Earthwise Environmental

Soil · Water · Geotechnical

On-site Wastewater Management Report

Land capability assessment for a new dwelling

Prepared for:		
	Client:	Mr S. Lui
	Site Address:	10 Manor Road, Ingleside, NSW
	Project No:	J350
	Version:	V.1.0
	Report Date:	7.03.2025

Cover photo description:

Photograph showing the topography and ground cover at a location of the proposed effluent application area (EAA) Photo: T.Brown

Determination of potential bedroom:

A potential bedroom is a room that could reasonably be used as a bedroom. A potential bedroom is a room with a closable door, at least one window and a minimum of 8 square metres. A room in a separate building such as a studio could be considered a potential bedroom if it has a toilet and washing facilities or close access to same. This is the criteria used by Water NSW.

Report conditions of use:

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This report is to be used in conjunction with the client's application to local council (under section 68) to install and/or alter and operate an Onsite Sewage Management System (OSMS) within their property boundaries. The client nor the plumber should not proceed with the installation of the OSMS recommended in this report until the local consenting authority has given approval. For those properties located within the Sydney drinking water catchment area additional approvals from Water NSW may also apply. This report does not outline of the OSMS as this is to be undertaken by the installer.

Document revision history

Date	Version	Author	Reviewer	Comment
07.03.25	v.1.0 (draft)	Tyler Brown	Brett Enman	Draft report sent to client for comments
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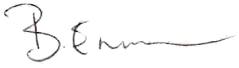
Signature:	
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1 Executive summary

Owner	Mr S. Lui
Address	10 Manor Road, Ingleside, NSW (Figure 1)
Lot and DP	Lot 82 in DP 866452
Investigation	This on-site wastewater management report outlines the results of a recent site and soil inspection. As the property is not serviced by a reticulated sewerage system effluent treatment and disposal is to be managed via an on-site sewage management system (OSMS). This wastewater report sets out a design of the OSMS to ensure it meets the objectives and scope set out below in section 2.
Existing dwelling	Small cottage slated for demolition and outside the scope of this investigation.
Proposed Development	Six-bedroom dwelling (Appendix 2).
Water supply	Town ☒ | Tank ☐ | Bore water & tank ☐
No potential rooms	Six (6)
Wastewater flow allowance (Q)	1,500 L/day (Water NSW, 2019)
Design Loading Rate (DLR)	12 mm/day (AS/NZS1547:2012 soil category 5).
Effluent treatment	NSW Health accredited secondary treatment system (STS) consisting of an Aerated Wastewater Treatment System (AWTS) complying with AS/NZS 1546.3.2017 (Standards Australia, 2017).
Effluent disposal	Pressure dosed raised absorption beds (RAB).
Total bed/trench length	44 m (assume 4m width)
Minimum basal area	176 m^2 (see section 6.2)
No. of beds/trenches and proposed dimensions	Two beds at 22 x 4 m

2 Introduction

Earthwise Environmental (EE) was engaged by the client named above to undertake a site and soil assessment with the aim to design an on-site sewage management system (OSMS) to treat and dispose wastewater from a new proposed dwelling to be built on a rural property in Ingleside (Figure 1). It is understood that the existing dwelling located on the southwestern side of the property will be demolished.

2.1 Objective

The key objectives of this on-site site wastewater management study are:

- To protect public health and meet NSW Health statutory requirements.
- To maintain and enhance the quality of the environment by ensuring the on-site disposal of treated effluent will have a neutral or beneficial effect (NorBE) on water quality.
- To maintain and enhance community amenity.
- To protect natural resources.

Regarding this wastewater assessment the following standards, guidelines and local council requirements were followed:

Australian/New Zealand Standard (AS/NZS 1547:2012) for on-site domestic wastewater management (Standards Australia, 2012).

Australian/New Zealand Standard (AS/NZS 1546.3:2017) On-site domestic wastewater treatment units, Part 3: Secondary treatment systems

Australian/New Zealand Standard (AS/NZS 3500:2018) Plumbing and drainage - Part 2: Sanitary plumbing and drainage (Standards Australia, 2018).

NSW Environment and Health Protection Guidelines, On-site sewage management for single households “The Silver Book” (NSW Health, 1998).

Designing and Installing On-Site Wastewater Systems. ‘The manual’. A Water NSW Current Recommended Practice (Water NSW, 2019).

Northern Beaches Local Environment Plan.

Local Government (General) Regulation 2021.

2.2 Scope

EE undertook the following scope of works to achieve the above objectives.

- A desktop study to collate relevant information about the site, the area and proposed development.
- Visual and desktop assessment of any existing OSMS (as required) to determine feasibility and suitability for re-use;
- A site inspection to record land surface, site features, identify potential site constraints and identify the most appropriate effluent application area (EAA).
- An intrusive soil investigation to characterise the soil profile and determine depth of bedrock and limiting layers
- Undertake basic toil testing to determine potential soil limitations.
- An evaluation of the expected wastewater flow rates.
- Recommend a suitable effluent treatment system, disposal method and the sizing of the EAA required to meet to industry standards.

3 Site Information

Owner	Mr S. Lui
Address	10 Manor Road, Ingleside, NSW (Figure 1)
Lot and DP	Lot 82 in DP 866452
Current allotment Size	2.352 hectares
Local Council	Northern Beaches Council
Land use zoning	RU2: Rural Landscape
Existing dwelling(s)	A single-story dwelling (to be demolished).
Proposed Development	Six-bedroom dwelling (Appendix 2).
Water supply	Town ☒ | Tank ☐ | Bore water & tank ☐
No potential rooms	Six (6)
Wastewater flow allowance (Q)	1,500 L/day (Water NSW, 2019)
Decile 5 annual rainfall	998 mm – Terry Hills (Bureau of Meterology, 2024)
Mean annual evaporation	1,825 mm Sydney Airport (Bureau of Meterology, 2024)
Annual Moisture deficit	827 mm
Crop factor	0.4 to 0.8

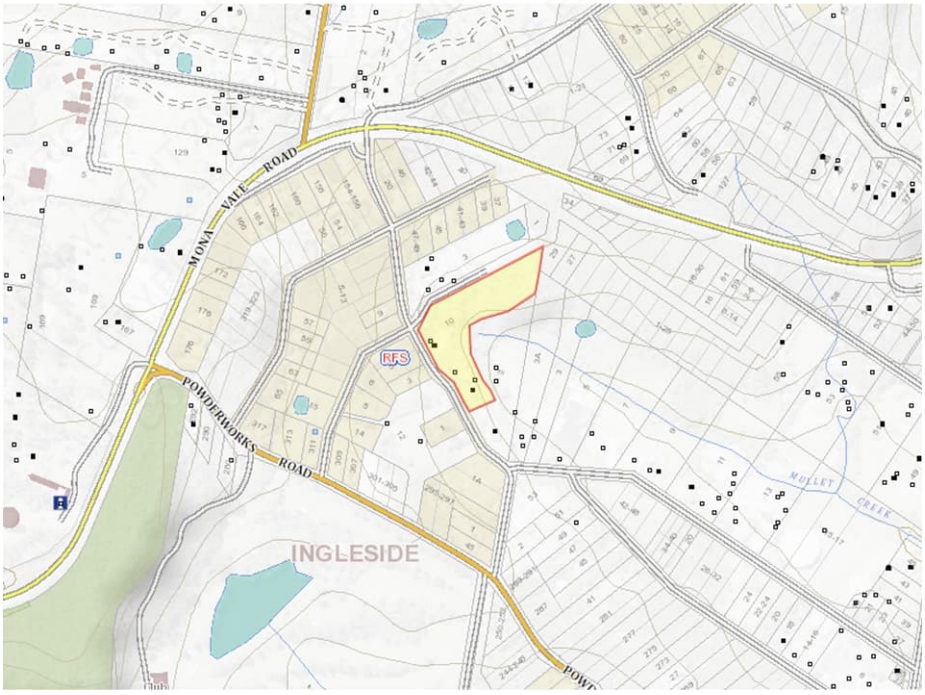

Figure 1: 10 Manor Road, Ingleside, NSW (Source: SIX Maps)

4 Site Assessment

Details of the site assessment for the proposed Effluent Application Area (EAA) are summarised in Table 1, with the EAA depicted in the Site Layout Plan (SLP), Appendix 1. The site has been levelled using uncontrolled fill and was overgrown with weeds at the time of inspection.

A small drainage line runs near the proposed EAA; however, it is upgradient of the EAA. Additionally, a bund wall runs along its western side, preventing any contact between the EAA and stormwater flows.

Table 1: Site assessment findings with constraint ratings according to The Silver Book (NSW Health, 1998).

Site Feature	Comment	Constraint rating
Inspection date	21.02.25	-
Rainfall (mm)	Week prior < 5 ☐ | 5 - 10 ☒ | 10-20 ☐ | 20-30 ☐ | > 30 ☐	-
Proposed vegetation	Good ☐ Poor ☐ woodland | Managed Lawn ☐ | Unmanaged Lawn ☒ | Improved Pasture ☐ | Perennial Pasture ☐ | Trees & scrubs ☐ | Trees & Shrubs (unmanaged) ☐	N/A
Flood Potential:	EDA above 1:20 yr. Y ☒ | N ☐	minor
	Treatment system above 1:100 yr contour Y ☒ | N ☐	minor
Exposure	Solar exposure: Poor ☐ | Moderate ☐ | Excellent ☒ Wind exposure. Poor ☐ | Moderate ☐ | Excellent ☒	minor
Slope	Waxing: Divergent ☐ | Planar ☐ | Convergent ☐ Linear: Divergent ☐ | Planar ☒ | Convergent ☐ Waning: Divergent ☐ | Planar ☐ | Convergent ☐ Estimated slope grade <5 % ☒ | 5-10 % ☐ | 10-20 % ☐ | > 20 ☐	minor
Landform	Hill Crest, convex side slopes & plains ☐ Concave side slope and foot slope ☐ Drainage line or incised channel ☐	minor
Run-on and seepage	Run-on potential: Low ☒ | Medium ☐ | High ☐ Seepage potential: Low ☒ | Medium ☐ | High ☐ Upslope diversion: Y ☐ | N ☒ | Assess after wet period & install as required ☐	minor
Site drainage	Surface water: Y ☐ | N ☒, if yes, temporary ☐ or long term ☐ Wet boggy ground. Y ☐ N ☒ Natural spring Y ☐ N ☐	minor
Erosion potential	Visual signs of erosion within or adjacent to EDA? Y ☐ | N ☒ Erosion potential: Low ☒ | Moderate ☐ | Major ☐	major
Fill	Fill material within proposed EDA? Y ☒ | N ☐ Potential impact on effluent disposal: Low ☐ | Moderate ☐ | Major ☒	minor
Rocks & outcrops	Surface rocks: < 10% ☒ | 10-20 % ☐ | > 20% ☐ Rocky outcrops: < 10% ☒ | 10-20 % ☐ | > 20% ☐	minor
Bore water (100 m radius)	Y ☐ | N ☒ | Stock and garden use ☐ drinking water ☐ Disused ☐ (See Appendix 6)	minor

5 Soil Assessment

5.1 Site geology

Hawkesbury Sandstone, which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses (NSW Department of Planning & Environment, 2024).

5.2 Desktop soil research

Shallow (<50 cm) discontinuous Earthy Sands and Yellow Earths occur on crests and the insides of benches. Shallow (<20 cm) Siliceous Sands/Lithosols are found on leading edges. In poorly drained areas, Leached Sands, Grey Earths, and Gleyed Podzolic Soils range from shallow to moderately deep (<150 cm). Localised Yellow Podzolic Soils are associated with shale lenses (NSW Department of Planning & Environment, 2024).

5.3 On-site soil findings and test results

Four boreholes (BH1 – BH4) were taken on the property to assess the characteristics of the soil and determine a suitable location to situate the EAA The soil inspection was carried out with the aid of a pneumatic post driver to ram a 50 mm steel tube to target depth or refusal.

The relatively undisturbed soil cores were laid out, photographed, and described in terms of soil horizons, colour, texture, structure and other notable features (see soil profile description in Appendix 3).

With the exception of BH3, the target depth of 1.5 m or greater was reached at BH1, BH2, and BH4. The refusal at BH3 is likely to have been caused by a submerged rock or boulder. However, for conservative design reasons, the depth of the absorption bed at this location should be limited to a maximum depth of 300 mm, ensuring at least 600 mm of soil below the application area.

The indicative permeability (Ksat) has been inferred using the soil category type and the structure of the most limiting layer (LL). The LL is located 600 mm below the depth of wastewater application, typically between 400 mm to 600 mm. From this a design loading rate (DLR) has been selected using the recommended DLRs outlined in Table L1 of AS/NSZ 1546:2012 (Standards Australia, 2012).

Three soil samples from BH1 underwent acidity (pH 1:5 soil water extract) and Electrical Conductivity (EC, 1:5 soil water extract) tests using a calibrated EZDO pH/EC meter. The $pH_{1:5}$ results were adjusted to pH_{ca} levels for comparison with NSW Health (1998) guidelines.

Additionally, three soil aggregates (natural and remoulded) were assessed for stability by observing their reaction in deionized water over two hours, to identify slaking or dispersion. Detailed soil assessment and laboratory test results, including assessment ratings, are presented in Table 2 and Table 3 below.

Table 2: Summary of the physical soil characteristics compared to the assessment ratings for on-site systems given in the Silver Book (NSW Health, 1998). Assume wastewater application at 400 mm depth.

Soil Feature	Units	BH1	BH2	BH3	BH4	Constraint level
Bedrock depth	m	>1.5	>1.5	>0.9	>1.5	major
Water table depth	m	>1.5	>1.5	>0.9	>1.5	minor
LL	unitless	Fine Sandy Clay	Fine Sandy Loam	Light Clay	Light Clay	N/A
Depth of LL	m	1.0	0.95	0.75	0.5	N/A
LL soil category	unitless	4	3	5	5	major
Structure of LL	unitless	Massive	Moderate	Moderate	Strong	N/A
Ksat	m/d	0.06-0.12	1.5-3.0	<0.06	0.12-0.5	N/A
DLR	mm/day	10	50	10	12	N/A
Course fragments	%	<20	<20	<20	<20	minor
Bulk density	g/cm^3	1.5	1.5	1.4	1.4	minor

Table 3: Summary of the soil test results (with ratings) compared to NSW Health (1998) soil constraints.

Laboratory soil test results	Units	BH 1 0-0.1 m	BH 1 0.4-0.6 m	BH 1 1.1-1.2 m	Constraint level
$pH_{1:5\ water}$	pH units	6.1	5.5	4.7	N/A
pH_{ca}	pH units	6.9	6.3	5.5	minor
Acidity rating	unitless	Ideal	Ideal	Ideal	N/A
EC (1:5)	dS/m	0.141	0.010	0.007	minor
ECe	dS/m	1.34	0.14	0.06	minor
Salinity rating	unitless	non-saline	non-saline	non-saline	N/A
ESP	%	NT	NT	NT	N/A
Sodicity rating	unitless	NT	NT	NT	N/A
CEC (effective)	cmol (+)/kg	NT	NT	NT	N/A
Phosphorus Sorption^	mg/kg	400	400	500	N/A
	kg/ha	6,000	6,000	7,500	minor
Emerson aggregate	Class/subclass	7	7	7	minor

Note: NT = Not tested, N/A = not applicable

^ Where no P sorption testing was performed, the soil texture-based P-sorption values given in Water NSW (2019) are used

6 On-site Wastewater Management System

6.1 Proposed wastewater treatment system

Wastewater treatment for the primary dwelling is to be provided via a NSW Health accredited secondary treatment system (STS) consisting of an aerated wastewater treatment system (AWTS) which meets AS/NZ 1546:2017 (Standards Australia, 2017) specifications (see recommendations below).

6.2 Treated wastewater disposal method and sizing

The recommended wastewater disposal method is a pressure-dosed absorption bed (see standard drawing in Appendix 5). As outlined in Section 5.3, the base of the bed should not exceed a depth of 300 mm. Therefore, approximately 100 mm of additional topsoil will be required to achieve a total cover depth of 400 mm.

Sizing of the bed is given as follows:

$$\text{Minimum bed length } (L) = \frac{\text{Mean Daily Wastewater volume (Q)}}{\text{Design loading rate (DLR)} \times \text{Bed width (W)}}$$

$$\text{L} = \frac{1{,}500}{10 \times 4}$$

$$\text{L} = 37.5\ m$$

$$\text{Minimum basal Area } (A) = 37.5\ \text{m} \times 4\ \text{m}$$

$$\text{A} = 150\ m^2$$

6.3 Water balance

It is noted that there is an annual water deficit of 827 mm, indicating that wastewater disposal via an absorption system is feasible. To determine whether the 150 m² absorption bed basal area is appropriately sized, a full water balance is required (see Appendix 4).

To comply with NSW Health (1998) and local council requirements, a year-round water balance was conducted (Appendix 4) using a Q value of 1,500 L/day and an EAA of 150 m². The results indicate that in June, a minimum basal area of 175 m² is required.

6.4 Location and configuration of EAA

Assuming 22 m long beds are installed, a total of two will be required, spaced 1 m apart. The location and configuration of the beds are outlined in the Site Layout Plan (SLP) in Appendix 1. This design provides a basal area of 176 m², adding an extra margin of conservatism. The 1 m spacing increases the effluent management area (EMA) to approximately 198 m².

6.5 Reserve area

Due to the location of the house, site topography, and proximity to the nearby creek, there is limited space to expand the absorption beds. One option is to construct an absorption bed on the eastern side of the property, but this would require an additional on-site sewage management investigation and report to support the design.

6.6 Set back distances

Recommended buffer distances for absorption systems with secondary treatment are shown in Table 4. It is assumed that the finished surface of the EAA will be <2 % grade (i.e. flat)

Table 4: Recommended set back (buffer) distances for the site based on the silver book (NSW Health, 1998).

Feature	Set back distance (Absorption bed)	Comments
Property boundary	3.0m downslope and where flat, or 4.0m upslope of the feature	(Water NSW, 2019)
Drainage line and dam	40 m	Easily achievable. The Silver Book.
Bed walls	1 m	(Standards Australia, 2012)
Dwelling/buildings and driveways	6 m (upgradient) 3 m (downgradient)	Easily achievable. The Silver Book.
In ground water tanks	4 m	Water tanks should be upgradient of EAA.

7 Conclusion

EE conducted a site and soil assessment to design an OSMS for a proposed new dwelling in Ingleside. It is understood that the existing dwelling on the southwestern side of the property will be demolished, making the proposed dwelling the primary residence. The assessment ensures compliance with AS/NZS 1547:2012, and the NSW Health (1998) guidelines to protect public health and the environment.

Given the site location and proposed development, it is recommended that wastewater be treated to a secondary level via an AWTS.

The site assessment identified a suitable location for the EAA near the proposed dwelling. A small drainage line is located adjacent to it (see SLP, Appendix 1), however it does not present an issue as it located above the EAA plus has a small bund wall running on the southwestern side that prevents stormwater contact with the wastewater irrigated into the EAA. Another nearby option (BH4) was investigated however it was too close a drainage line and creek and deemed unsuitable. A reserve area was identified on the far southwestern side of the block, however this would be subject to further investigation.

The soil investigation identified uncontrolled fill across the proposed EAA, which is not expected to impact wastewater disposal. Any large rocks, boulders, plastics, or other debris pre-classified as General Solid Waste (GSW) encountered during excavation should be removed and disposed of at a NSW EPA-licensed waste management facility that accepts this category of waste.

If any soil waste is to be taken off-site, a waste classification report should be carried out in accordance with the NSW Waste Classification Guidelines. (NSW EPA, 2014).

Additionally, if unexpected objects suspected to contain asbestos-containing material (ACM) (e.g., cemented fibro sheeting) are discovered, the area should be fenced off, and a licensed occupational hygienist should be contacted for clearance.

The proposed OSMS outlined in this report will ensure optimal wastewater treatment and disposal, maintaining system efficiency and compliance with regulatory requirements.

It is concluded that a sustainable OSMS can safely treat and dispose of the potential wastewater loads generated on-site. The recommendations outlined below will help the OSMS align with the objectives outlined above.

8 Recommendations

8.1 General

- A licensed plumber should be consulted for the installation of the new proposed OSMS. Installation must comply with the manufacturer's recommendations, AS/NZS 1547:2012, Water NSW (2019) and AS/NZS 3500.2:2018 specifications and local council requirements.
- All pipes and fittings should comply with AS2439.2, AS2698.2, AS/NZS 4129, AS/NZS 4130 or AS/NZS 1477.
- Use of low phosphorus and low sodium (liquid) detergents to improve effluent quality and maintain soil properties.
- No bleaches or harmful chemicals should be used for cleaning sanitary devices nor tipped down sink or toilet.
- Baby wipes, tampons, cotton buds should not be disposed down toilet where a septic/AWTS is in use. Both owners and tenants of the property should be made aware of this.
- Operation and management of the treatment and disposal system in accordance with manufacturer's recommendations and the recommendations made in this report. An operator's manual incorporating service records is to be kept by the owner.

8.2 Water saving measures

- Where possible, install water saving devices such as AA or AAA rated plumbing all water fixtures within the dwelling as this will help reduce the effluent loading volume for disposal area.
- Leaking taps or toilets should be repaired immediately as this can lead to an overload of the absorption bed/trench and cause failure.

8.3 Sewage Treatment

- Install a new AWTS which is NSW Heath accredited, provides secondary treatment and disinfection. A licenced electrician will be required to connect the AWTS to mains electricity. The AWTS should be anchored to the ground or filled with water to prevent uplift, as per AS/NZS1546:2017 (Standards Australia, 2017). A list of NSW health accredited AWTS's can be found on the NSW Health website under the register of certificates of accreditation. It is the responsibility of the client to nominate the AWTS manufacturer.
- A proposed location for the AWTS tank is given in the SLP however the exact location should be decided in consultation between the client/owner and the installer.
- The AWTS tank should be downgradient of the wastewater source(s) and be at least 3 m setback from property boundary and dwelling. Ease of access for servicing and desludging should be considered. Additional notes are provided in the SLP (Appendix 1).
- Any new untreated sewer pipes laid should be in accordance with the Water NSW (2019) document "Designing and Installing On-Site Wastewater Systems (Water NSW, 2019) and AS/NZS 3500.2.2018 (Table 5).

Table 5: Minimum pipe diameter calculations and minimum grades.

Nominal pipe size (DN)	Minimum grade %	Minimum grade ratio
65	2.5	1:40
80	1.65	1:60
100	1.65*	1:60
125	1.25	1:80
150	1.00	1:100

* Except for drains from septic tanks, sewage treatment plants and unvented discharge pipes from tundishes, which may have a minimum grade of 1%

- All sewer pipes between the plumbing amenities, AWTS and EAA must be buried at a depth that provides protection against mechanical damage or deformation. Table 6 shows the minimum pipe depth for trafficable areas.

Table 6: Minimum pipe depth for trafficable and non-trafficable areas (Standards Australia, 2018).

Location	Minimum depth of cover (mm) for all pipematerials other than cast iron
subject to vehicular traffic	500
elsewhere	300

8.4 Wastewater disposal

- Effluent disposal will occur via two pressure-dosed absorption beds running parallel to the slope contour. A total basal area of 176 m² is required to comply with AS/NZS 1547:2012. Assuming an absorption bed width of 4 m, a total of 44 linear metres is needed. While the detailed design of the absorption beds is the installer's responsibility, a standard drawing is provided in Appendix 5. The base of the absorption beds should not exceed 0.3 m in depth, to enable 0.6 m of soil depth below the base of the bed.
- The proposed configuration consists of two absorption beds, each 22 m in length, positioned parallel to the contour and spaced 1 metre apart.
- If additional effluent disposal capacity is required, an absorption bed on the eastern side of the property could be considered (see SLP); however, this would require a further on-site sewage management investigation and supporting report.
- Alternative bed dimensions (to allow for a different configuration) are permitted as per AS/NZS 1547:2012 (Table 7), however the beds should be equally sized to ensure an even application of wastewater.

Table 7. Absorption bed dimensions and depths. Source Table L2 of AS/NZS 1547:2012 (Standards Australia, 2012).

Bed dimensions	Typical dimensions (mm)	Maximum (mm)	Minimum (mm)
Width	1000-4000	4000	1000
Depth of aggregate	300-600	600	300
Depth of topsoil	100-150	150	100
Spacing between adjacent beds (sidewall to sidewall)	-	N/A	1,000

- The choice of aggregate type size is at the discretion of the installer or plumber. Typically, (blue metal gravel (~ 20–40 mm aggregate size) are used, though 40–70 mm aggregate (railway ballast) has also been reported to perform well. Recycled bricks and concrete are not recommended for aggregates.
- Where beds are dug by an excavator in more clayey soils, scarify the bed walls to remove any smearing caused by the excavator bucket.
- Excavated topsoil and clay subsoil material should be separated. The medium clay subsoil should not be re-used in the construction of the absorption bed.
- Care should be taken not to smear the bottom or side walls of the beds as this could block the soil pores and prevent infiltration. If there are any tree roots or trench cuttings dissected during excavation work the holes/trench should be plugged with a medium clay or bentonite clay to prevent preferential flows.

- Pressurised dosing laterals within bed will consist of 25/32 mm PVC pipes with 3 mm deburred holes, spaced between 1,000 mm and 1,200 mm initially, with adjustments made as needed based on pressure and the squirt height requirement. The holes will be drilled along the centreline, facing upwards.
- The length of the laterals will be determined by the required bed size (m^2). It is essential to ensure even effluent distribution across the distribution bed to maintain system efficiency and prevent localised saturation.
- Before installing the drilled 25 mm PVC pipe inside the 90/100 mm slotted PVC or 100 mm Ag pipe, the squirt height must be tested across the laterals to ensure consistent pressure distribution. The target squirt height should be approximately 1 metre, with no more than 15% variation observed. Additionally, static head and friction loss must be considered when sizing the pump to ensure adequate pressure and uniform effluent distribution.
- Further site-specific details regarding bed construction, such as covering pipes with aggregate and using geotextile fabric, including effluent line positioning, inspection holes, and pressure valves (if required), should be determined in consultation with the plumber/installer.
- Erosion and sediment controls (all excavation work) should be put in place, as per the NSW Department of Planning and Environment publication "Managing Urban Stormwater: Soils and construction - Volume 1 (NSW DECC, 2004).
- Any stormwater or rainwater overflows from the proposed dwelling or other buildings should be diverted away from the proposed EDA.
- Up to 150–200 millimeters of topsoil, complying with AS 4419:2018 (Soils for Landscaping and Garden Use), should be placed over the geofabric to cover the top of the absorption beds. The finished ground level should be even and planted with a lawn species suitable for receiving treated wastewater (Appendix 7).
- The absorption bed(s) should be fenced off or clearly delineated so that no weight bearing vehicles (e.g., truck, tractor or car) or cattle can pass over the EDA as this may cause crush and damage the beds.
- Ground cover should be quickly established on any area which experiences disturbance to the soil.

9 Disclaimer, Assumptions, and Intellectual Property

This report provides information regarding the design of an on-site wastewater management system. The information is based on the best available knowledge and practices at the time of writing; however, it does not guarantee the performance of any particular system. System performance may vary depending on site-specific conditions, installation quality, and ongoing operation and maintenance.

The property owner(s) are responsible for ensuring that the system is installed, operated, and maintained in accordance with all applicable laws and regulations. The property owner(s) also assume responsibility for any damages or injuries resulting from improper installation, operation, or maintenance of the system.

Earthwise Environmental Pty Ltd and the authors of this report are not liable for any damages, injuries, or losses arising from the use of this report.

The soil assessment data used in the design of the on-site wastewater management system is based on a limited number of borehole inspection locations and soil samples. Actual soil conditions at the site may differ from those observed in the boreholes or tested samples, and there is no guarantee that the system will perform as expected. System performance is also dependent on proper operation and maintenance, and all system components have a limited lifespan.

A desktop study into the feasibility of connecting the proposed dwelling to a nearby reticulated sewage management facility was beyond the scope of this investigation. It has been assumed that such a connection is not feasible and would be a costly option.

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10 References

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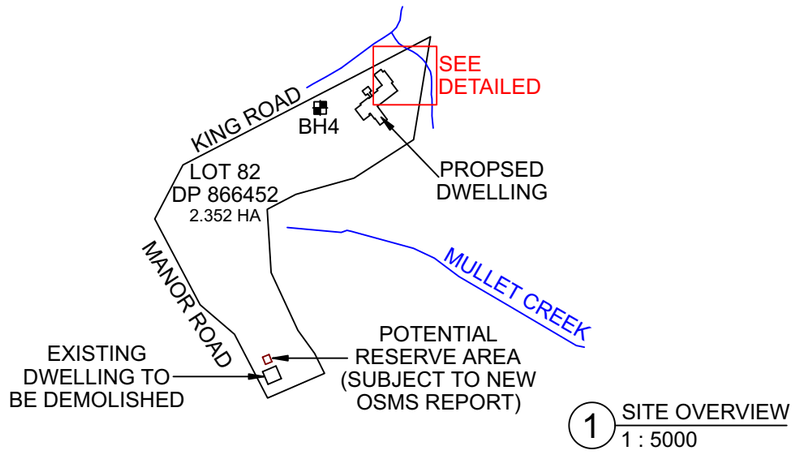
Appendix 1
Site layout plan

ONSITE WASTEWATER MANAGEMENT SITE LAYOUT PLAN & BOREHOLE LOCATIONS

KEY

- EFFLUENT DISTRIBUTION LINE
- 100MM SEWER MAIN
- BOREHOLE LOCATION & ID
- INSPECTION PORT



1 SITE OVERVIEW
1 : 5000

GENERAL NOTES

1. ALL PLUMBING AND SEWER PIPES TO BE LAID OUT IN ACCORDANCE WITH AS/NZS 3500.2:2021. CLEANOUTS/INSPECTION HOLES SHOULD BE SPACED AT LEAST EVERY 30 M, AND NO 90-DEGREE BENDS ARE PERMITTED. REFER TO SECTION 8 OF THE REPORT AND AS/NZS 3500 FOR MINIMUM PIPE DIAMETERS AND GRADES.

2. ANY EFFLUENT DISTRIBUTION LINES FOR THE IRRIGATION SYSTEM UNDER DRIVEWAYS MUST BE AT LEAST 0.45 M DEEP FOR LIGHT VEHICULAR TRAFFIC OR 0.5 M DEEP FOR HEAVY VEHICULAR TRAFFIC.

3. THE LOCATION OF AWTS OR SEPTIC IN THE DRAWING IS INDICATIVE ONLY. THE FINAL LOCATION MUST BE DECIDED BETWEEN THE OWNER AND INSTALLER. INSTALLATION AND ANCHORING OF TANKS MUST COMPLY WITH AS 1546.3:2017. TANKS MUST BE FILLED WITH WATER TO PREVENT UPLIFT AND BE POSITIONED DOWNSLOPE OF WASTEWATER GENERATION POINTS TO ENSURE SUFFICIENT FALL (>1%).

4. GENERAL AWTS/SEPTIC SETBACKS ARE TO BE:
- AT LEAST 3 M AWAY FROM THE BUILDING
- AT LEAST 3 M FROM THE PROPERTY BOUNDARY
- AT LEAST 4 M (AWTS) OR 15 M (SEPTIC) DOWNGRADIENT OR CROSS GRADIENT FROM ANY IN-GROUND DRINKING WATER STORAGE TANKS.

5. OPERATION AND MANAGEMENT OF THE ATWS OR SEPTIC SHOULD BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS

6. PLUMBER TO ENSURE ADEQUATELY SIZED PUMP WITHIN AWTS OR PUMP WELL TO DOSE THE ABSORPTION BEDS AND ENSURE AN APPLICATION OF WASTWATER OVER THE ENTIRE BED(S). NON-RETURN VALVES MAY BE REQUIRED TO PREVENT BACKFLOW.

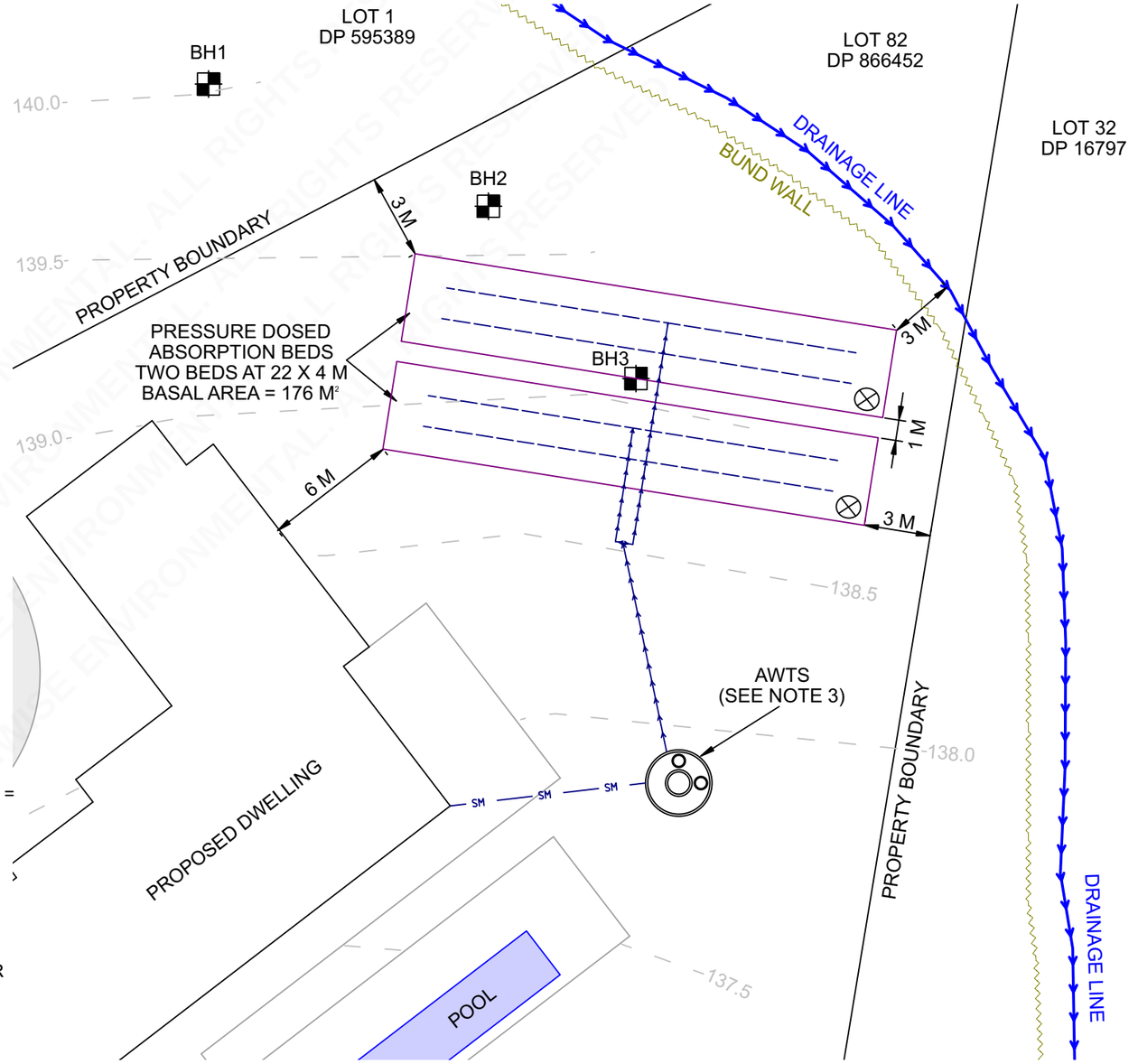
7. WASTEWATER DISPOSAL IS TO BE VIA A PRESSURE DOSED ABSORPTION BED(S). MINIMUM BASAL AREA REQUIRED = 176 M^2. BEDS SHOULD BE APPROXIMATLEY 400 MM DEEP. THE BASE OF THE BED SHOULD BE SCOURED AND GYPSUM APPLIED TO THE BASE AT A RATE OF 1 KG/M^2. THE DOSING PIPES SHOULD BE DRILLED AND PRESSURE TESTED BEFORE COVERING WITH 90/100 MM SLOTTED PVC OR AG PIPE. FURTHER DETAILS PROVIDED IN SECTION 8 OF REPORT AND STANDARD DRAWING PROVIDED IN APPENDIX 5.

8. TO REDUCE THE LIKELIHOOD OF SURFACE WATER RUN-ON AND SEEPAGE INSTALL A SURFACE DIVERSION DRAIN UPGRADIENT OF EAA. A STANDARD DRAWING IS PROVIDED IN APPENDIX 5.

9. SET BACK REQUIREMENTS BETWEEN BEDS AND SELECTED SITE FEATURES ARE OUTLINED IN THE REPORT. OTHER GENERAL DISTANCES ARE GIVEN IN THE DRAWING.

10. ANY STORMWATER DRAINS/OVERFLOW OUTLETS OR RETENTION TRENCHS/PITS SHOULD NOT BE POSITIONED UPGRADIENT OF EDA (I.E. IRRIGATION AREA, TRENCHES, BEDS).

11. EROSION AND SEDIMENT CONTROL IN ACCORDANCE WITH LOCAL COUNCIL DCP AND NSW DEPARTMENT OF PLANNING AND ENVIRONMENT PUBLICATION "MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION - VOLUME 1 (NSW DECC, 2004).



2 DETAILED VIEW
1 : 250

REV	DESCRIPTION	DATE	REV	DESCRIPTION	DATE
0	ISSUE TO CLIENT	07/03/25	4		
1			5		
2			6		
3			7		

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SOIL | WATER | GEOTECHNICAL

N

TITLE	ON-SITE WASTEWATER MANAGEMENT SITE LAYOUT PLAN			SHEET	1/1
CLIENT	S. LUI				
LOT / DP	LOT 82 IN DP 866452			REVISION	0
ADDRESS	10 MANOR ROAD, INGLESIDE, NSW				
SIZE: A3	**NOT TO SCALE**	PROJECT: J350	DATE: 07/03/2025		

Appendix 2
Floor plans

GROUND LEVEL

POOL
10.0 x 2.5 (36,000 L)

ALFRESCO
5.0 x 13.4

FAMILY
7.0 x 5.8

RAKED CEILING

FIRE

GAMES
7.5 x 5.6

BAR

CELLAR

WM WM

MUDROOM / LAUNDRY
6.4 x 3.7

GYM / WORKSHOP
6.0 x 4.9

STORE

STORE

PDR

STORAGE

ALFRESCO
4.7 x 9.9

LIVING / DINING
9.3 x 6.9

RAKED CEILING

KITCHEN

SKY

SKY

OPEN RISER STAIRS

THEATRE ROOM
4.7 x 7.2

ENTRY
VOID OVER

STUDY
3.2 x 5.1

4 CAR GARAGE
12.0 x 6.8

BBQ

CABINETS

WASH ROOM

ENSUITE

COLD ROOM

WIP

BED 4
4.7 x 4.0

WIR

BED 5
4.7 x 4.0

WIR

ROBE

ENSUITE

BED 6
4.7 x 4.0

ENSUITE

PORTE COCHERE

S.L DOOR

SD 1
SD 2
SD 3
SD 4
SD 5

W 1 W 2 W 3 W 4 W 5 W 6 W 7 W 8 W 9 W 10 W 11 W 12 W 13 W 14 W 15 W 16 W 17 W 18 W 19 W 30 W 31

UP

2 x 820

1479

2X920

820

720

1550

7300

8850

5486 4102 6000 7795 6000

29383

3150 4700 1850 3553 10000 3300 1761 5000

3150 4700 20764 7500 5691050 6800

38233

35490 13400 11400 7680 9930 2110 1275 11840 10775 2570

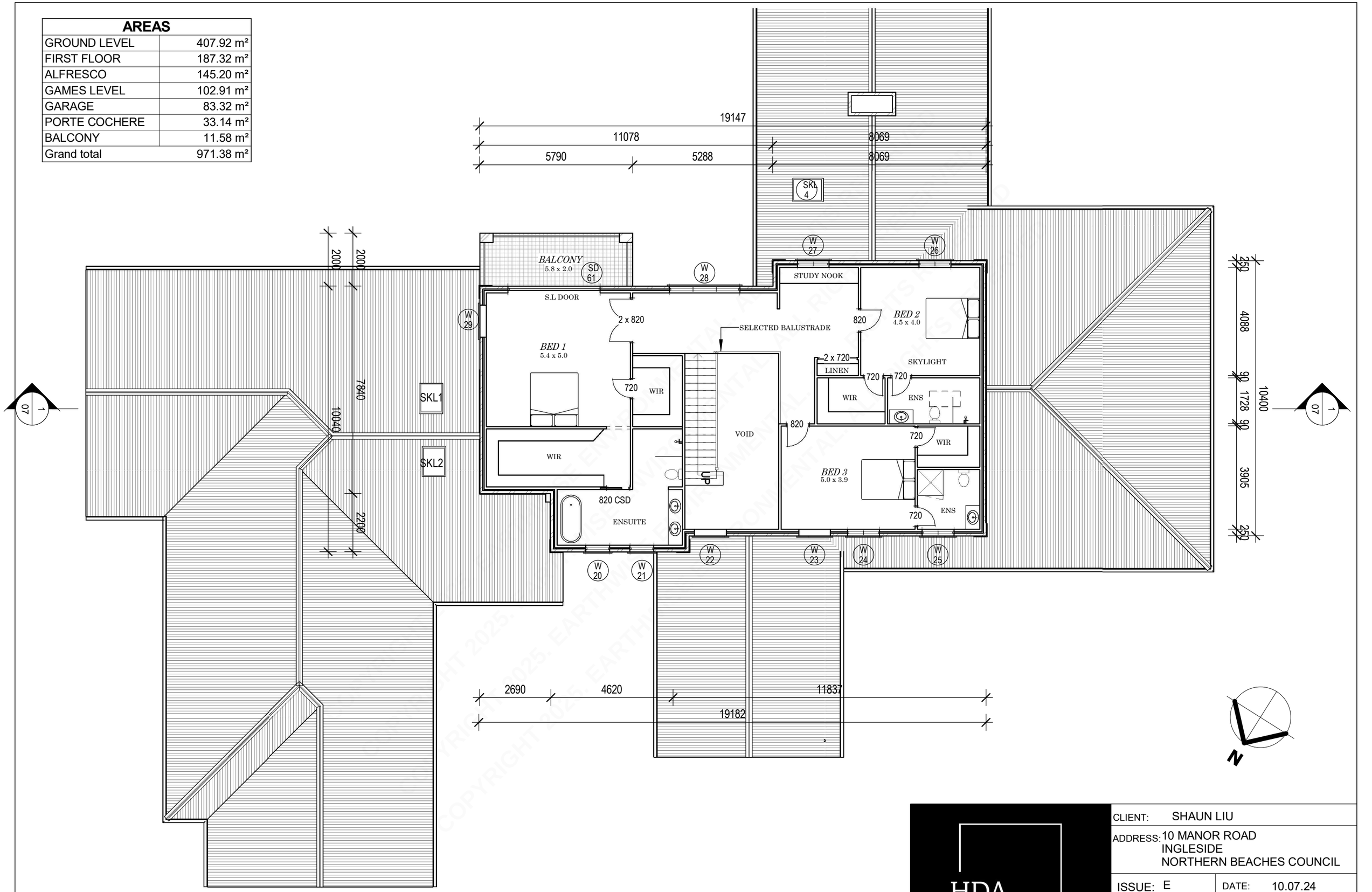
11100 6697 4403 1180 11440 10260 900 2811 4500

N

CLIENT:	SHAUN LIU
ADDRESS:	10 MANOR ROAD INGLESIDE NORTHERN BEACHES COUNCIL
ISSUE: E	DATE: 10.07.24
SCALE: 1 : 150	SHEET NO: 02 /

HDA
HOME DESIGN AGENCY

AREAS	
GROUND LEVEL	407.92 m²
FIRST FLOOR	187.32 m²
ALFRESCO	145.20 m²
GAMES LEVEL	102.91 m²
GARAGE	83.32 m²
PORTE COCHERE	33.14 m²
BALCONY	11.58 m²
Grand total	971.38 m²



UPPER LEVEL

HDA
HOME DESIGN AGENCY

CLIENT:	SHAUN LIU
ADDRESS:	10 MANOR ROAD INGLESIDE NORTHERN BEACHES COUNCIL
ISSUE: E	DATE: 10.07.24
SCALE: 1 : 125	SHEET NO: 03 /

Appendix 3
Soil profile descriptions

Earthwise Environmental

SOIL PROFILE DESCRIPTION OF BH1

PROJECT NUMBER/NAME 350 - WWR
CLIENT S. LIU
LOT & D.P. 82 / 866452
ADDRESS 10 Manor Road, Ingleside

CORING DATE 21/2/25
MAX DEPTH 1.5 m
CORING METHOD Post Driver
VEGETATION Weeds
GROUND COVER 100%

LAT/LONG see Appendix 1
GROUNDWATER DEPTH >1.5 m
TOPOGRAPHY
SURFACE ELEVATION see Appendix 1
LOGGED BY TB

COMMENTS Taken to the east of the proposed dwelling in the corner of the property.

Photograph	Depth (m)	Horizon	Colour	Soil Texture	Soil Category	Structure	Mottles	Moisture	Soil profile features	Depth Sampled (cm)
	0.1	F	Dark brown	Sandy clay loam	4	Strong	Nil	Slightly moist	Roots. Piece of broken brick at surface. Large root at 20 cm.	0-10
	0.2 0.3 0.4 0.5 0.6 0.7	F	Grey brown Light grey brown	Sandy loam	4	Moderate	Nil	Slightly moist	Gradual colour change. Root penetration.	40-60
	0.8 0.9 1 1.1 1.2 1.3 1.4	B	Light grey brown	Fine sandy clay	5	Massive	Few	Slightly moist	Gradual texture change. Red brown mottles.	110-120
	1.5								BH terminated at target depth	

Disclaimer Actual soil conditions may differ across the site.

Earthwise Environmental

SOIL PROFILE DESCRIPTION OF BH2

PROJECT NUMBER/NAME 350 - WWR
CLIENT S. LIU
LOT & D.P. 82 / 866452
ADDRESS 10 Manor Road, Ingleside

CORING DATE 21/2/25
MAX DEPTH 1.5 m
CORING METHOD Post Driver
VEGETATION Weeds
GROUND COVER 100%

LAT/LONG see Appendix 1
GROUNDWATER DEPTH >1.5 m
TOPOGRAPHY
SURFACE ELEVATION see Appendix 1
LOGGED BY TB

COMMENTS Taken ~11m south of BH1

Photograph	Depth (m)	Horizon	Colour	Soil Texture	Soil Category	Structure	Mottles	Moisture	Soil profile features	Depth Sampled (cm)
	0.1 0.2 0.3	F	Dark brown	Sandy loam	4	Strong	Nil	Slightly moist	Roots. Piece of intact fibro with blue/pink pain at 19cm.	
	0.4 0.5 0.6 0.7 0.8 0.9	F	Grey brown Orange brown	Loamy sand	4	Strong	Nil	Slightly moist	Layer of mulch 38-42 cm many roots. Sandstone rocky layer from 50-95 cm.	
	1 1.1	F	Grey brown	Fine sandy loam	4	Moderate	Few	Slightly moist	Abrupt change.	
	1.2 1.3 1.4		Grey	Sandy clay	5	Massive	Few	Slightly moist	Roots to depth.	
	1.5								BH terminated at target depth	

Disclaimer Actual soil conditions may differ across the site.

Earthwise Environmental **SOIL PROFILE DESCRIPTION** OF BH3

PROJECT NUMBER/NAME 350 - WWR
CLIENT S. LIU
LOT & D.P. 82 / 866452
ADDRESS 10 Manor Road, Ingleside

CORING DATE 21/2/25
MAX DEPTH 0.9 m
CORING METHOD Post Driver
VEGETATION Weeds
GROUND COVER 100%

LAT/LONG see Appendix 1
GROUNDWATER DEPTH >0.9 m
TOPOGRAPHY
SURFACE ELEVATION see Appendix 1
LOGGED BY TB

COMMENTS Taken ~ 8 m south of BH2

Photograph	Depth (m)	Horizon	Colour	Soil Texture	Soil Category	Structure	Mottles	Moisture	Soil profile features	Depth Sampled (cm)
	0.1	F	Dark brown	Sandy loam	4	Moderate	Nil	Slightly moist	Roots.	
	0.2	F	Grey brown	loamy sand	4	Moderate	Nil	Slightly moist	Sandstone rocks	
	0.4	F	Orange brown	Fine sandy clay	4	Weak to Moderate	Few	Slightly moist	Sandstone rocks	
	0.8	F	Grey	Light clay	5	Weak	Many	Slightly moist	Ironstone	
	0.9								BH terminated due to refusal	

Disclaimer Actual soil conditions may differ across the site.

Earthwise Environmental

SOIL PROFILE DESCRIPTION OF BH4

PROJECT NUMBER/NAME 350 - WWR
CLIENT S. LIU
LOT & D.P. 82 / 866452
ADDRESS 10 Manor Road, Ingleside

CORING DATE 21/2/25
MAX DEPTH 1.6 m
CORING METHOD Post Driver
VEGETATION Weeds
GROUND COVER 100%

LAT/LONG see Appendix 1
GROUNDWATER DEPTH >1.6 m
TOPOGRAPHY Flat
SURFACE ELEVATION see Appendix 1
LOGGED BY TB

COMMENTS Taken on 'paddock' section of property to the west of the proposed dwelling. Drainage line ~10 m downslope.

Photograph	Depth (m)	Horizon	Colour	Soil Texture	Soil Category	Structure	Mottles	Moisture	Soil profile features	Depth Sampled (cm)
	0.1	F	Brown	Sandy loam with gravel	4	Strong	Nil	Dry	80% sandstone gravel rocks.	
	0.2									
	0.3	F	Brown	Sandy clay loam	4	Strong	Nil	Slightly moist	Abrupt change. Many sandstone gravel rocks.	30-50
	0.4									
	0.5	F	Orange brown	Light clay	5	Strong	Few	Slightly moist	Sandy clay loam lenses.	60-80
	0.6									
	0.7									
	0.8								Light grey brown between 80-90 cm with fine sandy clay.	
	0.9	F	Dark brown	Light clay	5	Strong	Few	Slightly moist	red grey mottles	100-110
	1									
	1.1	F	Red brown	Medium clay	6	Moderate	Many	Slightly moist	red grey mottles	
	1.2									
	1.3									
	1.4									
	1.5									
	1.6								BH terminated at target depth	

Disclaimer Actual soil conditions may differ across the site.

Appendix 4
Hydraulic balance calculations

Water balance with nominated area to determine wet weather storage

Earthwise Environmental

Client: S. Lui
Address: 10 Manor Road, Ingleside

Parameter	Symbol	Units	Total
Daily wastewater flow	Q	L/day	1,500
DIR or DLR	DIR	mm/day	10
Void Space Ratio[1]	V		0.3
Runoff Coeffient[2]	Rc		0.9
Nominated EAA	L	m^2	150

Application Type	Absorption Bed
Slope (%)	0-10
Rainfall Data Location[3]	Terry Hills AWS (066059)
Evaporation Data Location[3]	Sydney Airport (066037)

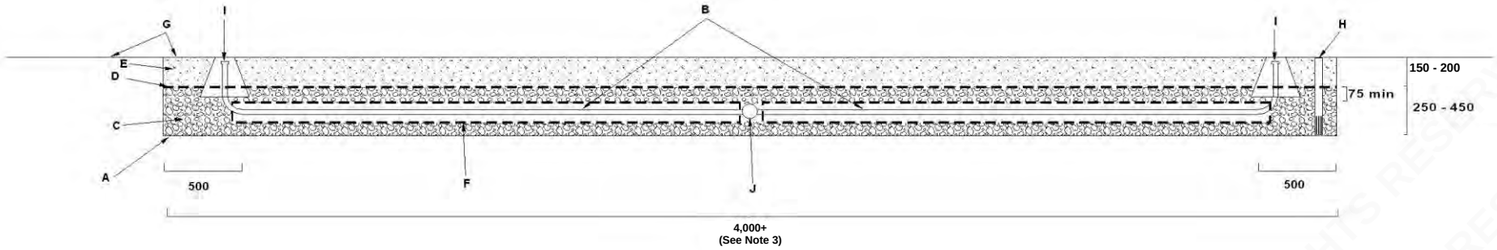
Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in Month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Median Precipitation	P		mm/mth	111	115	129	136	43	105	53	42	52	56	79	76	**998**
Mean Evaporation	E		mm/mth	226	182	167	126	93	75	84	115	147	186	198	229	**1,825**
Crop Factor	C			0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	
INPUTS	**Symbol**	**Formula**	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Retained rainfall	RR	P x Rc	mm/mth	100	104	116	123	39	95	48	38	46	51	71	69	**898**
Effluent Irrigation	W	Q x D / L	mm/mth	310	280	310	300	310	300	310	310	300	310	300	310	**3,650**
Total Inputs	I	RR+W	mm/mth	**410**	**384**	**426**	**423**	**349**	**395**	**358**	**348**	**346**	**361**	**371**	**379**	**4,548**
OUTPUTS	**Symbol**	**Formula**	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Evapotranspiration	ET	E x C	mm/mth	181	146	134	88	65	53	59	80	103	149	158	184	**1,399**
Percolation	B	DIR X D	mm/mth	310	280	310	300	310	300	310	310	300	310	300	310	**3,650**
Total Outputs	O	ET + B	mm/mth	**491**	**426**	**444**	**388**	**375**	**353**	**369**	**390**	**403**	**459**	**458**	**494**	**5,049**
STORAGE	**Symbol**	**Formula**	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	
Carry over			mm/mth	0	0	0	0	115	27	167	131	0	0	0	0	
Monthly Storage	S	(I-O)/V	mm/mth	-271	-139	-61	115	-89	141	-37	-140	-188	-327	-292	-383	-1670
Cumulative Storage	M		mm	0	0	0	115	27	167	131	0	0	0	0	0	**440**
Area required for no storage	EAAs	Q*D/(ET-RR+B)	m^2/mth	119	131	142	170	138	175	145	132	126	114	116	109	

Storage	largest M	mm	**167**
	V X L/1000	KL	**25**
EAA Required	largest EEAs	m^2	175

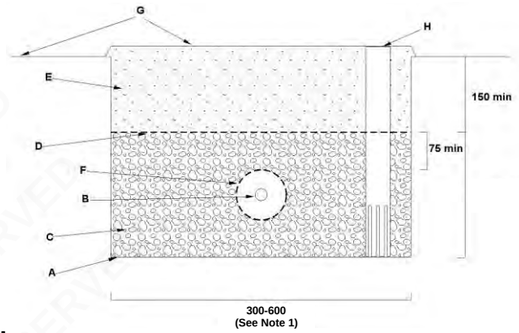
[1] Patterson (2006)
[2] Proportion of rainfall that remains onsite and infiltrates
[3] BOM (2025)

Appendix 5
Standard drawing an absorption bed

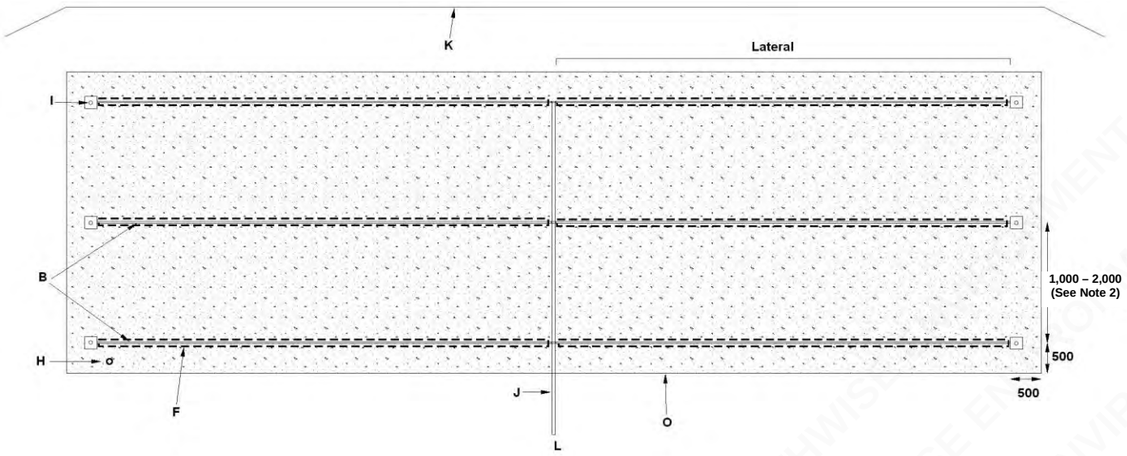
Cross Section: Pressure-dosed Bed



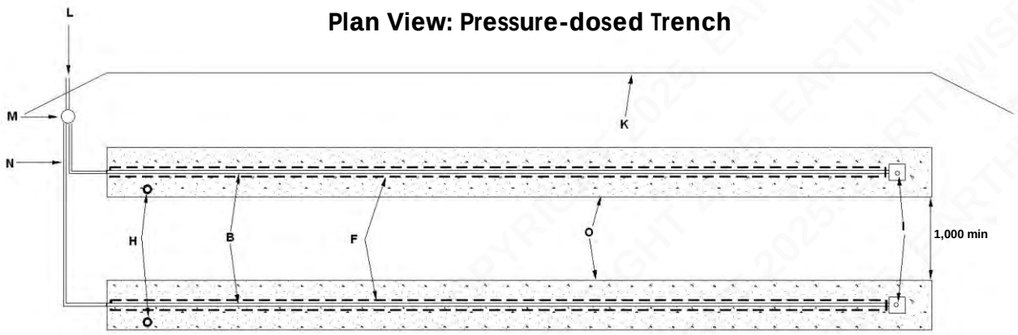
Cross Section: Pressure-dosed Trench



Plan View: Pressure-dosed Bed



Plan View: Pressure-dosed Trench



Pressure-dosed Trench / Bed Construction

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

B Pressure-dosing manifold consisting of 25mm PVC pipe with 3mm holes drilled (deburred) at 400mm centres facing upwards. Where a dosing device is used in place of a pump, holes will need to be 4-5mm depending on flow rate achieved. The total number and length of laterals will be determined by the required bed size (m^2) and the lateral spacings shown in this drawing.

C 20-40mm distribution aggregate.

D Geotextile filter cloth.

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

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

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

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

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

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

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

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

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

N 25mm polyethylene or PVC dosing manifold.

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

Notes

1 Trenches should optimally be 600mm wide. Optimum width will balance storage requirements against footprint and required trench length.

2 Nominal lateral spacing of 2,000mm for clay loams to light clays. 1,000mm for sandy loams to sands.

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

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

Standard Drawing 10C – Pressure-dosed Bed / Trench

(not to scale)

Source: Water NSW 2019.

Appendix 6
Groundwater search results

NSW GROUNDWATER BORE SEARCH

Source: Water NSW

REVISIONS	No	REVISION	DATE
	0		
	1		
	2		

N

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M: 0421 251 064
WWW.EARTHWISEENVIRONMENTAL.COM.AU
SOIL | WATER | GEOTECHNICAL

Surveyed	Drafted	Checked	Title	GROUNDWATER BOREHOLE SEARCH RESULTS	Sheet No.
			Client		
FINAL VERSION			Lot/ DP		
		Original Size	Address		Revision
DO NOT SCALE		A3	QCAD File:	Ref No:	Date:

Appendix 7
Plants and shrubs suitable for effluent disposal areas

Vegetation suitable for planting with effluent application areas

Below is a list of grasses, groundcover/climbers and other native trees and scrubs that are recommended for planting in the effluent disposal areas. You may take this list to your local nursery or to your landscaper. Note: Other plants may also be suitable to grow with effluent disposal areas, please seek expert advice for further information.

Botanical Name	Approximate Height	Common Name or Variety
Grasses		
Carex spp.		
Lomandra longifolia		
Microlaena stipoides		
Oplismenus imbecillis		
Pennisetum alopecuroides	40 - 80 cm	Available as lawn turf
Poa lab		
Stipa spp.		
Ground cover/climbers		
Hibbertia scandens		Snake vine
Hibbertia stellaris		
Isotoma fluviatalis	Prostrate	
Kennedia rubicunda	Climber	Dusky coral pea
Scaevola albida		
Scaevola ramosissima		
Veronica plebeia		
Viola hederacea		Native violet
Sedges/grasses/small plants		
Anigozanthus flavidus	2m	Kangaroo Paw
Baumea acuta		
Baumea articulata	Sedge	
Baumea juncea	Sedge	
Baumea nuda	Sedge	
Baumea rubiginosa	Sedge	
Baumea teretifolia	Sedge	
Blandfordia grandiflora	30-90cm	Christmas Bell
Blandfordia nobilis	30-90cm	Christmas Bell
Brachyscome diversifolia	Clump	Native Daisy
Carex appressa	Sedge	
Cotula coronopifolia	10-20cm	Waterbutton
Crinum pedunculatum	<2m	Swamp Lily
Cyperus polystachyos	Sedge	
Dianella caerulea	Low plant	Blue Flax Lily
Epacris microphylla	50cm -1m	
Ferns		
Gahnia spp.	Tall Grass	
Juncus spp.	0.5 m Rush	
Lobelia trigonocaulis	5-10cm	
Lomandra spp.	Grass	
Patersonia fragilis		Native Iris
Patersonia glabrata		Native Iris
Patersonia occidentalis		Native Iris
Ranunculus graniticola	5cm	
Restio australis	Reed	
Restio tetraphyllus	1m	
Sowerbaea juncea	Sedge	Rush Lily
Tetratheca juncea	<30cm	
Xyris operculata	<1m	Tall Yellow Eye

Botanical Name	Approximate Height	Common Name or Variety
Shrubs		
Agonis flexuosa nana		
Baekea linifolia	1 - 2.5 m	
Baekea utilis	1-2.5 m	
Baekea virgata	< 4 m	
Banksia aemula	1 - 7 m	
Banksia robur	0.5 - 2 m	
Bauera ruboides	0.5 - 1.5 m	
Callistemon	2 - 3 m	Burgundy
Callistemon	2 - 4 m	Eureka
Callistemon	3 - 4 m	Harkness
Callistemon	3 - 4.5 m	Kings Park Special
Callistemon	2 - 3 m	Mauve Mist
Callistemon	1 - 2.5 m	Red Clusters
Callistemon	2 - 3 m	Reeves Pink
Callistemon citrinus	50 - 80 cm	Austraflora Firebrand
Callistemon citrinus	2 - 4 m	Splendens
Callistemon citrinus	60cm – 1m	White Ice
Callistemon linearis	1 - 3 m	
Callistemon macropunctatus	2 - 4 m	
Callistemon pachyphyllus	2 - 3 m	
Callistemon pallidus	1.5 - 4 m	
Callistemon paludosus	3 - 7 m	
Callistemon pinifolius	1 - 3 m	
Callistemon rigidus	1.5 - 2.5 m	
Callistemon salignus	3 – 10m	
Callistemon shiresii	4 - 8 m	
Callistemon sieberi	1.5 - 2 m	
Callistemon sieberi	50 - 80 cm	Austraflora Little Cobber
Callistemon subulatus	1 - 2 m	
Callistemon viminalis	1 - 2 m	Captain Cook
Callistemon viminalis	5 - 10 m	Dawson River
Callistemon viminalis	3 - 5 m	Hannah Ray
Callistemon viminalis	50 cm - 1 m	Little John
Callistemon viminalis	1.5 - 2 m	Rose Opal
Callistemon viminalis	2 - 3 m	Western Glory
Goodenia ovata	1 - 1.5 m	
Hibiscus diversifolius	1 - 2 m	Swamp hibiscus
Kunzea capitata	1 - 2 m	
Leptospermum flavescens	< 2 m	Tea-tree
Leptospermum juniperinum	1 m	Tea-tree
Leptospermum lanigerum	1 - 2 m	Woolly tea-tree
Leptospermum squarrosum	< 2 m	Tea-tree
Melaleuca alternifolia	4 - 7 m	
Melaleuca decussata	1 - 2 m	Cross-leaved honey myrtle
Melaleuca lanceolata	4 - 6 m	
Melaleuca squamea	1 - 2 m	
Melaleuca thymifolia		

Botanical Name	Approx Height	Common Name or Variety
Trees		
Acacia elongata	> 2 m	
Acacia floribunda	2 - 4 m	Gossamer wattle
Agonis flexuosa	5 - 6 m	Willow myrtle
Allocasuarina diminuta	1.5 m	
Allocasuarina paludosa	0.5 - 2 m	
Angophora floribunda	Large tree	
Angophora subvelutina	Large tree	
Callicoma serratifolia	< 4m	
Casuarina cunninghamiana	10 - 30 m	River she-oak
Casuarina glauca	6 - 12 m	Swamp oak
Elaeocarpus reticulatis	Large tree	Blueberry ash
Eucalyptus amplifolia	Large tree	
Eucalyptus botryoides (coastal areas)	10 - 30 m	
Eucalyptus camaldulensis (west of ranges)	15 - 20 m	River red gum
Eucalyptus deanei	Large tree	Blue Mountains blue gum
Eucalyptus elata	Large tree	River Peppermint
Eucalyptus grandis	10 - 20 m	Flooded gum
Eucalyptus longifolia	20 m	Woollybutt
Eucalyptus pilularis	30 - 40 m	Blackbutt
Eucalyptus punctata	< 35 m	Greygum
Eucalyptus robusta	20 - 30 m	Swamp mahogany
Eucalyptus saligna (coastal)	30 - 50 m	Sydney blue gum
Eucalyptus tereticornis	30 - 40 m	Forest red gum
Eucalyptus viminalis (ranges)	20 - 40 m	Ribbon gum
Acmena smithii	10 - 20 m	Lilli pilli
Flindersia australis	< 40 m	Native teak
Hymenosporum flavuum	3 - 6 m	Native frangipani
Melaleuca armillaris	3 - 4 m	Bracelet honey myrtle
Melaleuca decora	4 - 7 m	
Melaleuca ericifolia	6 m	
Melaleuca halmaturorum	4 - 6 m	
Melaleuca hypericifolia	2 - 3 m	
Melaleuca linariifolia	4 - 8 m	Snow in summer
Melaleuca quinquenervia	5 - 7 m	Broad paperbark
Melaleuca squarrosa	6 m	
Melaleuca stypheloides	6 - 15 m	
Melia azedarach	15 - 20 m	
Pittosporum spp.		
Syzgium paniculatum	8 - 10 m	Bush cherry
Tristania laurina	5 - 15 m	Kanuka
Viminaria juncea	2 - 3 m	Golden spray

Source: Australian Plants Society