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APPENDIX H

Effluent Assessment

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DESIGN . PLAN . MANAGE

Site and Soil Assessment for On-site Effluent Management System

Client [redacted]

Site Address: Lot 111, 2 Premiers Street
Nemingha, NSW 2340

10 March 2025

Our Reference : 43564-ER01_A

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DISCLAIMER

This report has been prepared solely for Robjie Superannuation Pty Ltd 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 111 DP1272283, 2 Premiers Street, Nemingha NSW 2340
Client:	[redacted]
Project Number:	43564
Report Reference:	43564-ER01_A
Date:	10/01/2025

Prepared by:	Reviewed by:
[redacted]	
Jeremy Wiatkowski **AdvDip Laboratory Operations** Senior Laboratory Technician	**Georgina Moir** **BEnvSc** Environmental Scientist

1.0 SYSTEM OVERVIEW

The following table provides a summary of the information for a sustainable onsite effluent management system proposed at Lot 111 DP1272283, 2 Premiers Street, Nemingha NSW 2340. The sections of this report that follow, provide site specific details justifying the recommended system.

Table 1 : System Overview

Site Assessor	Jeremy Wiatkowski
Client	[redacted]
Site Location	"Lot 111 DP1272283", 2 Premiers Street, Nemingha NSW
No. of Occupants	70 x Preschoolers 74 x Toddlers 24 x Babies 29 x Staff Total = 197 Occupants
Water Source	Town water
Estimated Daily Flow (L/day)	3940L/Day based on 197 people at 20L/person/day as per page 76 of SA Onsite Wastewater System Code
Tank Recommendation	Commercial Secondary Treated Septic Tank
Tank Capacity	As per section 6.0 the minimum size tank required is 9000L
Sub Soil Assessment Class	Field assessment and subsequent laboratory tests have classed the subsoil as category 6
Sub Soil Recommended Hydraulic Loading mm/day (DIR/DLR)	Effluent dispersion mounds constructed on category 6 soils have a design loading rate of 5mm/day as specified in Table N1 AS/NZS 1547:2012
Recommended Effluent Application Type	Due to the category 6 soil (Medium to Heavy Clays) and limited area onsite it is recommended that an absorption mound be utilised to disperse effluent.
Effluent Design Criteria	As per section 7.0 the minimum effluent application area was determined by calculating the requirements of Hydraulic Loading. As shown, **2 x mounds 48.69m long, 8.850m wide and 1.275m high with a side slope of 1V : 3H** is required for disposal of the effluent
Additional Notes	• 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.

2.0 INTRODUCTION

2.1 Overview

Barnson Pty Ltd on behalf of [redacted] has prepared this report for submission to Tamworth Regional Council. This report provides direction for sustainable on-site effluent management for the proposed Child Care Centre, on Lot 111 DP1272283, at 2 Premiers Street, Nemingha NSW (refer **Figure 1 & 2**).

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";
- Tamworth Regional Council Development Control Plan, 2010;
- Tamworth Regional Council Onsite Sewage Management Strategy, 2014;
- Tamworth Local Environmental Plan, 2010;
- 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 onsite effluent management system proposed for this site consists of a standard septic tank with secondary treated effluent pressure dosed into absorption mounds. **Figure 1 & 2** illustrates the site location. **Figure 3** illustrates the proposed buffer, setback areas and proposed application area.

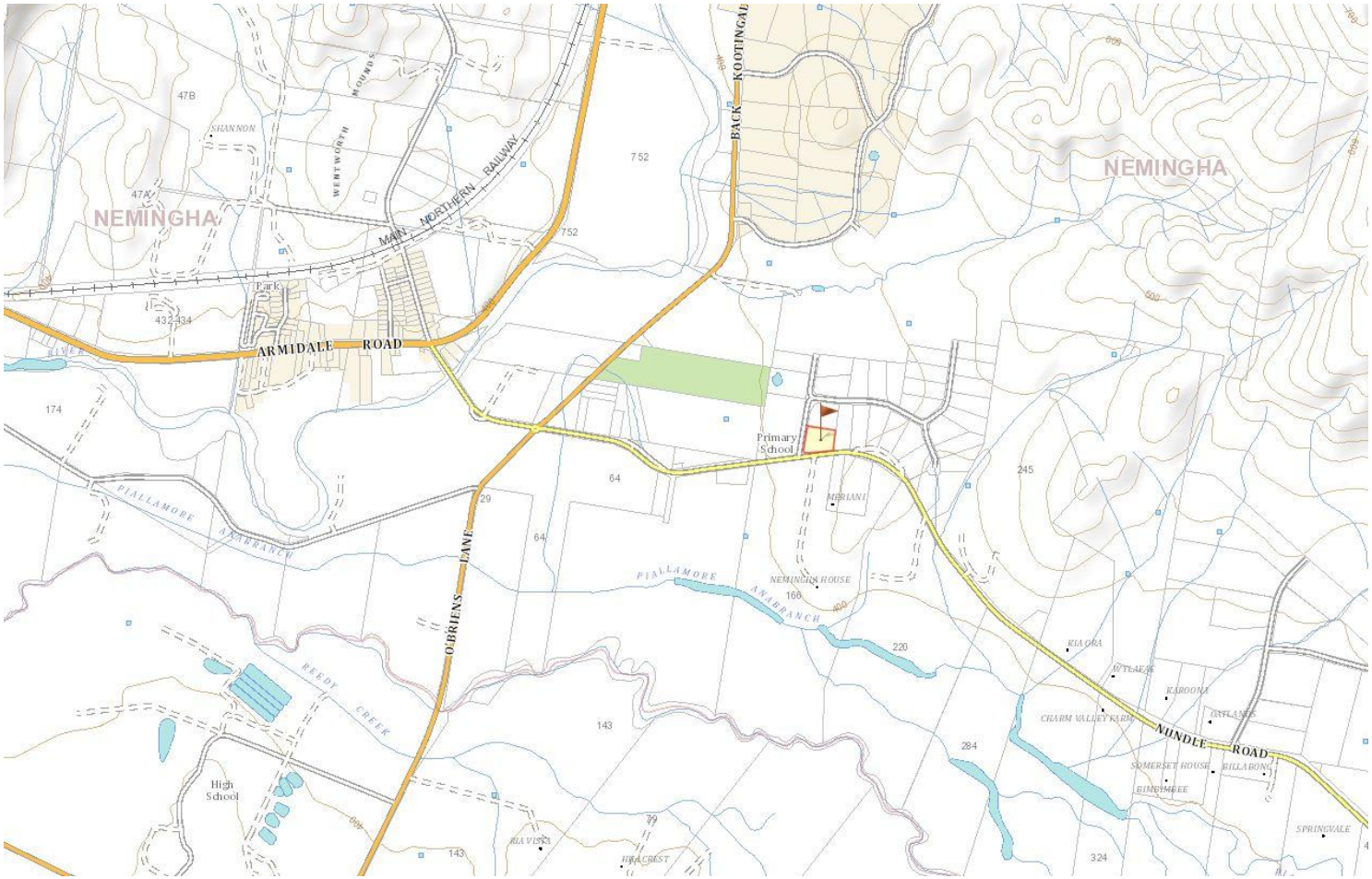

Figure 1 – Site Location Plan

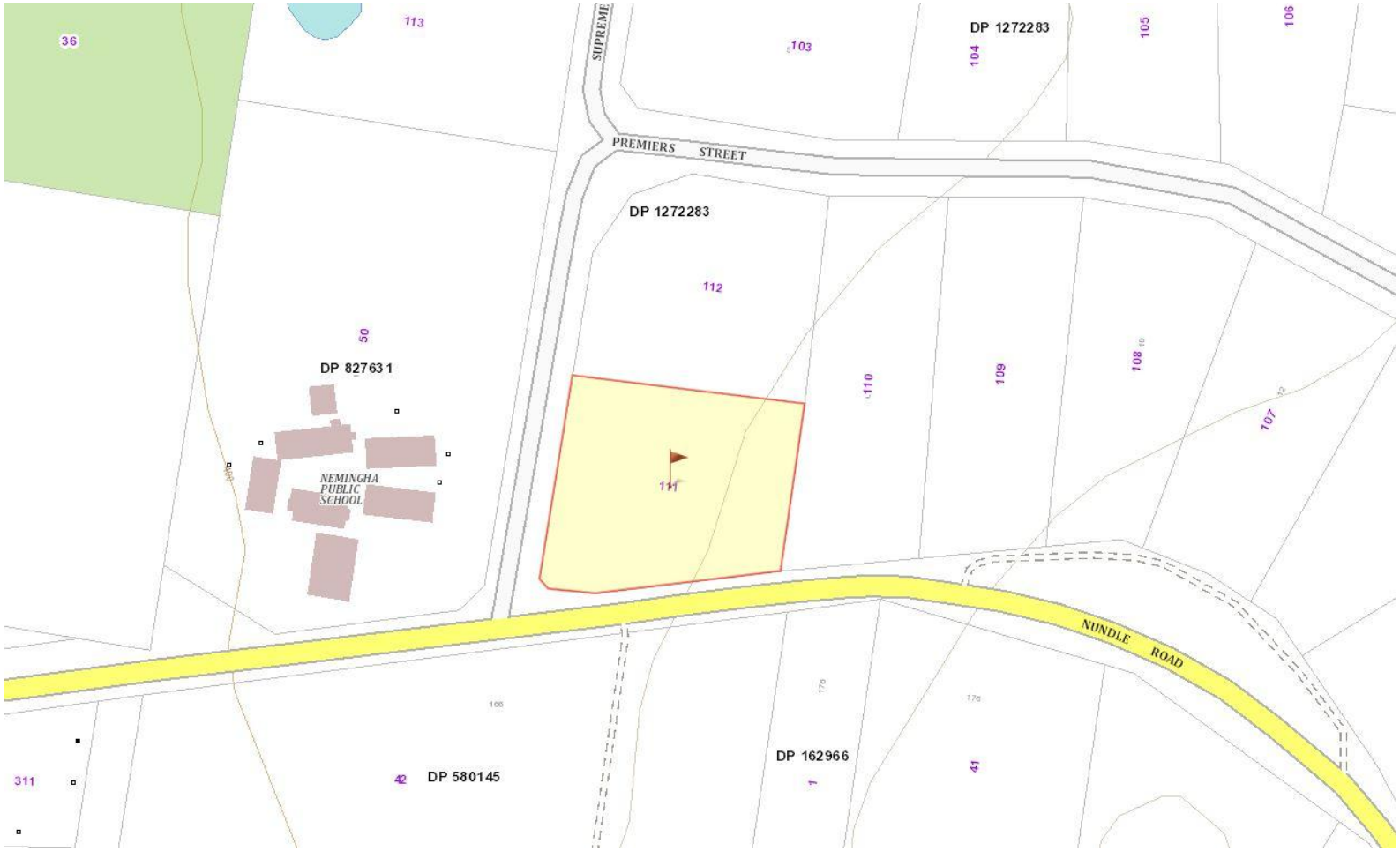

Figure 2 – Site Location Plan

Figure 3 – Buffer and Setback Plan

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Project
ONSITE SEWAGE DISPOSAL
Client
ROBJIE SUPERANNUATION PTY LTD
Drawing Title
PROPOSED SITE BUFFERS

Site Address
LOT 111, 2 PREMIERS ST
NEMINGHA NSW

Design JW
Drawn JW
Check AR
Original Size A4
Revision A

Certification

Project No 43564
Drawing No GD01

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	Jeremy Wiatkowski
Role/ Qualifications	Geotechnical Technician
Company	Barnson Pty Ltd
Company Address	1/36 Darling Street Dubbo NSW 2830
Contact Details	1300 BARNSON
Date of Assessment	30/09/2024

3.2 Site Information

The following table provides an overview of the site information.

Table 3: Site Particulars

Address/Locality	2 Premiers Street, Nemingha NSW Lot 111 DP1272283
Local Government Area	Tamworth Regional Council
Owner	[redacted]
Block Configuration	1 ha (By Title)
Intended Water Supply	Town water supplied
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 Tamworth is 673.1mm. Warm summers with large evaporative deficit, cool winters with small evaporative deficit. The mean summer monthly rainfall (January) is 85.4mm. The mean winter rainfall (July) is 46.1mm.
Underlying Geology[3]	*"Cherty argillite, limestone, greywacke, argillite.".*
Groundwater Review	Ten water bores were found within 500m of the proposed site, as illustrated in **Figure 4.** No groundwater vulnerability or flood prone maps were available for the site at time of reporting**.**

[1] Bureau of Meteorology online Climate Data website

[2] Tamworth 1:250000

3.4 Groundwater Review

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. Ten water bores were 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	Approximate Location	Total Depth (m)	Water Bearing Zones (m)	Standing Water Level (m)	Yield (L/s)	Salinity Description
GW965376 **Bore** **Domestic**	Lot 50 DP827631 (Nemingha Public School) ~110m West	41.10	34.00-34.30 38.30-38.60	7.50	0.50	Not Provided
GW902309 **Bore** **Domestic, Stock**	Lot 41 DP580145 ~90m South-East	79.20	45.70-46.00	24.30	0.25	Not Provided
GW967321 **Bore** **Domestic, Stock**	Lot 41 DP580145 ~170m South	137.00	79.80-80.00	76.00	0.063	Not Provided
GW965416 **Bore** **Recreation**	Lot 50 DP827631 (Nemingha Public School) ~170m West	30.50	25.90-26.20	13.70	0.60	Not Provided
GW902310 **Bore** **Domestic, Stock**	Lot 41 DP580145 ~170m South	91.40	76.80-77.10	26.50	0.10	Not Provided
GW968034 **Bore** **Domestic, Stock** **(Abandoned)**	Lot 41 DP580145 ~220m South	106.70	Not Provided	Not Provided	Not Provided	Not Provided

GW905928 **Bore** **Domestic**	Lot 103 DP1272283 ~150m north	60.00	44.00-46.00	10.00	0.60	Not Provided
GW967053 **Bore** **Domestic, Stock**	Lot 41 DP755334 ~280m south-east	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
GW902388 **Bore** **Domestic, Irrigation, Stock**	Lot 31 DP755334 ~440m west	12.50	Not Provided	11.00	Not Provided	Good
GW047245 **Well** **Domestic, Irrigation, Stock**	Lot 31 DP1124417 ~440m south-west	9.00	Not Provided	Not Provided	Not Provided	Not Provided

Using available groundwater information from local bores, it can be determined that in the local vicinity the standing water level is greater than 7m below the ground surface and the water bearing zones are greater than 25m below the ground surface.

Given constructed absorption mound is the recommended effluent disposal method, the risk of groundwater contamination is reduced. The silty clay displayed throughout the site's soil profile and existing clays found within the surrounding area also decelerates groundwater infiltration. The field inspection did not indicate any natural springs or dampness within the general area of the proposed development.

It is important to note the six groundwater bores exists within 250m of the proposed site (GW965376, GW902309, GW967321, GW965416, GW902310, GW968034, GW905928). AS1547:2012 indicates a buffer of 15-50m (Table R1).

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 site is drains towards the west. A dam is located on a neighbouring lot, approximately 200m northwest of the site. The Piallamore Anabranch is located approximately 600m to the south. The Cockburn River is located approximately 750m northwest of the site. The Peel River is located approximately 1km south of the site.

Figure 4 – Groundwater Bore Locations

3.6 Field Assessment Information

A field inspection was conducted on 30/09/2024. 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.
Slope		The site has a slight to moderate slope to the west.
Run-On		None
Seepage		None
Erosion Potential		Low due to vegetation cover.
Site Drainage		Moderate to good.
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

A soil sample was collected and returned to Barnson Pty Ltd for analysis on 30/09/2024. The sample was collected at a depth of 800mm during the site inspection as per AS1289.1.2.1.6.5.3. Laboratory report with results are provided at Appendix A. 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		>1.5m
Depth to high soil water table via field assessment		>1.5m
Soil Analysis	pH – subsoil $CaCl_2$ (lab), subsoil	7.8
	Electrical conductivity (dS/m) - ECe	0.6
	Emerson Test Result –subsoils (Lab)	6
	Liquid Limit, Plastic Limit, Plasticity Index, Linear Shrinkage. (%)	LL = 60 PL = 13 PI = 47 – **High Plasticity** LS = 17.0 – **Highly Reactive** See Borelog in **Appendix A**
	Estimated Soil Category–topsoil, subsoil A	BH1 (North West of Lot) - 6,6 BH2 (East of Lot) - 6,6
	Structure massive, weak, high, moderate, strong (Field)	Strongly Structured
	Soil Profile description	See Borelog in **Appendix A**
	Sub soil Permeability (from table 5.2 of AS 1547:2012)	0.06-0.5(k_{sat}) (m/d) 2.5-20.8 (mm/hr) (Infiltration is Slow)
	Recommended Hydraulic Loading for disposal system (from Table 5.2 of AS 1547:2012)	5mm/day as per AS/NZS 1547:2012 for Medium to Heavy Clays (effluent disposal mounds)

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 8 and 9. The highlighted categories represent site and soil conditions of the land covered in this report.

Table 8: 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 9: 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 0-40cm; 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 Tamworth Regional Council Setback Requirements

Tamworth Regional Shire Council 'On-Site Sewage Management Strategy (2014)' species that Onsite Sewage Management Systems (OSMS) must adhere to minimum buffer distances as specified under the 'On-Site Sewerage Management for Single Households' (1998), these setback should be adhered to, unless otherwise directed by Council.

The guidelines in the 'On-Site Sewerage Management for Single Households' (1998) aim to promote ecologically sustainable development, protection of the environment, protection of public health and protection of community amenity. These guidelines have been developed as part of NSW Government commitment to a consistent and comprehensive approach to the use of small septic tanks and other on-site sewage management systems.

All Land Application Systems

- 100m to permanent surface waters (e.g. river, streams, lakes, etc.);
- 250m to any domestic groundwater well;
- 40m to other waters (e.g. farm dams, intermittent waterways and drainage channels, etc.)

Absorption Systems

- 12m if area up-grade and 6m if area down gradient of property boundaries;
- 6m if area is up-gradient and 3m if area is down gradient of swimming pools, driveways and building.

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

Actual siting of the effluent application area is the responsibility of a licenced plumber. The prescribed buffer areas/setbacks are to be adhered to unless otherwise specified by Council.

5.2 AS 1547:2012 Setbacks (Domestic Wastewater Management)

AS 1514:2012 identifies the following horizontal setbacks for domestic sites:

- Property Boundary –1.5-50m.
- Buildings/houses 2-6m
- Surface Waters – 15-100m
- Bores/Wells – 15-50m

5.3 Recommendations/Considerations – Buffer Distances

Given the identified site constraints, the proposed development and system requirements, the following point is noted:

Groundwater Bores – There are seven neighbouring bores (GW965376, GW902309, GW967321, GW965416, GW902310, GW968034, GW905928) located within 250 meters of the proposed application area. These bores are licensed for stock, domestic, and recreational purposes. This proximity does not meet the required 250-meter buffer zone outlined in the 'On-Site Sewerage Management for Single Households.'

Tamworth Regional Council will have to consider the proposed buffer distances and provide approval for non-adherence to the current 'On-Site Sewerage Management for Single Households'. Although the proposal does not adhere to the distances specified by 'On-Site Sewerage Management for Single Households', it does conform to the site setbacks specified in Table R1 of AS 1547:2012 with a buffer of 50m from groundwater bores **See Appendix B.**

5.4 Design Allowances – SA Onsite Wastewater System Code

In accordance SA Onsite Wastewater System Code, the recommended daily flow allowance for Schools and Kindergartens is 20L/person/day with a sludge/scum rate of 25L/person/year. Given the proposed childcare accommodates a maximum 197 students and staff, the proposed daily load is estimated to be 3940L/day and a sludge/scum rate of 4925L/year

Table 10: SA Onsite Wastewater Code

Premises	Fixtures	Sludge/scum rate		Daily flow rate		BOD_5 loading
SCHOOLS AND KINDERGARTENS						
Including kiosk facilities e.g. take away food	W.C./urinal, basin, kitchen sink	total number of students plus staff	25	total number of students plus staff	20	15
	shower			10% of total number of students and staff	10	5
Canteen facilities (e.g. plated hot and cold meals)	kitchen sink, dishwasher	total number of students plus staff	10	total number of students plus staff	5	5

6.0 SEPTIC TANK SELECTION AND CALCULATION

The SA On-Site Wastewater Systems Code guideline provides calculation for determination of primary treatment septic tank capacity.

For all primary treatment/septic tank capacities, including non-residential premises, the minimum effective tank capacity (in litres) is obtained by using Equation 1 as follows:

Maximum Effective Capacity (L) = (P1 x S x Y) + (P2 x DF)

$$P1 = \ Number\ of\ persons\ using\ the\ system$$

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

$$Y = \ Desludging\ frequency\ in\ years$$

$$P2 = \ Number\ of\ persons\ using\ the\ system$$

$$DF = \ Daily\ flow\ in\ litres\ per\ person\ per\ day\ (L/p/d)$$

Child Care Centre

P1/P2 =197,

S = 25L/p/y,

Y= 1 year,

DF= 20L/p/day

= (197 x 25 x 1) + (197 x 20)

= (4925) + (3940)

Maximum Effective Capacity (L) = 8865 L

6.1 System Selection

Table 11: System Selection

Application System	Treatment System	Site Limitations	Suitability
Absorption system	Septic Tank	Category 6 Soils – Heavy Clays	No
Surface Irrigation	AWTS	Limited application area	No
Sub Surface Irrigation	AWTS	Limited application area	No
Wisconsin Mound	AWTS	Nil	Yes

6.2 System Recommendations

The following table provides details on the system selection.

Table 12: System Selection Details

Consideration of connection to centralised sewerage system	**Distance to sewer**	>5km
	Potential for future connection?	None planned
	Potential for reticulated water?	None planned
Expected Wastewater volume (litres/day)	**Child Care Centre** –potential occupancy of 197 people. Typical wastewater design flow is 20L/person per day in accordance with SA On-Site Wastewater Systems Code Appendix E Hydraulic and BOD5 Loading. Therefore, 197 people at 20L per person per day gives a total load of 3940L/day	
Type of Treatment system best suited	9000L commercial septic tank system with secondary treated effluent pressure dosed to absorption mounds.	

Water conservation measures should be adapted to the greatest extent possible in the proposed childcare centre, 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 on-site 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'* 2019 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 = 3940L/day (based on 197 people and an estimation rate of 20L/person/day)

Proposed number of mounds = 2

Loading rate per mound – 1970L/day

$$A = Q/BLR$$

Where Q = 1970L/day/mound and the Bed loading rate, BLR = 40mm/day (as per *Section N2.2 AS 1547:2012*)

Therefore,

$$Area\ of\ Distribution\ Bed = \left(\frac{1970}{40}\right)$$

$$\boldsymbol{Area, Ar = 49.25\ m^2}$$

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 = 1.2m.

$$Length\ of\ Distribution\ Bed, B = \left(\frac{49.25}{1.2m}\right)$$

$$\boldsymbol{B = 41.04m}$$

Therefore, the distribution aggregate bed should be 41.04m long and 1.2m wide in the mound.

Mound Sizing

- As specified in AS/NZS1457:2012,
- Mound face slope = 1 in 3
- Distribution bed thickness, T1 = 225mm minimum
- Sand cover over distribution bed, T2 = 300mm minimum
- Topsoil cover over mound, T3 = 150mm minimum
- Sand depth below distribution bed, T4 = 600mm minimum

Minimum mound height, T = T1 + T2 + T3 + T4
= 225 + 300 + 150 + 600
= 1.275m

For flat ground surface,
Mound Extent Upslope/Downslope, J & I = T/ (mound face slope)
= 1.275/ (1/3)
= 3.825m

Upper/Lower Mound Extent across slope, K = T / (mound slope)
= 3.825m / (No Slope)
= 3.825m

Basal Length, L = Bed length + 2 x Upper/Lower Mound extent across slope
= 41.04 + (2 x 3.825)
= 48.69m

Basal Width, J + A + I = Bed width + 2 x Mound Extent Upslope/Downslope
= 1.2 + 3.825 x 2
= 8.85m

Mound Base loading Rate (DLR)
DLR = total hydraulic loading/ basal area
= 1970/ (48.69 X 8.85)
= 4.6mm/day which is less than 5mm/day as specified in Table N1 AS/NZS 1457:2012 for Strongly Structured Medium to Heavy Clays.

Therefore, based on the hydraulic loading requirement, Wisconsin mound with following design parameters is required: Refer to the figure attached in **Appendix C**.

Table 13: Design Parameters

Parameter (Per Mound)	Units	Design requirement
Max. Discharge	L/day	1970 – per mound
Hydraulic loading to aggregate bed	L/m/day	40
Design loading to Basal Area	mm/day	4.6 (5mm/day as per AS/NZS 1547:2012 for Medium to Heavy Clays)
Basal Area	m	48.69m x 8.85m = 430.9m²
Distribution bed area	m	49.3m x 1.2m = 49.3m²
Slope of mound face	V:H	1:3
Number of mounds	#	2
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

7.2 Wet Weather Storage Calculation

Sand Base Dimensions

- Total Mound Base Length: 48.69 m
- Total Mound Base Width: 8.85 m
- Sand Base Length: 47.743 m
- Sand Base Width: 7.901 m

Sand Base Area (Sand Base Width x Length)
The area of the sand base is calculated as follows:
7.901 x 47.743 = 377.2m²

Sand Height and Horizontal Extension

- Sand Height: 0.825 m
- Slope Ratio (Horizontal:Vertical): 1:3
- Horizontal Extension:
  0.825 x 3 = 2.475m

Top Dimensions of Sand & Aggregate Layer

(Sand Base Length x Sand Base Width – 2 x Horizontal Extension)

- Top Length of Sand & Aggregate Layer:
  47.743 – 2 x 2.475 = 42.793m
- Top Width of Sand & Aggregate Layer:
  7.901 - 2 x 2.475 = 2.951m

Top Area of Sand and Aggregate Layer
The top area of the sand and aggregate layer is calculated as:
42.793 x 2.951 = 126.28m²

Volume of Sand & Aggregate
The volume of sand & aggregate is determined using the geometric mean:
sqrt(110.5 x 29.07) = 56.68m³
Approximate Volume of Sand:
=0.825/3*(377.2+126.28+218.25)= 198.48m³

Effective Storage Volume
Assuming a sand porosity of 30% (0.3), the approximate storage volume is calculated as:
198.48 x 0.3 = 60 KL

Wet Weather Storage
With a daily loading rate of 480 liters, the approximate days of storage volume per mound as follows:
=(60*1000)/3940= 15.2 days

Therefore, the system can support approximately **15 days of wet weather storage** prior to mound saturation.

8.0 EFFLUENT MANAGEMENT PRESCRIPTIONS

8.1 Effluent Treatment

For this property effluent will be treated by an NSW Health Accredited system capable of achieving primary treated standards suitable for effluent disposal to the mound. The chosen system 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**. 2 x mounds 48.69m long, 8.85m 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 **41.04m long, 1.2m 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

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 C.**

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.

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

Yours Faithfully	Reviewed By
[redacted]	
Jeremy Wiatkowski	Georgina Moir
Laboratory Technician	Environmental Scientist

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APPENDIX A

Borehole Logs & Laboratory Results

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Geotechnical Log - Borehole

Borehole 1

Latitude	:	Location	: Lot 111/2 Premiers Street, Nemingha NSW	Job Number	: 43564
Longitude	:	Logged By	: Gareth Williams	Client	: Robjie Superannuation Pty Ltd
Total Depth	: 1.5 m	Date	: 30/09/2024	Project	: Proposed Childcare Centre

Drilling Method	Depth (m)	Graphic Log	Classification Code	Material Description	DCP graph	Samples: Disturbed sample	Remarks
Auger drill with TC bit	0.2		TS	Topsoil Silty CLAY stiff, high plasticity, dark brown, trace fine sized gravel, trace fine to medium grained sand, w > pl.	1, 2		
	0.6		CH	Alluvial Silty CLAY firm to stiff, high plasticity, brown, trace fine grained sand, w > pl.	2, 2, 3, 4		
	1.3		CH	Alluvial Silty CLAY very stiff to hard, high plasticity, brown, trace fine grained sand, w > pl.	7, 19, 23	LS=17.0%, PI=47%	
			CH	Alluvial Silty CLAY hard, high plasticity, yellow-brown, w < pl to w = pl.			
				Borehole 1 Terminated at 1.5m			

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Geotechnical Log - Borehole

Borehole 2

Latitude	:	Location	: Lot 111/2 Premiers Street, Nemingha NSW	Job Number	: 43564
Longitude	:	Logged By	: Gareth Williams	Client	: Robjie Superannuation Pty Ltd
Total Depth	: 1.5 m	Date	: 30/09/2024	Project	: Proposed Childcare Centre

Drilling Method	Depth (m)	Graphic Log	Classification Code	Material Description	DCP graph	Samples	Remarks
Auger drill with TC bit	0.2		TS	Topsoil Silty CLAY stiff, high plasticity, dark brown, trace fine sized gravel, trace fine to medium grained sand, w > pl.	1 2	Disturbed sample	
	0.6		CI-CH	Alluvial Silty CLAY firm to stiff, medium to high plasticity, brown, trace fine grained sand, w > pl.	2 3 5		
	0.9		CI-CH	Alluvial Silty CLAY very stiff to hard, medium to high plasticity, brown, trace fine grained sand, w > pl.	6 11 18	LS=13.0%, PI=34%	
			CH	Alluvial Silty CLAY hard, high plasticity, yellow-brown, with medium sized gravel, w < pl to w ≈ pl.	25		
				Borehole 2 Terminated at 1.5m			

Material Test Report

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Accredited for compliance with ISO/IEC 17025 - Testing

[redacted]

Approved Signatory: Jeremy Wiatkowski
Geotechnical Technician
NATA Accredited Laboratory Number: 9605

Report Number: **43564-1**
Issue Number: 1
Date Issued: 09/10/2024
Client: [redacted]
Contact:
Project Number: 43564
Project Name: Proposed Childcare Centre
Project Location: Lot 111, 2 Premiers Street, Nemingha NSW
Work Request: 11273
Sample Number: D24-11273A
Date Sampled: 30/09/2024
Dates Tested: 30/09/2024 - 04/10/2024
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Sample Location: **Borehole 1, Depth: 800mm**
Material: Brown Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	60		
Plastic Limit (%)	13		
Plasticity Index (%)	**47**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**17.0**		
Cracking Crumbling Curling	Curling		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**6**		
Soil Description	Brown Silty CLAY		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	19		

Material Test Report

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Accredited for compliance with ISO/IEC 17025 - Testing

[redacted]

Approved Signatory: Jeremy Wiatkowski
Geotechnical Technician
NATA Accredited Laboratory Number: 9605

Report Number: 43564-1
Issue Number: 1
Date Issued: 09/10/2024
Client: [redacted]
Contact:
Project Number: 43564
Project Name: Proposed Childcare Centre
Project Location: Lot 111, 2 Premiers Street, Nemingha NSW
Work Request: 11273
Sample Number: D24-11273B
Date Sampled: 30/09/2024
Dates Tested: 30/09/2024 - 04/10/2024
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Sample Location: **Borehole 2, Depth: 800mm**
Material: Brown Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	41		
Plastic Limit (%)	7		
Plasticity Index (%)	**34**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**13.0**		
Cracking Crumbling Curling	None		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**6**		
Soil Description	Brown Silty CLAY		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	19		

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APPENDIX B

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

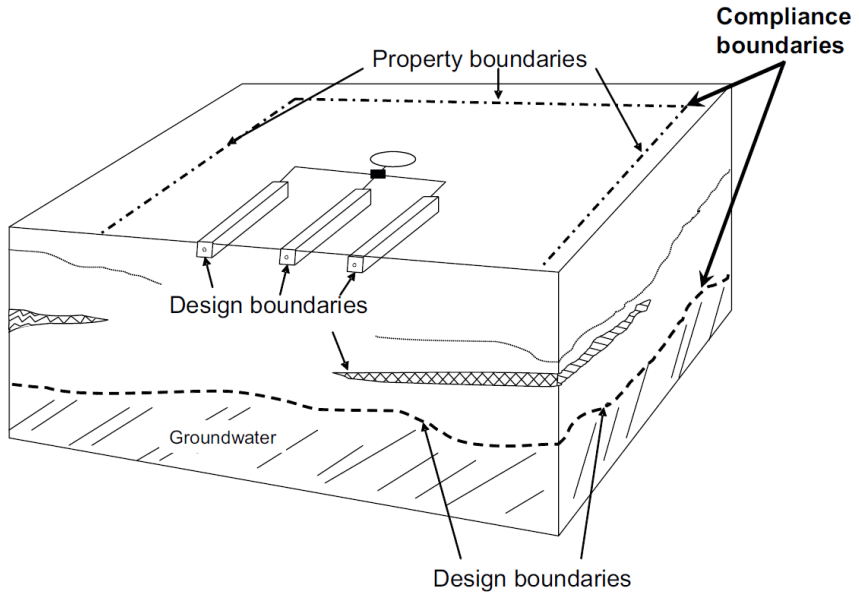
NOTES:

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

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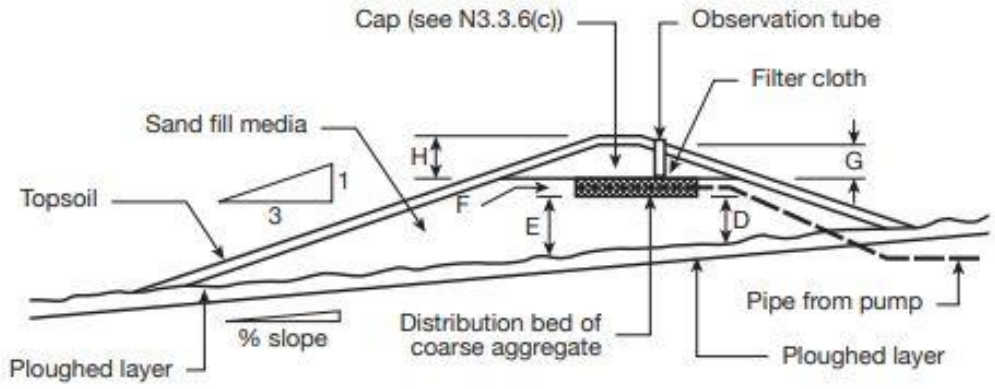
APPENDIX C

Concept Design Loading and Sketches – Wisconsin Mound System

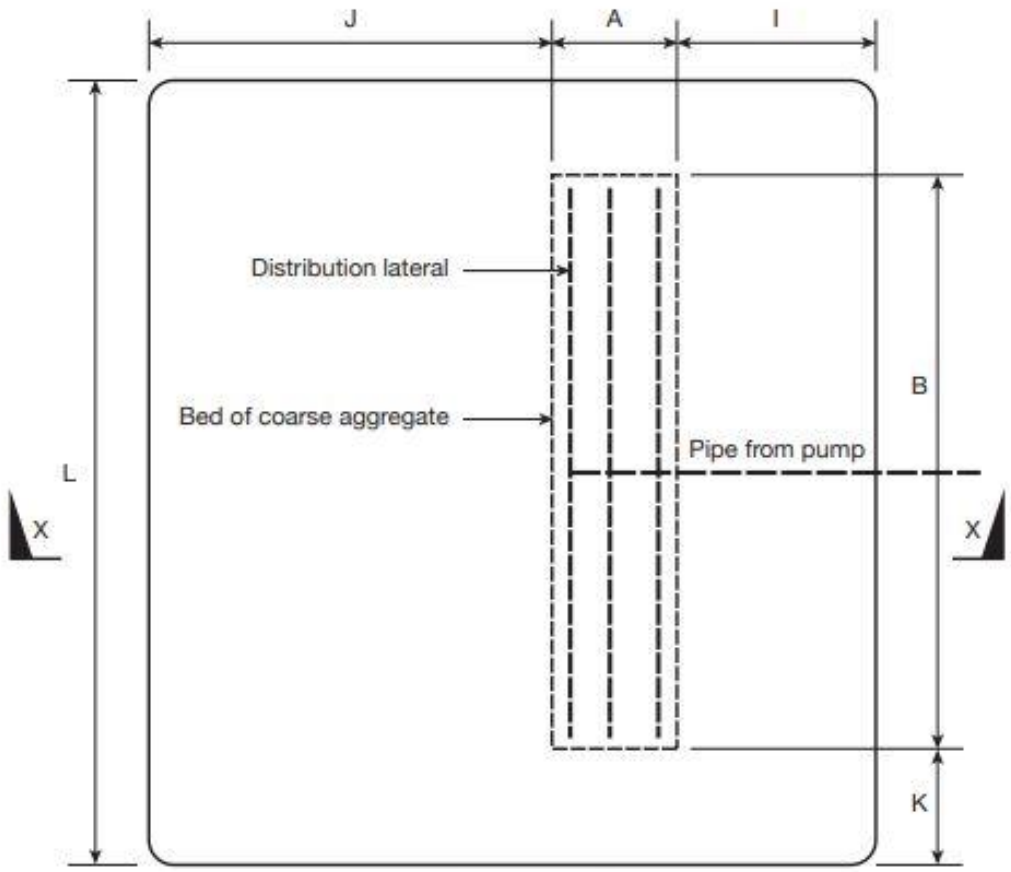
TABLE N1
RECOMMENDED MOUND DESIGN LOADING RATES

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



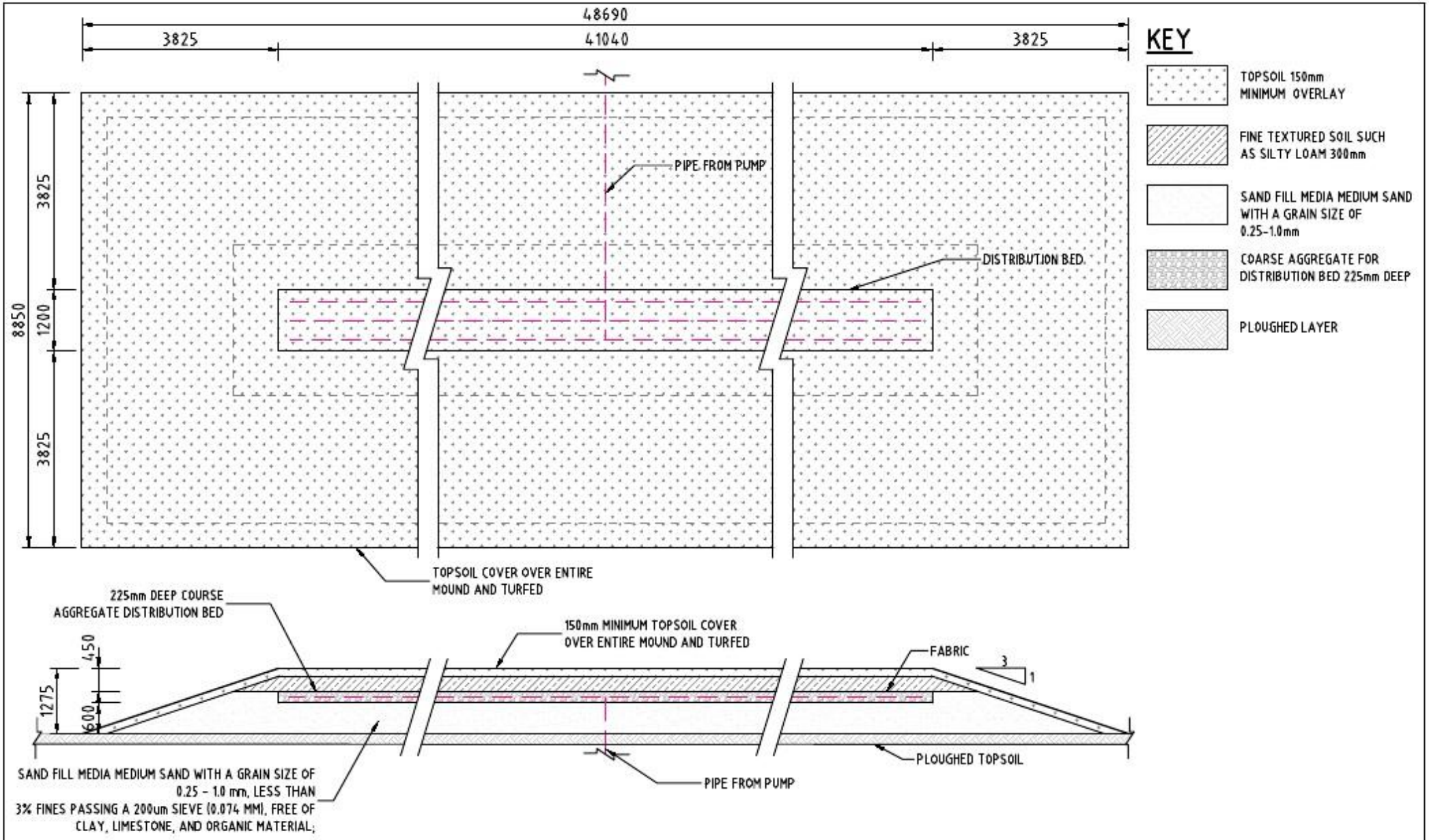
PLAN VIEW OF DISTRIBUTION BED

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



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web barnson.com.au

Project
ONSITE SEWAGE DISPOSAL

Client
ROBJIE SUPERANNUATION PTY LTD

Drawing Title
MOUND SECTION

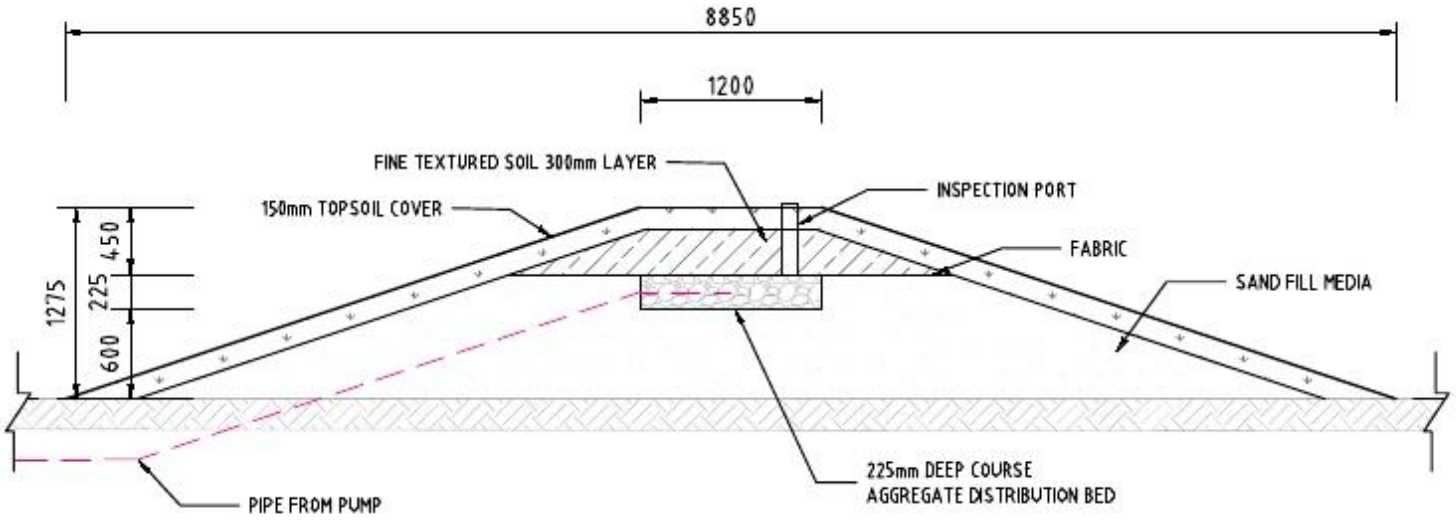
Site Address
LOT 111, 2 PREMIERS STREET
NEMINGHA NSW

Certification

Design	JW	Original Size	A4
Drawn	JW	Revision	B
Check	AR		

Project No 43564

Drawing No GD02



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DESIGN . PLAN . MANAGE

BARNSON PTY LTD
phone 1300 BARNSON (1300 227 676)
email generalenquiry@barnson.com.au
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Project
ONSITE SEWAGE DISPOSAL

Client
ROBJIE SUPERANNUATION PTY LTD

Drawing Title
MOUND SECTION

Site Address
LOT 111, 2 PREMIERS STREET
NEMINGHA NSW

Certification

Design	JW	Original Size	A4
Drawn	JW	Revision	A
Check	AR		

Project No 43564

Drawing No GD03

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APPENDIX D

List of Plates

Plate 1 – Overview of proposed site

Plate 2 – Overview of proposed site