAD, GULGONG

DRAWING:

SITE LOCALITY PLAN

ISSUE	DATE	AMENDMENT
A	2/02/22	ISSUED FOR REVIEW

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ENV_1130 -1

2.2 SITE PARTICULARS

The following table provides site specific details for this assessment. **Figure 2** provides the proposed site layout.

Table 3 : Site Particulars

Address/Locality	Lot 450 DP 755434, 37 Racecourse Road, Gulgong
Local Government Area & Consent Authority	Mid-Western Region/ Mid-Western Regional Council
Relevant Planning Instruments	Mid-Western Regional Council Local Environment Plan, 2012
Zoning	RE1- Public Recreation
Possible LEP Constraints[1]	As per the NSW Planning Portal and MWRC LEP (2012): • The allotment is mapped as being groundwater vulnerable. • The allotment is not mapped as flood prone. • The allotment is not identified as bushfire prone. • All wooded areas within the allotment are mapped as 'high biodiversity value'.
Builder or Plumber	Jason Muller Plumbing
Allotment Size – (approx.)	42ha
Proposed Development	New Club house and Amenities building
Number of Persons	Estimations provided for a major event (expected to be 1-2 per year) = 325 persons using amenities, 150 persons using the Club House – with kitchen facilities.
Intended Water Supply	Tank
Proposed Daily Flow Rate	Calculation of daily flow rate is based on the NSW Department of Health Septic Tank and Collection Well Accreditation Guidelines, Annexure 3 – Capacity Calculation Criteria – Commercial Installations. **A maximum of 325 persons was considered for this system**. **325 persons using the amenities in a recreational ground setting** – Calculated flow rate (CFR) = estimated daily attendance plus estimated no. of persons using showers CFR = 325 persons x 3L + 300 persons x 23L CFR = 8,450L **150 of these persons using the unlicensed club kitchen facilities** CFR = persons x 25L plus 1550L/100 persons for dishwater allowance

[1] Via Mid-Western Regional Council Local Environment Plan 2012 and NSW Planning Portal

	CFR= 6,075L **Total maximum daily flow rate = 14,525L**
Power Supply	Supplied
Local Experience	Most systems work adequately in the area on appropriate soils and site conditions. 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. Prior to any major events both tanks are to be pumped out and serviced – to ensure all alarms and pumps are working correctly.

2 SITE PLAN

0m 16m 32m 48m 64m 80m

VISUAL SCALE 1:800 @ A3

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DETAILS:
SEPTIC DRAWINGS AT
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DRAWING:
SITE PLAN

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SHEET 2 / 3

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ENV_1130 -2

3 SITE CAPABLITY ASSESSMENT

3.1 DESKTOP REVIEW

The following table provides site specific details for this assessment.

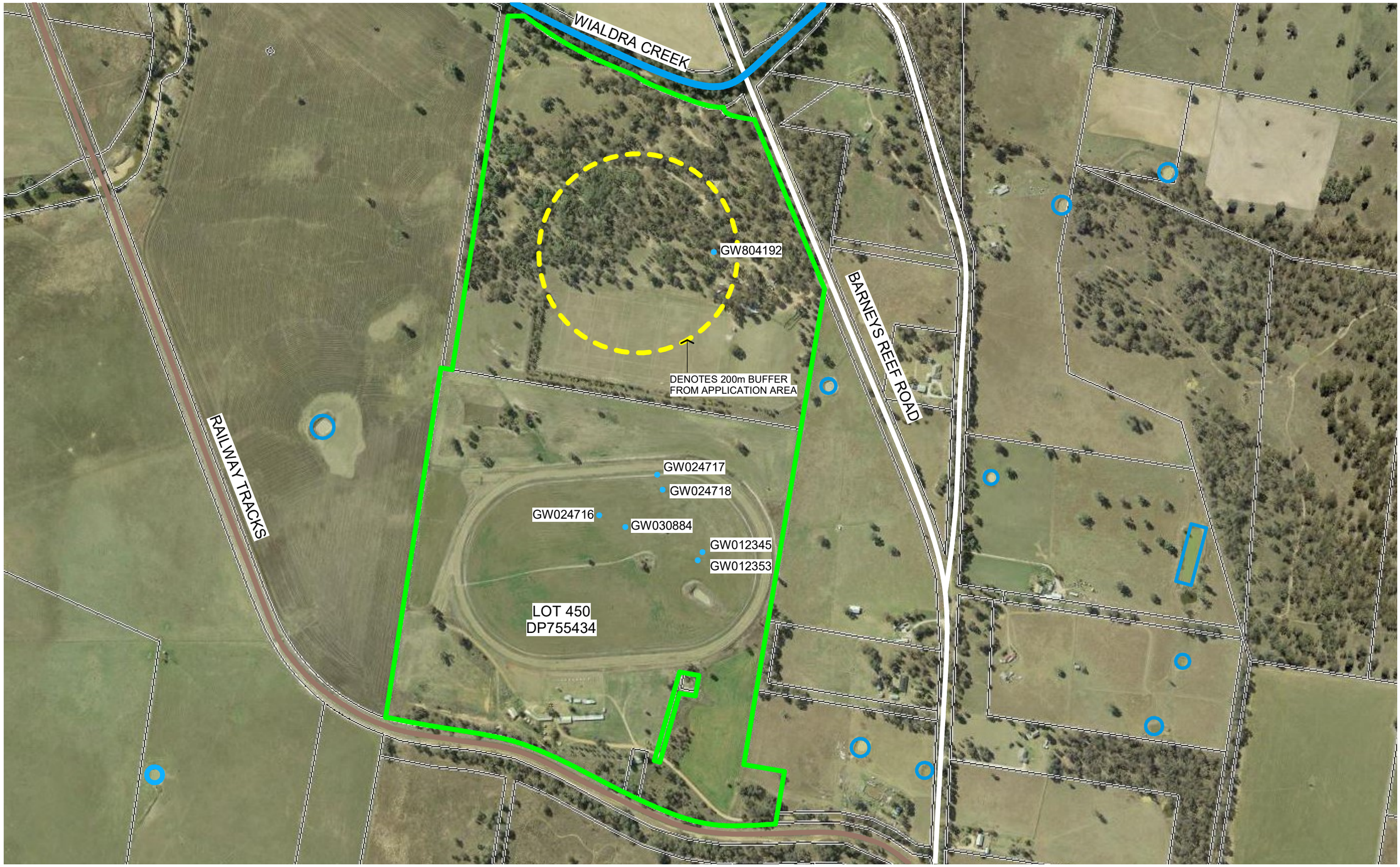
Table 4 : Desktop Research Summary

Climatic Overview[2]	Warm summers with larger evaporative deficit, cool winters with small evaporative deficit. Mean summer monthly rainfall (January) is 70.2mm. The mean winter rainfall (July) is 48.8mm. The mean monthly summer evaporation (January) is 175mm with evapotranspiration averaged at 90mm. The mean monthly winter evaporation (July) is 60mm with evapotranspiration averaged at 30mm. Annual Average Rainfall for Gulgong is 649.50mm
Soil Landscape Group[3]	Area has been mapped within the 'Craigmore' Landscape Group. Non-Calcic Brown Soils and Red Earths dominate the soil types. Topsoils are generally weakly structured red- yellow sandy loams, with sub-soils loams to light clays. Soil chemical fertility is moderate, with the fragile surface soils susceptible to soil structure degradation, surface sealing, poor friability and low surface infiltration. Waterholding capacity is moderate to high, profile permeability is moderate to low. Subsoils largely suitable for root growth. Erosional hazards increase when surface coverage is low. **Attachment A** provides a summary table of the main soils within this landscape group and possible limitations.
Australian Soil Group Mapping[3]	Chromosols
Naturally Occurring Asbestos [4]	Geological Units with LOW asbestos potential located to the south of the development.
Overall Salinity Mapping Hazard[3]	Moderate
Geology /Geomorphology[5]	Physiographic Unit Recent Alluvial Deposits Geological Unit Quaternary alluvium, older alluvium on higher terrace Parent Rocks Sources of alluvium are mostly metasediments of the Capertee Rise Parent Materials Quaternary alluvium and eluvium, sand, silt, clay, some gravel

2 Bureau of Meteorology Online Climate Data website – George Street Station No. 62021
3 http://www.environment.nsw.gov.au/eSpade2WebApp
4 https://www.arcgis.com/apps/PublicInformation/index.html?appid=87434b6ec7dd4aba8cb664d8e646fb06
5 Soil Landscapes of the Dubbo 1:250 000 Sheet Map, DLWC (1998)

Groundwater[6]	Review of the WaterNSW database indicated numerous groundwater bores within the general area, with one onsite registered bore(GW804192) onsite. Refer to **Figure 3** and **Attachment B** for a summary of groundwater information. One registered bore is within 200m of the proposed application area, approximately 180m to the east of the application area, within the allotment. The bore log indicated that groundwater within the location is at depth, with water bearing zones being 42-45m below the earth's surface. The standing water level of the bore was noted as 31m below the earths surface. The information generally indicates that groundwater is at depth in this area. The area is mapped as being potentially groundwater vulnerable (as per the Mid-Western Regional LEP, 2012), therefore the potential for groundwater contamination via effluent is a risk factor for consideration. In the event groundwater is encountered during excavation, all earthworks should cease, and advice sought from Council.
Hydrogeological Overview[7]	Inspection of the NSW Office of Environment and Heritage E-spade Database indicates that the site is within the 'Macquarie Alluvial Sediments Hydrogeological Landscape System (HGLG)'. This landscape contains aquifers that are unconfined with groundwater flow occurring through permeable alluvial soils and saprolite. Lateral and vertical flow occurs through alluvial sediments. The vertical flow component is important for recharging deeper aquifers within the alluvial system and underlying fractured rock. Hydraulic conductivity and transmissivity are typically moderate, but variable. Hydraulic conductivity and transmissivity is moderate. The depth to water table is typically 20m but ranges from 2-30m.
Surface Water[8]	Inspection of the NSW Six Maps database indicates there are no drainage lines within the allotment, however this is one small dam on the northeastern boundary. It is recommended that a geotechnical assessment by a suitably qualified consultant be undertaken to determine the integrity of the dam wall. As sub surface leakage is possible, especially if the wall is not clay lined or constructed using high quality material. It is recommended that given the small size of the allotment, and lack of stock, consideration be given to decommissioning the dam sue to its close proximity to the application area, shedding and house. The allotment is not identified as flood prone, however, an earth bank/contour bank around the application area is recommended to reduce the impact of surface flow from the application area to ensure all runoff remains onsite.
Dial Before You Dig Summary – a full search is required prior to earthworks by the excavation company.	Essential Energy - as per the notice provided at **Attachment C**– several assets are identified within the road reserve of the allotment, including underground earths and powerpole, but not within the general vicinity of the proposed application area. Telstra Service were identified within the vicinity of the allotment, as per the attached plan. None were identified within the general vicinity of the application area. The appointed earthmoving company is encouraged to take the necessary DBYD search and service location via a suitably accredited person to ensure all services are identified prior to earth works.

6 http://allwaterdata.water.nsw.gov.au/water.stm
7 http://www.environment.nsw.gov.au/eSpade2WebApp
8 https://maps.six.nsw.gov.au/



3 GROUNDWATER BORE PLAN

0m 160m 320m 480m 640m 800m

VISUAL SCALE 1:8000 @ A3

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CLIENT: GULGONG PONY CLUB & POLOCROSSE

DETAILS:
SEPTIC DRAWINGS AT
37 RACECOURSE ROAD, GULGONG

DRAWING:
GROUNDWATER BORE PLAN

ISSUE	DATE	AMENDMENT
A	2/02/22	ISSUED FOR REVIEW

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ENV_1130 -3

3.2 SITE INSPECTION & ASSESSMENT

The following table provides site specific details for this assessment in general accordance with Section 4.3.3 of the 'Silver' Book and Table D1 of AS/NZ 1547:2012. Refer **Plates 1-4**

Table 5 : Site Inspection

Date of Inspection	31 December 2021
Exposure	Adequate exposure across open within the proposed application area
Surface coverage	100% groundcover coverage – with grasses, weeds and forbs
Vegetation	Grasses, wooded vegetation within area
Slope	Generally flat **Figure 4** for slope/elevation profile for the proposed application area
Land Surface Shape	Generally flat
Site Drainage	Freely drained
Erosion Potential	Increased if surface cover low
Seepage	None noted
Fill	Nil
Outcrops	Nil
Surface Salinity	None noted
Surface Soil Conditions	Dry
Groundwater bores	One onsite GW804192
Surface Water Bodies	Wialdra Creek approximately 300m to the north. No onsite dams noted
Swimming Pools	No
Other Sensitive Areas	No large woody vegetation is proposed to be removed for the installation of this system.
Other Buildings	Onsite dwelling and sheds

Table 4 within Section 4.3.3 of the 'Silver Book', identifies the most limiting features of the site in terms of site capability for a land application system or on-site sewerage management system. This Table has been reproduced below. The highlighted categories represent site and soil conditions of the land covered in this report.

4 **S L O P E**

0m 30m 60m

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CLIENT: Gulgong Pony Club & Polocrosse

DETAILS:

SEPTIC DRAWINGS AT
37Racecourse Road, Gulgong

DRAWING:

SITE ELEVATION PROFILE

ISSUE	DATE	AMENDMENT
A	28//01/22	ISSUED FOR REVIEW

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SHEET 1 / 4

DRAWING REFERENCE

ENV_1130 -4

Table 6 : Site Limitation Assessment as per Table 4 of the 'Silver Book'

Site Feature	Relevant System (s)	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Flood potential	All land application systems	Rare, above 1 in 20-year flood contour		Frequent, below 1 in 20-year flood contour	Transport of wastewater off-site
	All treatment systems	Vents, openings, and electrical components above 1 in 100-year flood contour		Vents, openings, and electrical components above 1 in 100-year flood contour	Transport of wastewater off-site. System failure and electrocution hazard
Exposure	All land application systems	High sun and wind exposure		Low sun and wind exposure	Poor evapotranspiration
Slope %	Surface irrigation	0-6	6-12	>12	Run-off, erosion
	Sub-surface irrigation	0-10	10-20	>20	Run-off, erosion
	Absorption system	0-10	10-20	>20	Run-off, erosion
Landform	All systems	Hill crests, convex side slopes and plains	Concave side slopes and footslopes	Drainage plains and incised channels	Groundwater pollution hazard Resurfacing hazard
Run-on and upslope seepage	All land application systems	None – low	Moderate	High – diversion not practical	Transport of wastewater off-site
Erosion potential	All land application systems	No signs of erosion potential present		Signs of erosion, e.g. rills, mass movement and slope failure, present	Soil degradation and transport, system failure
Site drainage	All land application systems	No visible sign of surface dampness		Visible signs of surface dampness, such as moisture-tolerant vegetation (sedges and ferns), and seepages, soaks and springs	Groundwater pollution hazard Resurfacing hazard
Fill	All systems	No fill	Fill present		Subsidence. Variable permeability
Buffer distance	All land application systems	(see table 5)			Health and pollution risks
Land area	All systems	Area is available		Area is not available	Health and pollution risks
Rocks and rock outcrops (% of land surface containing rocks >200mm diameter)	All land application systems	<10%	10-20%	>20%	Limits system performance
Geology/Regolith	All land application system			Major geological discontinuities, fractured or highly porous regolith	Groundwater pollution hazard

4 SOIL CAPABLITY ASSESSMENT

The following table provides a summary of the soil assessment undertaken during the site inspection. A hand auger was used to dig to a depth of 550mm in one location for trench installation. The soil profile was examined (refer **Plates 3**) and a sub-surface sample from Bore Hole 1 was collected for analysis by EastWest Laboratory Tamworth. Laboratory Results are provided at **Appendix C.** The following tables provides detail on both field and laboratory assessment results.

Table 7: Field Soil Assessment

		Bore Hole 1 (BH1) Plate 3
Depth to bedrock or hardpan via field assessment		>1m
Depth to high soil water table via field assessment		>1m
Profile subsoil dampness		Dry at depth
pH (field)	H1 Subsoil (0-2cm) H2 Subsoil (2-40cm) H2 Subsoil (40cm+)	6 6 7
Dominant Colour Via Munsell Colour Chart	H1 Subsoil (0-2cm) H2 Subsoil (2-40cm) H2 Subsoil (40cm+)	10YR 6/2 Light brownish gray 10YR 7/2 Light gray 10YR 4/3 Dark Yellowish Brown
Soil Texture (field)	H1 Subsoil (0-2cm) H2 Subsoil (2-40cm) H2 Subsoil (40cm+)	Loam Loam Sandy Loam
Boundaries	H1 Subsoil (0-2cm) H2 Subsoil (2-40cm) H2 Subsoil (40cm+)	Gradual throughout

Large Course Fragments greater than 2mm % (field)	H1 Subsoil (0-2cm) H2 Subsoil (2-40cm) H2 Subsoil (40cm+)	<5% <5% <5%
Structure	H1 Subsoil (0-2cm) H2 Subsoil (2-40cm) H2 Subsoil (40cm+)	Increases with depth – generally loose
Assessed Soil Class at Depth		Category 2

The following table provides a summary of the laboratory results obtained from Bore Hole 1 at subsurface level (between 500-550mm). These selected results are important when considering DIR/DLR values, system selection and other requirements (such as gypsum application).

Table 8: Laboratory Analysis Results (BH1 Sub Sample H3)

pH ($CaCl_2$)	7.75
Electrical Conductivity EC dS/m	0.11
Phosphorous Sorption Capacity mg/kg	200
Cation Exchange Capacity (ECEC) cmol/kg	10.4
Exchangeable Sodium % (ESP)	1.74 (non-sodic)
Modified Emerson Aggregate Test (SAR 5)[9]	6 (no limitations to wastewater application)
Saturated Hydraulic Conductivity mm/hr	0.6mm/h (however this does not take into account the sand particles)
Texture	SL – Sandy Loam

[9] As per Technical Note T14-1 Emerson Aggregate Stability Test for Wastewater – an interpretation for consultants and regulators – Dr Robert Patterson, Lanfax Laboratory, 2020

Table 6 within Section 4.3.34 of the 'Silver Book', identifies the most limiting features of the soil in of site capability for a land application system or on-site sewerage management system. This Table has been reproduced below. The highlighted categories represent site and soil conditions of the land covered in this report.

Table 9 : Soil Limitation Assessment as per Table 6 of the 'Silver Book'

Soil Feature	Relevant System (s)	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Depth to bedrock or hardpan (m)	Surface irrigation Sub-surface irrigation	>1.0	0.5 – 1.0	<0.5	Restricts plant growth (trees), excessive runoff, waterlogging
	Absorption system	>1.5	1.0 – 1.5	<1.0	Groundwater pollution hazard Resurfacing hazard
Depth to high episodic/seasonal watertable (m)	Surface irrigation Sub-surface irrigation	>1.0	0.5 1 1.0	<0.5	Groundwater pollution hazard Resurfacing hazard
	Absorption system	>1.5	1.0 – 1.5	<1.0	Potential for groundwater pollution
Soil permeability Category[3]	Surface irrigation Sub-surface irrigation	2b, 3 and 4	2a, 5	1 and 6	Excessive run-off, waterlogging, percolation
	Absorption system [4]	3 and 4		1,2,5 and 6	
Course fragments (%)	All land application systems	0-20	20-40	>40	May restrict plant growth, affect trench installation
Bulk density (g/cm_3) Sandy Loam Loam & clay loam Clay	All land application systems	 <1.8 <1.6 <1.4		 >1.8 >1.6 >1.4	Restricts plant growth, indicator of permeability
pH CaCl	All land application systems	>6.0	4.5 – 6.0	-	Reduces optimum plant growth
Electrical conductivity (dS/m)	All land application systems	<4	4-8	>8	Excessive salt may restrict plant growth
Sodicity (exchangeable sodium percentage) [5]	Surface irrigation Sub-surface irrigation (0-40cm)	0-5	5-10	>10	Potential for structural degradation
	Absorption system (0-1.2m)				
Caption exchange capacity (cmol÷/kg) (0-40cm)	Surface irrigation Sub-surface irrigation	>20	5-20[6]	<5	Unable to hold plant nutrients
Phosphorus sorption (kg/ha) (0-100cm for irrigation) (100cm below intended base of trench)	All land application systems	>6000	2000-6000	<2000	Unable to mobilise and excess P
Modified Emerson Aggregate Test (depressiveness)	All land application systems	Class 3-6	Class 2	Class 1	Potential for structural degradation

Notes:

1. Sites with these properties are generally not suitable
2. Presence of soil water might indicate soil conditions that favour movement of nutrients and other contaminants into the groundwater.
3. See Table 8 of the *On-Site Sewerage Management for Single Households*.
4. Rate of application should not exceed 2 – 5 mm/day for the soil absorption systems.
5. Because of the elevated levels of sodium in domestic wastewater, gypsum should be put on application areas each year. Soil absorption systems should also be dosed on a regular basis.
6. Soil is likely to become more sodic with effluent irrigation.

4.1 SUMMARY OF SOIL CONSTRAINTS

The following table provides an overview of the soil type and associated constraints.

Table 10 : Summary of Soil Characteristics

Sub surface soils	Sub soils were assessed as being Category 2 for the site. Clay content increased with depth. Although the hydraulic conductivity of the soil sample was low, it is expected that it would increase higher up the profile. There is a high percentage of sand within the profile which would excel water drainage.

4.2 Recommended Hydraulic Loading for disposal system

For this design, given there are minimal soil constraints, and the area is gently sloped, a bed system is recommended. The conservative DLR rate has been applied (in accordance with Appendix L2 of AS/NZS 1547:2012.

For this design, based on the above, a DLR of 15mm/day for Category 2 massive soils will be applied – based on sub-soil type.

5 SYSTEM DESIGN – TANK REQUIREMENTS

The following table justifies the required tank capacity and requirements for the proposed development.

Table 11 : Tank Capacity Justification

Design Allowance & Calculated Maximum Flow Rate – as per NSW Dept of Health Septic Tank and Collection Well Accreditation Guidelines Annexure 3 (2001)	Calculation of daily flow rate is based on the NSW Department of Health Septic Tank and Collection Well Accreditation Guidelines, Annexure 3 – Capacity Calculation Criteria – Commercial Installations. **A maximum of 325 persons for a 1- day event was considered for this system**. **325 persons using the amenities in a recreational ground setting** – Calculated flow rate (CFR) = estimated daily attendance plus estimated no. of persons using showers CFR = 325 persons x 3L + 300 persons x 23L CFR = 8,450L **150 of these persons using the unlicensed club kitchen facilities** CFR = persons x 25L plus 1550L/100 persons for dishwater allowance CFR= 6,075L **Total maximum daily flow rate = 14,525L** As per the NSW Department of Health Septic Tank and Collection Well Accreditation Guidelines, Annexure 3 – Capacity Calculation Criteria – Commercial Installations – tank capacity = Sludge Allowance (S) + Daily Flow. The Sludge allowance applied to this calculation is based on the more conservative Silver Book estimation of 2,050L. Therefore, the total septic tank capacity = 14,525L + 2,050L. Total Septic Tank Capacity =16,575L They system will consist of a 7,000L Primary treatment tank with a 10,000L Holding tank.
New Tank Requirements (as required)	The new selected tank must be NSW Health accredited - http://www.health.nsw.gov.au/environment/domesticwastewater/Pages/stcw.aspx
Other Recommendations	A submersible alarmed pump will be required to ensure effluent is distributed to trenches from the holding tank. The pump is to be dual switch activated, ensuring effluent distribution is alternated between trenches. The septic tank and holding tank are to be pumped out prior to any major events to ensure there is capacity within the system. Additional facilities for waste management and showing is to be provided for major events beyond the estimated capacity for the designed system.

	Water conservation measures should be adapted to the proposed dwelling, where available. 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. Septic systems are particularly sensitive to cleaning products containing disinfectants and bleaches. They are also sensitive to herbicides, weedicides and pharmaceuticals such as antibiotics. The owner/lessee 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 tank should be de-sludged every 5 years. The internal structural integrity and capacity should be determined by a suitably qualified plumber.

6 SYSTEM DESIGN – EFFLUENT MANAGEMENT

6.1 MID-WESTERN REGIONAL COUNCIL 'ON-SITE SEWERAGE MANAGEMENT PLAN (2008)

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

Table 12 : MWRC OSSMP (2008) Buffer Requirements

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 neighboring property; ▪ 40m to other waters (e.g. farm dams, intermittent waterways and drainage channels, etc.)
Absorption Systems	▪ 12m if area up-gradient and 6m if area down-gradient of property boundary ▪ 6m if area up-gradient and 3m if area down-gradient of swimming pools, driveways and buildings12m if area up-grade and 6m if area down gradient of swimming pools, property boundaries, driveways and building; ▪ 6m if area is up-gradient and 3m if area is down gradient of swimming pools, driveways and building.
Assessment of the Current Development to the Buffer Requirements	The following should be noted for this site – Refer Figure 2- ▪ *The proposed system is over 100m from the property boundary.* ▪ *The proposed application area is approximately 180m from the onsite stock groundwater bore (GW804192).* ▪ *The proposed application area is greater than 40m to neighbouring bores.* ▪ *The proposed application area is greater than 200m from the Wialdra Creek to the north of the proposed application area* ▪ *Any future works will need to adhere to the required buffer distances.*
Absorption System Design	Given the nature of the soil, multi distribution pipes are preferred over a self-supporting arch piping. Care should be taken to ensure adequate fall is achieved across the bed/trench surface. As per MWRC OSSMP (2008), a trench width of 2m will be utilised.

6.2 EFFLUENT APPLICATION AREA CALCULATION

Jade Environmental Pty Ltd has analysed the current system in accordance with the NSW Government endorsed 'Silver Book' (1998), NSW Department of Health Septic Tank and Collection Well Accreditation Guidelines (2001), with additional advice sought from AS/NZS2047:2012 On-site Domestic Wastewater Management' and the Sydney Catchment Management Authority 'Designing and installing On-site Wastewater Systems' 2019 guideline. The following table provides justification for the design. The general site layout is provided in **Figure 2**, with **Plate 3** illustrating the application area.

Table 13 : Application Area Calculations

Flow application rate for the trenches	The estimated maximum daily flow rate was calculated as 14,525L. The dual septic tank and overflow holding tank will be designed to ensure 2,500L (or 17%) of the estimated maximum daily flow rate is pumped to absorption trenches over the course of the 1-day event. Effluent will be dispersed evenly during the 1-day large event. The pump and control switch will be designed to ensure that distribution is alternated between trenches. Therefore, neither the primary treatment tank nor overflow holding tank will reach full capacity.
Hydraulic Loading Calculation	The required application area for Primary treated effluent shall be determined from the following relationship $Length\ of\ Absorption\ Trenches\ = (Q)\ /\ (DLR\ x\ W)$ Where: Q= Daily Flow Rate, DLR = Design Loading Rate of the Soil, W = Width of the Bed For this current development Q = 2,500L, DLR=15mm, Width=2m $Length\ of\ Absorption\ Trenches\ = 2{,}500/(15\ x\ 2)$ $= 83.3m$ Therefore, a minimum of 83m of trenching is require (**4 x 20.75m long by 2m wide trenches**).
Water Balance Calculation	A water balance calculation was also undertaken for the current development. This water balance is provided at **Attachment E**. The site water balance indicates that an area of 163m^2 would be required. This is equivalent to **four 20.4 m long, by 2m** wide trenches are required, to a depth of 450mm.
Recommended Application Area	Given the similarity in the results, the greater will be used. Therefore, **4 x 21m long by 2m wide conventional absorption trenches** – multi distribution piped, to a depth of 450mm is considered adequate for this site.
Standard Drawings	Standard drawings from AS/NZS 1547:2012 and the Sydney Catchment Management Authority, (2012) Designing and Installing On-Site Wastewater Systems are also provided at **Attachment F.**

Common failures of trenches/beds are often caused by poor installation practices. In addition to specifications outlined in AS/NZS 1547:2012, the following table provides additional information in the design and construction of the application area.

Table 14 : Conventional Piped Trench/Bed Installation Recommendations

The conventional absorption trenches should be positioned as indicated in Figure 3. As stated in AS2047:2012 section 5.5.3.4, a reserve absorption area of similar size to the current design should be considered as part of the risk management process to be available on a site for expansion or for resting of the land application system.

Other Design Recommendations	▪ The Absorption Trenches should be positioned as indicated in Figure 2. ▪ As stated in AS2047:2012 section 5.5.3.4, a reserve absorption area of similar size to the current design should be considered as part of the risk management process to be available on a site for expansion or for resting of the land application system. ▪ The base of the trenches must be level to ensure an even distribution of effluent. It should also be scarified to overcome any smearing during excavation. Base levels should be checked with a laser (or dumpy) level. ▪ Grass should be established across the construction area as soon as possible. The Trenches area should be level or slightly mounded. Good quality clean topsoil should be used to optimise plant growth. ▪ The absorption trenches should not be laid near large trees. ▪ Avoid cutting the absorption trenches into weakened ground. ▪ Construction is to take place during fine weather. If it rains the absorption trenches is to be completely covered to protect them from rain damage. ▪ All distribution pipes and arches should be laid in accordance with the manufacture's instructions. ▪ Inspection ports shall be provided for the absorption trenches system. The inspection ports shall be installed so as to facilitate monitoring of the effluent level in the system across each of the distribution pipes. ▪ To ensure an even distribution of effluent across the Trenches, the following can be considered: o A manifold distribution box is to be built from moulded PVC or pre-cast concrete, housed within 360mm x 360 mm stormwater pit with solid lid. The distribution box must be placed and levelled on 1000mm x 1000mm pre-cast slab or bedded in concrete. o Feeder pipes, typically 100 mm PVC pipe should be installed from the distribution box to the pre-slottered sewer grade distribution pipes. Effluent should be intermittently dosed, and will be via a pumped application.

- A splitter box is to be built from moulded PVC or pre-cast concrete at each junction of the feeder/distribution pipe. The box must be placed and levelled on 360mm x 360mm pre-cast slab. This will encourage an even distribution of effluent along the distribution pipes – between trenches, and within individual trenches.

- Vegetation cover must be well maintained to ensure strong growth for maximum uptake of evapotranspiration. The surrounding landscape and vegetation must also be maintained to minimise shading and maximise exposure.
- The absorption trenches should be in an enclosed area, with and no exposed to vehicle movement or stock that can cause compaction and premature absorption trenches failure.
- Test the absorption trenches with clean water before filling with gravel to ensure effective and even distribution of effluent.

7 CONCLUSION

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 limited lifespan 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.

Jade Environmental Pty Ltd encourages the owner 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

PLATES

Plate 1– Proposed Club House & Amenities

Plate 2 – BH1

Plate 3- Application Area

ATTACHMENT A

Soil Landscape Summary

Summary Table of Landscape Information
'Craigmore' Landscape Group

SUMMARY TABLE FOR THE MAIN SOILS Of CRAIGMORE SOIL LANDSCAPE		
	Red Earths	**Non-calcic Brown Soils**
Dominance	Co-dominant	Co-dominant
Landform element	Alluvial terrace	Alluvial terrace
Surface condition	Hardsetting	Hardsetting
Drainage	Moderately well drained	Moderately well drained
Soil permeability	Permeable	Permeable
Watertable depth	>100 cm	>100 cm
Available waterholding capacity	Moderate to high	Moderate to high
Depth to bedrock	Very deep	Very deep
flood hazard	High terrace above modern flood level	High terrace above modern flood level
pH (topsoil)	Slightly acidic	Slightly acidic
fertility (chemical)	Moderate to high	Moderate to high
Expected nutrient deficiencies	N, P	N, P
Soil salinity	Low	Low
Erodibility (topsoil)	Low	Low
Erodibility (subsoil)	Low	Low
Erosion hazard	Low	Low
Structural degradation hazard	High	High
Land capability classification	II, III, IV	II, III, IV
USCS (subsoil)	ML, SM	CL
Shrink-swell potential	Low	Low to moderate
Mass movement hazard	Nil	Nil

Source – *Murphy B.W. & Lawrie J.W. 1998. Soil Landscapes of the Dubbo 1:250 000 Sheet Report, DLWC.*

ATTACHMENT B

Groundwater Bore Information

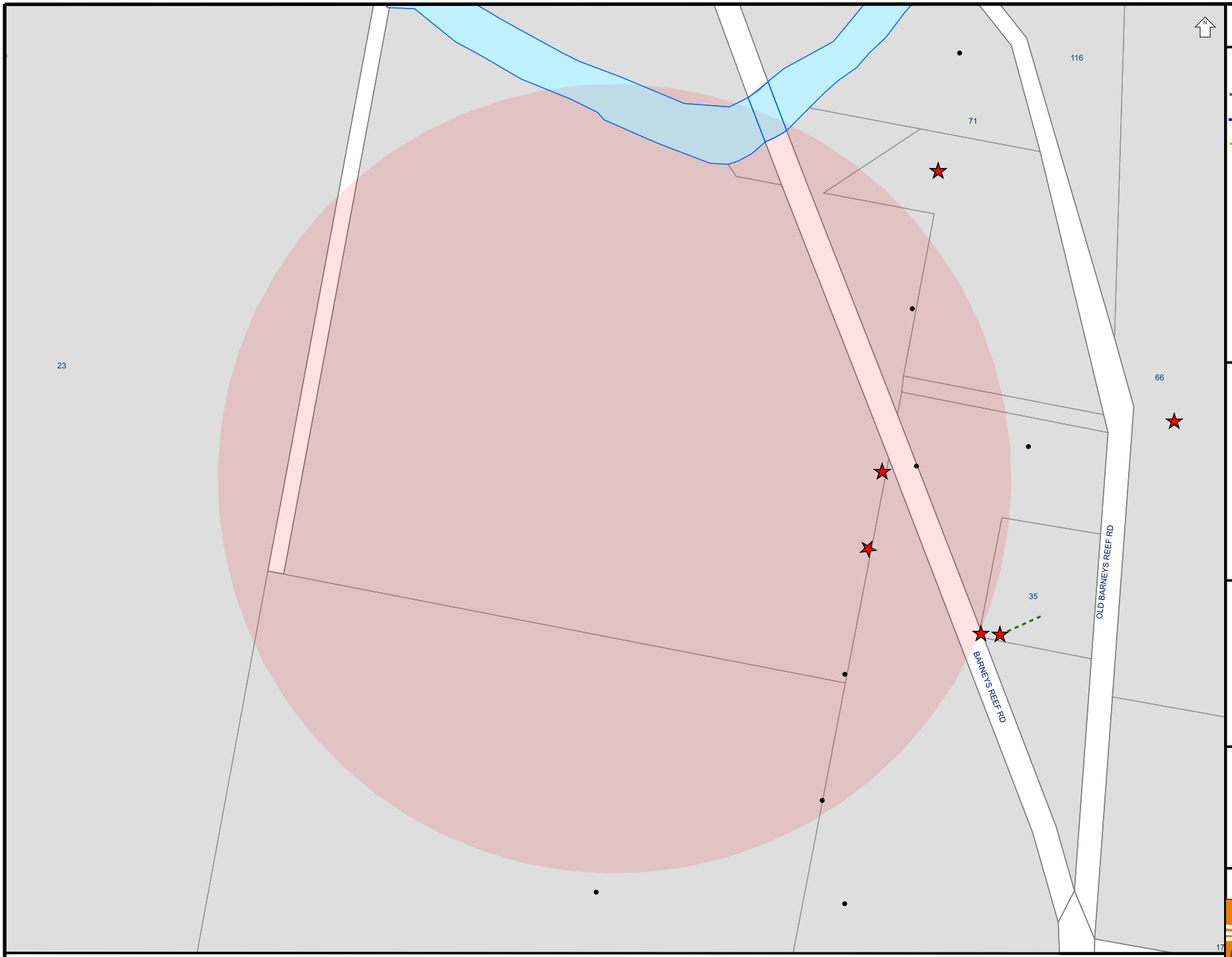
Summary Information of Local Groundwater Bores

The following information was obtained via desktop review of available groundwater information in the local area. Information was obtained from the NSW Office of Water online groundwater mapping tool. Information relating to historic groundwater report details on water bearing zones and standing water levels is provided in the table below.

Groundwater Bore Reference	Authorized Purpose	Within 200m of Application Area	Total Depth (m)	Water Bearing Zones (m)	Yield (L/s)	Standing Water Level	Salinity Description
GW804192	Stock	Yes	48.0	42.0-46.0	1.0	31.0	Not provided
GW024717	Public	No	11.6	Not provided	Not provided	Not provided	Not provided
GW024716	Public	No	11.6	Not provided	Not provided	Not provided	Not provided
GW024718	Public	No	39.03	11.4-11.9	Not provided	Not provided	Not provided
GW030884	Public	No	53.0	36.2-37.7	Not provided	Not provided	Not provided
GW012345	Public	No	25.9	Not provided	Not provided	Not provided	Not provided
GW012353	Public	No	25.9	17.0-25.8	5.11	15.8	0-500ppm

ATTACHMENT C

Dial Before you dig (summary information only)



Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- LV Underground Cable
- HV Underground Cable
- Underground Pipe
- Underground Earth or Wires
- Ground Substation
- Pole
- Cubicle
- Pit
- Area of Interest

Critical Assets

Contact Essential Energy on 13 23 91

- Zone Substation
- Underground Cable
- Underground Fibre

Proposed Works

- Area of proposed works

Proposed assets are shown as orange symbols

THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE. If details are incorrect, please notify Essential Energy on 13 23 91 (or fax 1800 354 636)

ISSUE DATE: 13/02/2022

You must resubmit your request if you have not started work within 4 weeks of the 'Issue Date' above

A4 | SCALE: 1:6227

Job Number: 31382147 Sequence number: 208069009 Job location: 35 Old Barneys Reef Road, Gulgong Map Centre: 149° 31' 41.2", -32° 19' 57.2"

essential energy

ATTACHMENT D

Laboratory Results

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geo ag enviro

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e admin@eastwestonline.com.au
t 02 6762 1733
f 02 6765 9109
abn 82 125 442 382

eastwestonline.com.au

ANALYSIS REPORT SOIL

PROJECT NO: EW220114		**Date of Issue:**	**19/01/2022**
Customer:	JADE ENVIRONMENTAL Pty Ltd	Report No:	1
Address:	[redacted]	Date Received:	10/01/2022
		Matrix:	Soil
Attention:	Kristy Bennetts	Location:	1129 & 1130
Phone:	[redacted]	Sampler ID:	Client Supplied
Fax:		Date of Sampling:	30/12/2021
Email:	[redacted]	Sample Condition:	Acceptable

Comments:
3b = moderate to slight dispersion of the remould.

Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

Signed: [redacted]
Anne Michie

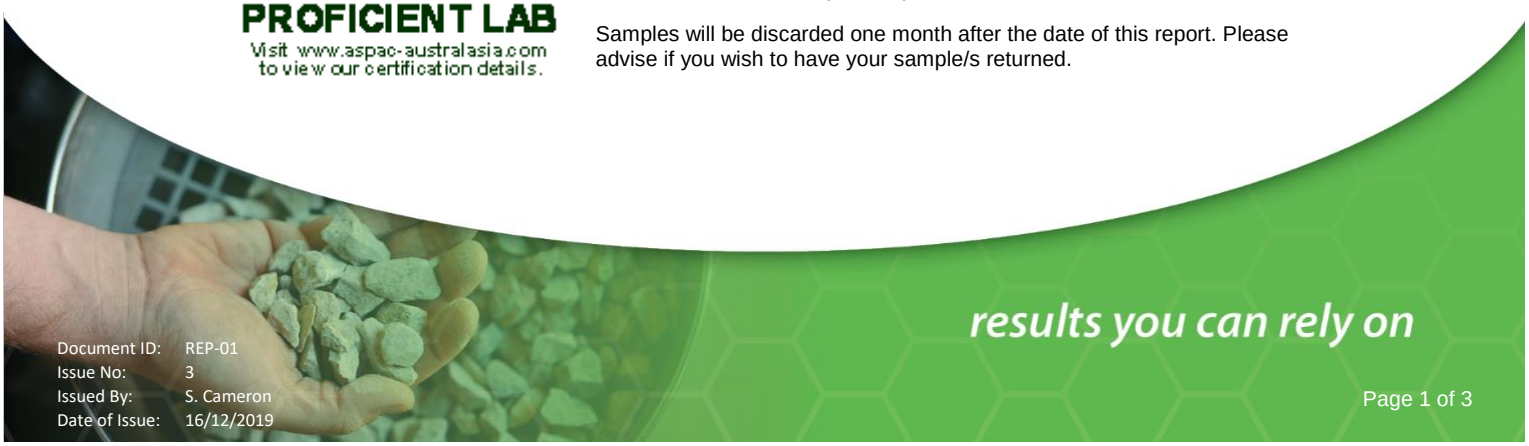
ASPAC
PROFICIENT LAB
Visit www.aspac-australasia.com to view our certification details.

East West is certified by the Australian-Asian Soil & Plant Analysis Council to perform various soil and plant tissue analysis. The tests reported herein have been performed in accordance with our terms of accreditation.

This report must not be reproduced except in full and EWEA takes no responsibility of the end use of the results within this report.

This analysis relates to the sample submitted and it is the client's responsibility to make certain the sample is representative of the matrix to be tested.

Samples will be discarded one month after the date of this report. Please advise if you wish to have your sample/s returned.



ANALYSIS REPORT

PROJECT NO: EW220114 Location: 1129 & 1130

				CLIENT SAMPLE ID	#1129	#1130		
				DEPTH	550mm	550mm		
Test Parameter	**Method Description**	**Method Reference**	**Units**	**LOR**	**220114-1**	**220114-2**		
pH (1:5 in H20)	Electrode	R&L 4A2	pH units	na	6.39	8.37		
pH (1:5 in CaCl2)	Electrode	R&L4B2	pH units	na	5.21	7.75		
Electrical Conductivity	Electrode	R&L 3A1	dS/m	0.01	0.03	0.11		
Phosphorus Buffer Index	UV-Vis	PMS-12	mg/kg	na	29.7	33.0		
Phosphorus (Colwell)	Bicarb/UV-Vis	R&L 9B1	mg/kg	1	10.1	12.5		
Phosphorus Sorption Capacity	Calc	PMS-12	mg/kg	na	184	200		
Phosphorus Sorption Capacity	Calc	na	kg/ha	na	2600	2800		
Exchangeable Potassium	NH4Cl/ICP	R&L 15A1	mg/kg	10	59.8	47.4		
Exchangeable Calcium	NH4Cl/ICP	R&L 15A1	mg/kg	20	179	1883		
Exchangeable Magnesium	NH4Cl/ICP	R&L 15A1	mg/kg	10	288	83.2		
Exchangeable Sodium	NH4Cl/ICP	R&L 15A1	mg/kg	10	88.1	41.6		
Exchangeable Potassium	R&L 15A1	R&L 15A1	cmol/kg	na	0.15	0.12		
Exchangeable Calcium	R&L 15A1	R&L 15A1	cmol/kg	na	0.90	9.42		
Exchangeable Magnesium	R&L 15A1	R&L 15A1	cmol/kg	na	2.40	0.69		
Exchangeable Sodium	R&L 15A1	R&L 15A1	cmol/kg	na	0.38	0.18		
ECEC	Calculation	PMS-15A1	cmol/kg	na	3.83	10.4		
Ca/Mg Ratio	Calculation	PMS-15A1	cmol/kg	na	0.37	13.6		
K/Mg Ratio	Calculation	PMS-15A1	cmol/kg	na	0.06	0.18		
Exchangeable Potassium %	Calculation	PMS-15A1	%	na	4.00	1.17		
Exchangeable Calcium %	Calculation	PMS-15A1	%	na	23.4	90.4		
Exchangeable Magnesium %	Calculation	PMS-15A1	%	na	62.6	6.66		

ANALYSIS REPORT

PROJECT NO: EW220114 **Location: 1129 & 1130**

				CLIENT SAMPLE ID	**#1129**	**#1130**		
				DEPTH	**550mm**	**550mm**		
Test Parameter	**Method Description**	**Method Reference**	**Units**	**LOR**	**220114-1**	**220114-2**		
Exchangeable Sodium %	Calculation	PMS-15A1	%	na	10.00	1.74		
Mod Emerson Agg Test (SAR5)	513.01	PMS-21	Class	na	6	6		
Saturated Hydraulic Conductivity	30cm tension	ASTM F1815-97	mm/hr	0.1	1.7	0.6		
Texture	Field	Northcote	Class	na	SC	SL		
Emerson Aggregate Test	Class	PMS-21	Number	na	3b	2		

Soils are air dried at 40^{0}C and ground <2mm.

NB: LOR is the Lowest Obtainable Reading.

DOCUMENT END

ATTACHMENT E

Water Balance

Jade Environment JN	1130	
Location :	37 Racecourse Road, Gulgong	

Design Wastewater Flow	**Q**	**l/day**	2500
Design Loading Rate	**R**	**mm/day**	15

Climate Zone	3 C	*As per Soil Landscapes of Dubbo 1:250 000* **Dropbox**

1	2	3	4	5	6	7	8	9	
Month	**Pan evap E (mm)**	**Evapo Transpiration Et (ET=0.75E)mm**	**Rainfall R (mm)**	**Retained Rainfall Rr (Rr=0.75R) mm**	**DLR per M720onth (mm)**	**Disposal Rate (3-5+6) mm**	**Effluent applied per month (L)**	**Size of Area (8/7) m²**	**Days In Month**
Jan	229	171.75	94	70.5	465	566.25	77500	136.8653422	**31**
Feb	178	133.5	86	64.5	435	504	72500	143.8492063	**29**
Mar	155	116.25	76	57	465	524.25	77500	147.8302337	**31**
Apr	104	78	64	48	450	480	75000	156.25	**30**
May	51	38.25	70	52.5	465	450.75	77500	171.9356628	**31**
Jun	46	34.5	75	56.25	450	428.25	75000	175.1313485	**30**
Jul	41	30.75	60	45	465	450.75	77500	171.9356628	**31**
Aug	58	43.5	66	49.5	465	459	77500	168.8453159	**31**
Sep	89	66.75	60	45	450	471.75	75000	158.9825119	**30**
Oct	130	97.5	81	60.75	465	501.75	77500	154.4593921	**31**
Nov	165	123.75	78	58.5	450	515.25	75000	145.5604076	**30**
Dec	229	171.75	96	72	465	564.75	77500	137.2288623	**31**
							Mean area	155.7m²	

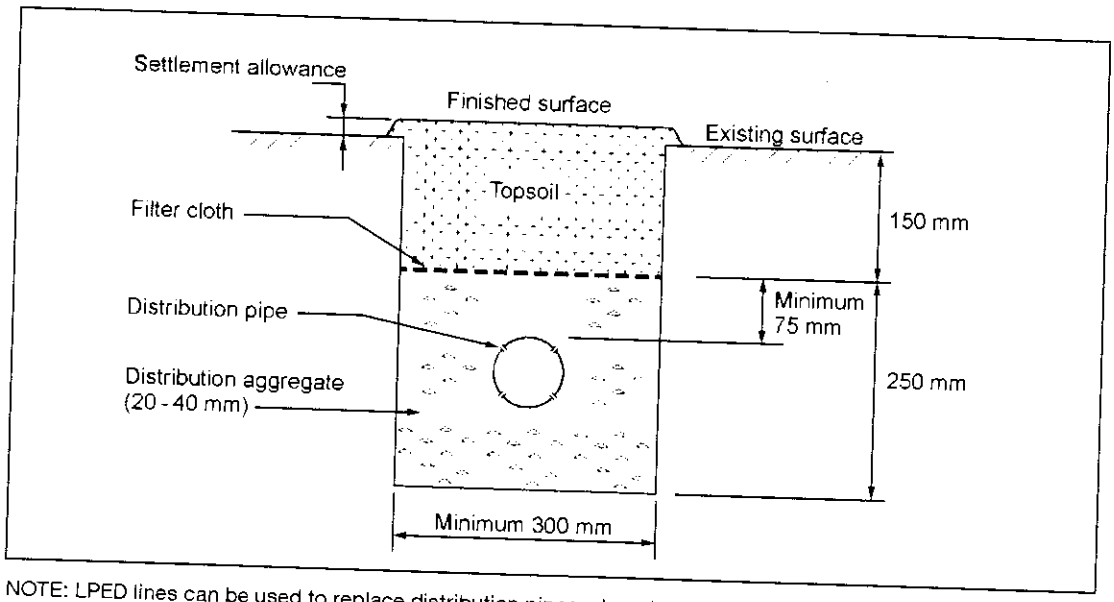
Month	First trial area	Application rate	Disposal rate	mm	Increase in Depth of Stored Effluent	Depth of Effluent for Month	Increase in Depth of Effluent	Computed	Reset if Et<0	Equiv Storage
Dec	163m²	475.4601227	564.75	-89.2898773	-297.6329243	0	-297.6329243	-297.6329243	0	0
Jan		475.4601227	566.25	-90.7898773	-302.6329243	0	-302.6329243	-302.6329243	0	0
feb		444.7852761	504	-59.21472393	-197.3824131	0	-197.3824131	-197.3824131	0	0
Mar		475.4601227	524.25	-48.7898773	-162.6329243	0	-162.6329243	-162.6329243	0	0
Apr		460.1226994	480	-19.87730061	-66.25766871	0	-66.25766871	-66.25766871	0	0
May		475.4601227	450.75	24.7101227	82.36707566	0	82.36707566	82.36707566	82.36707566	13425.83333
Jun		460.1226994	428.25	31.87269939	106.2423313	82.36707566	188.609407	188.609407	188.609407	30743.33333
Jul		475.4601227	450.75	24.7101227	82.36707566	188.609407	270.9764826	270.9764826	270.9764826	44169.16667
Aug		475.4601227	459	16.4601227	54.86707566	270.9764826	325.8435583	325.8435583	325.8435583	53112.5
Sep		460.1226994	471.75	-11.62730061	-38.75766871	325.8435583	287.0858896	287.0858896	287.0858896	46795
Oct		475.4601227	501.75	-26.2898773	-87.63292434	287.0858896	199.4529652	199.4529652	199.4529652	32510.83333
Nov		460.1226994	515.25	-55.12730061	-183.7576687	199.4529652	15.69529652	15.69529652	15.69529652	2558.333333
Dec		475.4601227	564.75	-89.2898773	-297.6329243	15.69529652	-281.9376278	-281.9376278	0	0
Jan		475.4601227	566.25	-90.7898773	-302.6329243	0	-302.6329243	-302.6329243	0	0
Feb		444.7852761	504	-59.21472393	-197.3824131	0	-197.3824131	-197.3824131	0	0
Mar		475.4601227	524.25	-48.7898773	-162.6329243	0	-162.6329243	-162.6329243	0	0
Apr		460.1226994	480	-19.87730061	-66.25766871	0	-66.25766871	-66.25766871	0	0
May		475.4601227	450.75	24.7101227	82.36707566	0	82.36707566	82.36707566	82.36707566	13425.83333

Estimated area of effluent drainfield	163m²
Maximum depth of stored effluent (must not exceed 350mm)	325.84mm
Trench dimensions	2000mm
Length of trench required	81.5m
<20m lengths of trench	4.075

Trench Depth	450	mm

ATTACHMENT F

Standard Drawings



NOTE: LPED lines can be used to replace distribution pipes when dose loading effluent into trenches.

FIGURE L1 CONVENTIONAL PIPED TRENCH

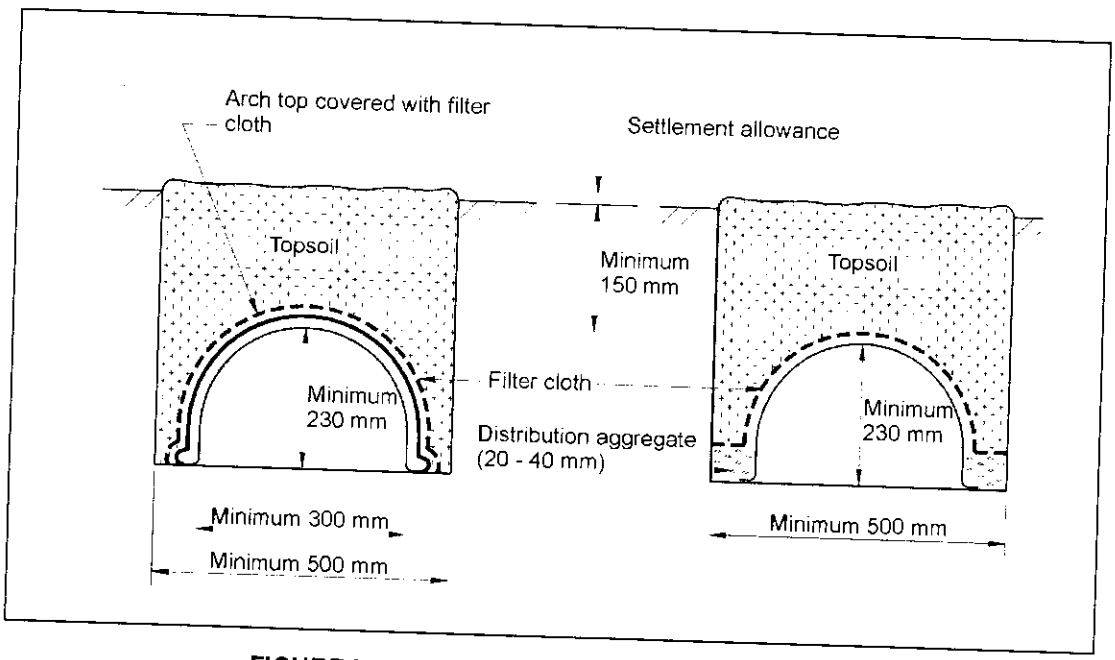
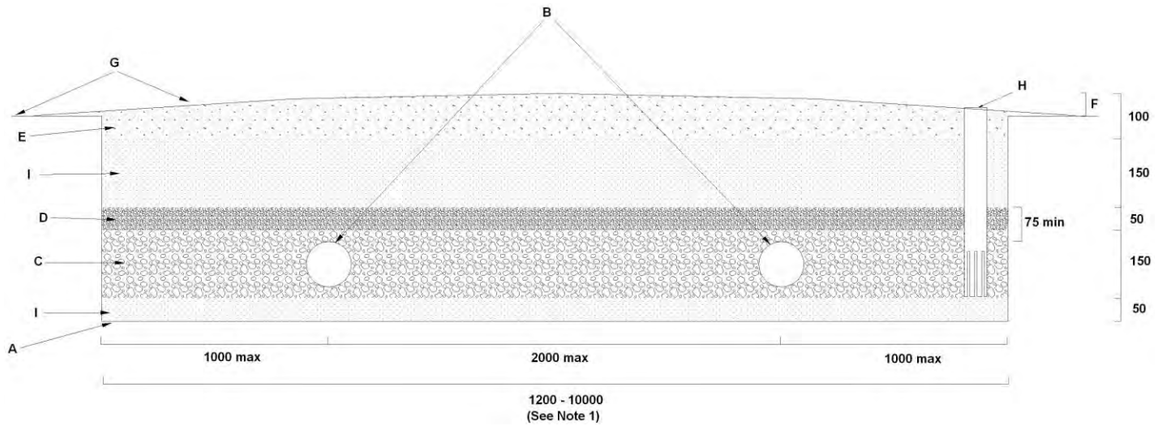
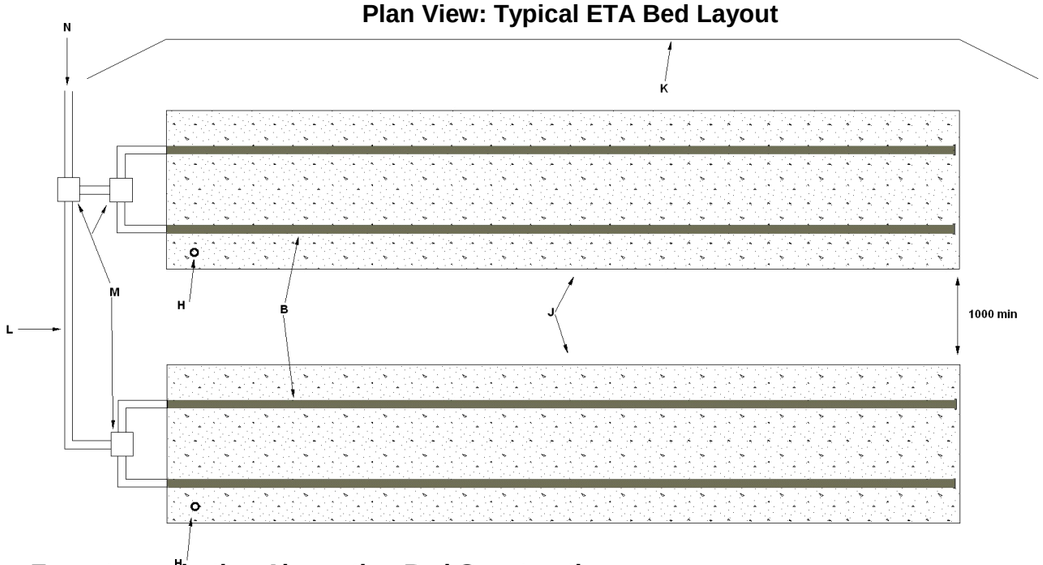


FIGURE L2 SELF-SUPPORTING ARCH TRENCH

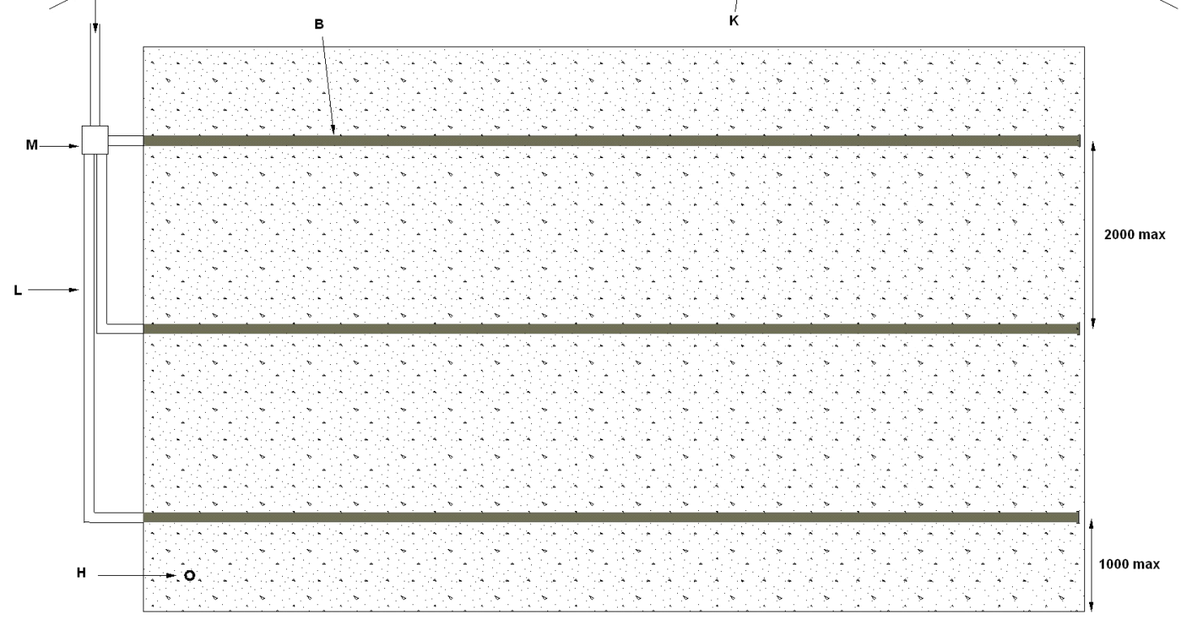
Cross Section: Evapotranspiration Absorption (ETA) Bed



Plan View: Typical ETA Bed Layout



Plan View: Typical Large ETA Bed Layout (applicable only if pressure-dosed and a flat site <5% slope)



Evapotranspiration Absorption Bed Construction

A The base of the bed must be level to ensure even distribution of effluent. It must also be scarified to overcome any smearing during excavation. Base levels should be checked with a dumpy / laser level.

B 100mm slotted PVC pipe.

C 20-40mm distribution aggregate.

D 5-10mm aggregate.

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

F Allowance for settling after backfilling.

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

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

I Fine sand (0.1mm).

J 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/NZS 1547:2012 and this Manual. 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.11A for design detail). Subsoil drainage may be necessary on particular sites.

L 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, siphon or pump fed effluent from treatment system.

Note

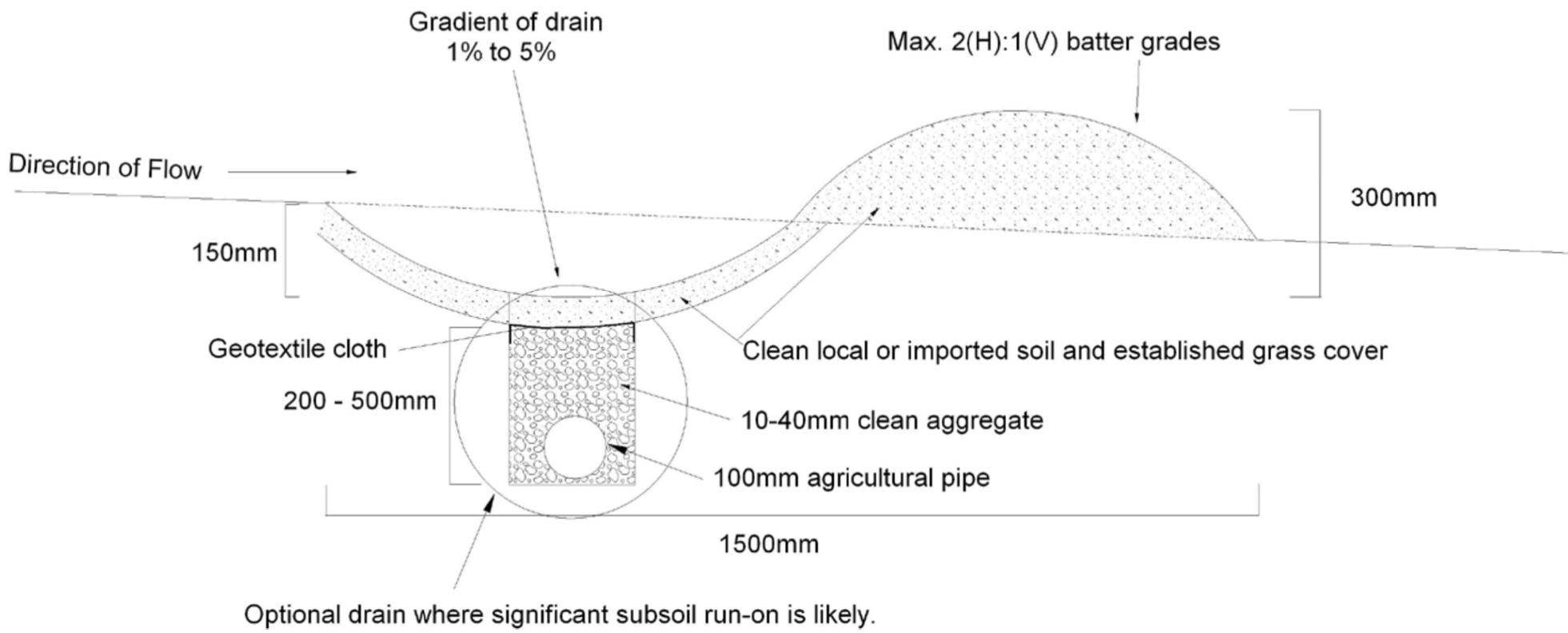
1 More than two distribution pipes will be required in beds wider than 4,000mm. Care should be taken with beds wider than 4,000mm to ensure a level base.

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

Standard Drawing 11B – Evapotranspiration Absorption Bed

(not to scale)

Cross Section: Upslope Diversion Drain



Standard Drawing 10A - Upslope Diversion Drain

(not to scale)