REF: 4257WW

VERSION [1.0]

FEBRUARY 19, 2021

SOIL AND SITE ASSESSMENT FOR ONSITE WASTEWATER MANAGEMENT

1226 MAMRE ROAD, MOUNT VERNON, NSW

LGA: Penrith

Lot 45 DP 30266

Project manager: Joseph Mammone

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VERSION CONTROL

Title	Soil and Site Assessment for Onsite Wastewater management			
Site address	1226 Mamre Road, Mount Vernon, NSW			
Description	Proposed subdivision, wastewater treatment systems for the existing dwelling on Lot 1 and proposed dwelling on Lot 2			
Created By	Sean Harris Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC)			
Date Created	19/02/2021			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
[1.0]	L.H.	Issue for client review	19/02/2021	Complete
				-
				-
				-

Limitations

The findings and recommendations in this report are based on the objectives and scope of work outlined above. Harris Environmental Consulting Pty performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. The report and conclusions are based on the information obtained at the time of the assessment. Changes to the site conditions may occur subsequent to the investigation described herein, through natural processes or through the intentional or accidental addition of contaminants, and these conditions may change with space and time. The results of this assessment are based upon site assessment conducted by HEC personnel and information provided by the client and site management. All conclusions regarding the property are the professional opinions of the HEC personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, HEC assumes no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of HEC, or developments resulting from situations outside the scope of this project.

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1. ASSESSMENT CRITERIA

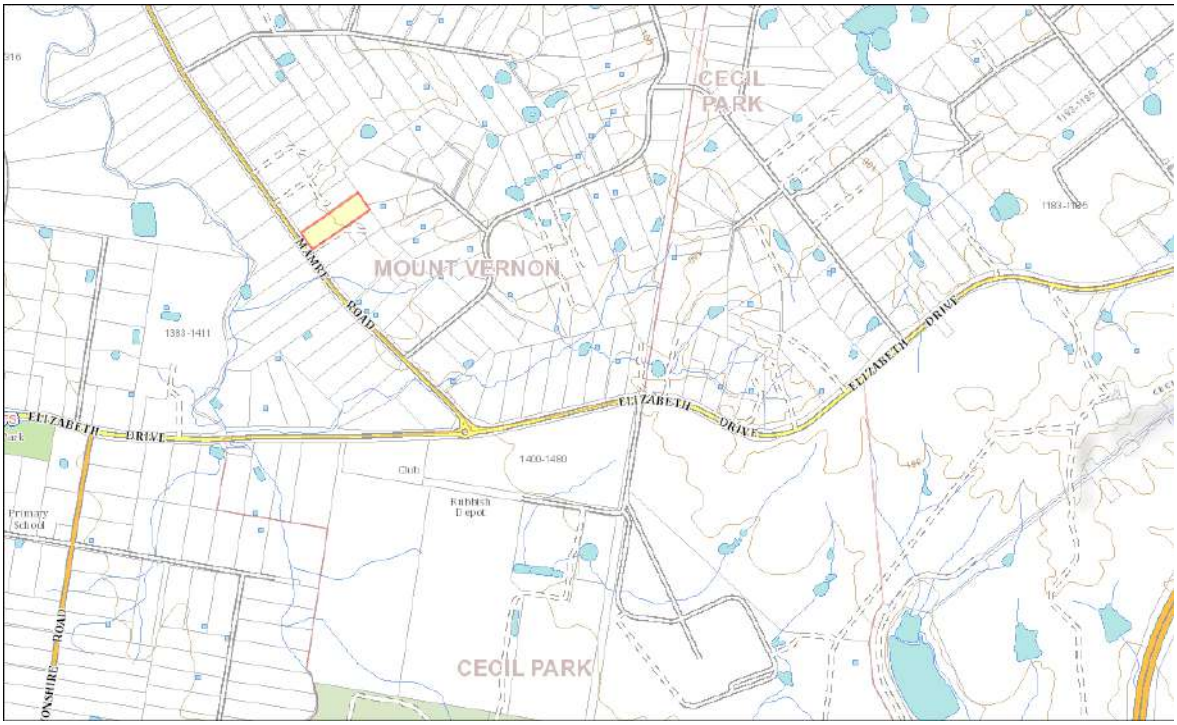
This report was prepared by Harris Environmental Consulting Pty for a proposed subdivision of 1226 Mamre Road, Mount Vernon, NSW. The proposed subdivision will create 1 additional lot, with the existing dwelling occupying Lot 1 and a vacant lot for a proposed dwelling on Lot 2. The current onsite wastewater treatment system and disposal area for the existing dwelling is currently located within the proposed Lot 2. This assessment proposes an on site wastewater management system and disposal area for each lot.

Fieldwork was undertaken by Harris Environmental Consulting (HEC) on the 17th of February 2021. This plan is based on the primary investigation of the soils, topography and hydrology of the site observed on the day of inspection. Soil samples and photos of the site were taken for further analysis. This assessment was undertaken for a proposal to install an Aerated Wastewater Treatment System (AWTS) for wastewater treatment and semi-fixed spray irrigation for treated wastewater disposal for each proposed Lot.

Harris Environmental Consulting was commissioned by the owner to undertake this Soil and Site Assessment for On-Site Wastewater Management in accordance with:

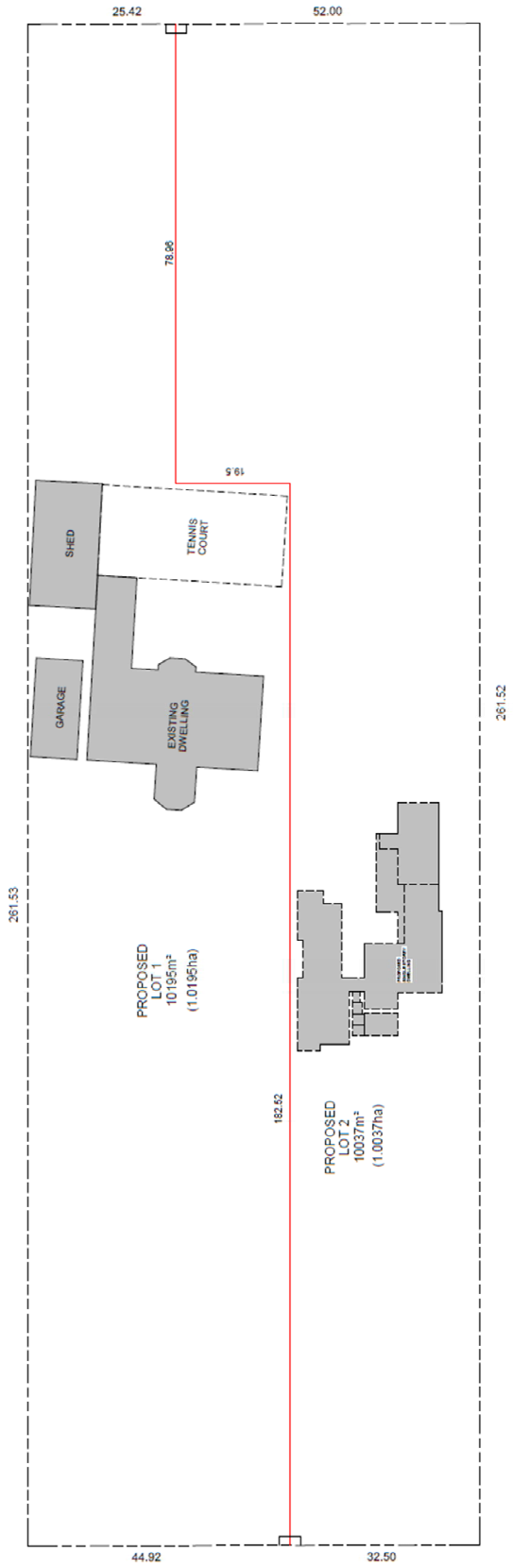
- Penrith City Council's On-site Sewage Management and Greywater Reuse Policy;
- Environment and Health Protection Guidelines (1998) On-site Sewage Management for Single Households (Department of Local Government);
- Local Government Act 1993
- AS/NZ 1547:2012 On-site wastewater management (Standards Australia, 2012); and
- AS/NZS 3500 Plumbing and Drainage 2018 (Standards Australia, 2012)

FIGURE 1 LOCATION OF PROPERTY



Source: SixMaps

FIGURE 2 PROPOSED SUBDIVISION



2. SITE INFORMATION

Project manager:	Joseph Mammone	
Project Manager details	[redacted]	
Size of property:	2 ha (proposed subdivided lots are 1 ha)	
Site address:	1226 Mamre Road, Mount Vernon, NSW	
Legal title:	Lot 45 DP 30266	
Local Government:	Penrith Council	
Water supply:	Town	
Wastewater design load and daily wastewater (L/day):	Existing Dwelling: Bedrooms: 3 + study Assuming 150L/person/day	Possible 5 persons: = 750L/day
	Proposed Dwelling: Bedrooms: 4 Assuming 150L/person/day	Possible 5 persons = 750L/day
Proposed wastewater treatment:	AWTS	
Proposed wastewater disposal:	Spray irrigation	
Date site assessed:	February 17, 2021	
Date report prepared:	February 19, 2021	
Site assessor:	[redacted] Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC) Sean Harris	

3. SITE ASSESSMENT

Climate - rainfall	Penrith Rainfall Station (median annual 1299mm)
Climate - evaporation	Badgerys Creek (median 1557mm)
Flood potential	Treatment system above 1 in 100 year flood level; minor limitation; Land application system above 1 in 20 year flood contour, minor limitation
Frost potential	The site is not known to be subject to severe frosts, minor limitation
Exposure	Northern aspect, full sun and wind exposure, minor limitation
Slope	8-10% slope, minor limitation
Landform	Side slope, minor limitation
Run-on and seepage	Minor upslope stormwater run on; minor limitation
Erosion potential	Minor erosion potential
Site drainage	Moderate to well drained soil profile; minor limitation
Evidence of fill	Light clay fill evident - overlies the native topsoil. No evidence that this affects grass growth or drainage; minor limitation
Domestic groundwater use	No used domestic groundwater bores within 100m
Surface rock	No surface rock; minor limitation
Buffers to dams, permanent and intermittent watercourses and other drainage features.	Permanent waters: 100m+ Intermittent waters: 40m+ Boundary of premises: 3-6m+ Swimming pools: 3-6m+ Buildings: 15m+

4. SOIL ASSESSMENT

Method:	Hand augur/crowbar/shovel			
Depth to bedrock (m):	1000mm to restrictive layer; minor limitation			
Depth to high soil watertable:	No groundwater or subsoil mottling encountered at 1000mm; minor limitation			
Coarse (%):	No coarse fragments in subsoil, minor limitation			
pH (soil/water):	pH 5.5-6; minor limitation			
Electrical conductivity:	0.04 dSm, minor limitation			
Salinity hazard:	The Department of Infrastructure, Planning and Natural Resources map of salinity hazard ,**moderate salinity hazard**.			
Domestic groundwater use:	The Department of Primary Industries Office of Water search of groundwater bores,**no known groundwater bores** within 100m			
Geological /Soil	Wianamatta Group Luddenham Soil Landscape			
Surface rock:	No surface rock in proposed effluent management area			
Bulk density:	Well drained soil profile; minor limitation			
Phosphorus balance assumptions:	P sorption capacity - 600,000mg/m^2/week/depth for clay soil types or 400,000mg/m^2/week/depth for sandy soil types			
Soil profile: site 1	Layer 1		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Clay loam (fill) Black 0-100mm Moderately structured NA	NA	NA
	Layer 2		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Loam Tan 100-400mm Moderately structured NA	NA	NA
	Layer 3		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Light clay Brown/tan 400-1000mm Moderately structured NA	3mm/day	NA
Soil profile: site 2 – front of property	Layer 1		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Loam Grey 0-50mm Moderately structured NA	NA	NA
	Layer 2		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Light clay (fill) 5% clumps red medium clay Tan/brown, red clumps 50-400mm Moderately structured NA	NA	NA
	Layer 3		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Loam Brown 400-1000mm Moderately structured NA	4mm/day	NA

5. SUMMARY OF SOIL AND SITE CONSTRAINTS

There are no major soil or site constraints that would prevent the use of an Aerated Wastewater Treatment System (AWTS) for wastewater treatment and spray irrigation wastewater disposal on each lot.

The disposal areas are designed with the required buffer distanced from property boundaries and dwellings.

Photo 1 On-site soil profile assessment (front of property)

Photo 2 Location of proposed irrigation area on Lot 2

Photo 3 Location of proposed irrigation area on Lot 1

6. PROPOSED METHOD OF WASTEWATER TREATMENT

6.1 Wastewater Treatment System

An Aerated Wastewater Treatment System is proposed for wastewater treatment. The owner is required to provide the Council with the AWTS manufacturer's specifications of the proposed treatment system. (Information on proposed AWTS can be obtained from the manufacturer or NSW Heath Register of Accredited Sewage Management Systems at http://www.health.nsw.gov.au/publichealth/environment/water/waste_water.asp.

The owner will need to lodge an application to install/operate a Sewage Management System under the Local government act 1993, Section 68. Council will require the owner to have selected an AWTS manufacturer and provide Council with the necessary plans and specifications including NSW Health Accreditation, tank dimensions and capacity, operation and maintenance details, plus Licensed Plumber's name, address, phone number and license number.

The AWTS will be installed and maintained in accordance with Section 5 of the guidelines 'On-site Sewage Management for Single Households' (Department of Local Government, 1998) and AS/NZS 1547-2012 'On-site Domestic Wastewater Management' (Standards Australia, 2012). **Upon approval from Penrith Council, the owner is to enter into a servicing contract with an approved servicing agent for the life of the system. Copies of the written service reports should be lodged with Penrith Council following each quarterly service**.

6.2 Location of proposed AWTS

The location of the AWTS should be decided in conjunction with the licensed plumber in consultation with the property owner. The AWTS must be positioned on a stable, level base and be downslope of the building so there is sufficient fall from drainage outlets in the dwelling. The location of AWTS must be

- At least 1.5m from any building.
- A power supply (and telephone line if telemetry or an automated monitoring/ alarm is fitted), will be required to deliver power to the treatment unit.
- Located above the 1% AEP (1:100) flood contour (not possible for this site).

AWTS installation must comply with the manufacturer's recommendations, AS/NZS 3500.2:2018 Plumbing and Drainage Part 2 Sanitary Plumbing and Drainage' and Council requirements.

6.3 Installation of pipes

The sewer pipes between the plumbing amenities, AWTS and irrigation area must conform with 'AS/NZS 3500(Set):2015 Plumbing and Drainage Set' specifying the nominal pipe sizes and respective minimum grades. Table 1 contains these specifications.

In addition, where a sewer carrying untreated wastewater to a treatment system is longer than 60 metres, the minimum grade should be doubled, and inspection ports should be installed at least every 30 metres or at an angle or change of grade.

The sewer pipes between the plumbing amenities, AWTS and irrigation area must be buried at a depth that provides protection against mechanical damage or deformation, in accordance with 'AS/NZS 3500.2:2018 Plumbing and Drainage Set'. Table 2 shows the minimum pipe depth for trafficable areas.

TABLE 1 Minimum pipe diameter and grade calculations

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%, Source: 'AS/NZS 3500.2:2018 Plumbing and drainage Part 2 Sanitary plumbing and drainage' Table 3.4.1. NB: pipe grades are expressed as a percentage of vertical to horizontal distances.		

TABLE 2 Minimum pipe depth for trafficable areas

Location	Minimum depth of cover (mm) for all materials other than cast iron
Where subject to vehicular traffic	500
Elsewhere	300
Source: 'AS/NZS 3500 (Parts 0-4):2018 Plumbing and drainage Set'. Table 3.7.2 Minimum Cover for Buried Pipes'	

Installation is to be done in accordance with the AWTS manufacturer's Installation Manual. The wastewater treatment unit is to be buried to near ground level but 100mm above ground level to avoid accumulation and ingress of stormwater under the tank lid.

7. REQUIRED IRRIGATION AREA

In accordance with *Table 2 Sizing of Domestic Aerated Wastewater Treatment Systems Effluent Disposal Areas* of the Penrith City Council's On-Site Sewage Management Policy, (Appendix II) the required irrigation area for a dwelling on clay soil types with town water supply:

- A 4-bedroom house will require a 695m^2 irrigation area

8. LOCATION AND METHOD OF IRRIGATION

- The land available for irrigation is located in the front portions of the properties, running alongside the existing and proposed driveways. The proposed irrigation area is within all the required boundaries.
- 695m^2 semi-fixed spray irrigation is required for 6-bedrooms on clay soils and reticulated water supply. The land available for irrigation is located in the rear portion of the property. The proposed irrigation area is within all the required boundaries.
- A 25mm purple line polythene pipe (buried 300mm deep) will run from the existing AWTS to the proposed irrigation area. Turf valves are to be installed at suitable locations within the irrigation area so the moveable hose can be rotated between each turf valve.
- Each moveable hose will have 2-3 sprinklers. The spray of the sprinkler must not exceed the perimeter of the designated irrigation area.

9. SUMMARY

This assessment recommends the following:

- Installation of a domestic Aerated Wastewater Treatment System (AWTS) for wastewater treatment on each proposed lot; and
- Installation of a minimum of 695m^2 semi-fixed spray irrigation on each proposed lot as described in the Appendix and shown on the Site Plans.

10. REFERENCES

Department of Local Government (1998) *On-site Sewage Management for Single Households*. NSW Government.

Standards Australia (2012) Australian/New Zealand Standard 1547:2012 *On-site domestic wastewater management*. Standards Australia.

NSW Health Septic Tank Accreditation Guidelines (2001).

Hazelton, P.A and Murphy, B.W ed. (1992) *What Do All the Numbers Mean? A Guide for the Interpretation of Soil Test Results.* Department of Conservation and Land Management (incorporating the Soil Conservation Service of NSW), Sydney.

Penrith City Council's On-site Sewage Management and Greywater Reuse Policy.

APPENDIX I FIXED SPRAY IRRIGATION

Irrigation set up

a) The irrigation area is to be split into three zones using turf valves;

b) Within each zone, 2 or 3 low plume wobbler / butterfly / rose sprinklers are to be mounted along the length of a ~5m length of 19mm purple wastewater irrigation pipe;

c) The low plume sprinklers should not be capable of producing aerosols;

d) All distribution lines shall be buried to a minimum depth of 300mm below finished surface level or, where this is not possible, covered with 150mm of concrete;

e) The throw on the sprinklers shall not exceed beyond the designated disposal area.

Management of irrigation area

f) The grass within the irrigation should be mown on a regular basis to ensure sprinklers can be seen through grass and any breakage or leaks can be seen and repaired;

g) The effluent disposal area shall be clearly identified within the property by post or some other means.

h) All stormwater and seepage from higher levels shall be diverted away from the effluent disposal area using a dish drain or similar.

i) Fruit or salad vegetables should not be irrigated with effluent from the wastewater treatment system.

j) The irrigation area should not be used for recreational purposes or used for parking a car.

k) Horse and cattle should not be kept within the effluent disposal area.

l) Buffer distances are 6m if area up gradient and 3m if area down gradient of swimming pools, property boundaries and driveways; 15m buffer to buildings.

m) A warning sign complying with AS1319:1994 – Safety signs for the occupational environment should be located at the boundary of the designated area in one or two places, clearly visible to property uses, with wording such as, RECYCLED WATER, AVOID CONTACT, DO NOT DRINK'.

Example of turf valve, flexible 19mm poly pipe and 'wobbler' sprinklers.

APPENDIX II PENRITH CITY COUNCIL, TABLE 2

Sizing of AWTS Effluent Disposal Areas			
Suburb	**No. of Bedrooms**	**Surface and Sub-Surface Irrigation Areas (m^2)**	
		Reticulated Water	Tank Water
Sandy Soil Types ***Agnes Banks - east of Castlereagh Road. Castlereagh - north of Devlin Road and east of Castlereagh Road.***	**2**	584	467
	3	779	623
	4	973	778
	5	1168	934
	6	1326	1090
Clay Soil Types ***Most other areas***	**2**	417	334
	3	556	444
	4	695	556
	5	833	667
	6	972	778

Notes: *(1) The irrigation areas in Table 2 are calculated using conservative figures to enable the sustainable management of effluent. A property owner can provide a Wastewater Assessment Report to support a proposal for a smaller irrigation area.*

(2) The Effluent Disposal Area (EDA) is based on nutrient balances as they are considered to be the most limiting factors in these areas.

(3) Figures in Table 2 are based on:

- *150 litres per person/day or 120 litres per person/day for tank water supply*
- *One person per bedroom and two for a master bedroom*
- *TN output value of 25 mg/L and a Critical Loading Rate of 27 mg/m^2/day*
- *TP output value of 12 mg/L*
- *P sorption capacity - 600,000 mg/m^2/depth for clay soil types or 400,000 mg/m^2/depth for sandy soil types*
- *Design Irrigation rate of 15 mm/week for clay soil types or 35 mm/week for sandy soil types.*

(4) A Wastewater Assessment Report is required for applications with more than 6 bedrooms.

(5) Council assesses effluent loading based on two persons for a master bedroom, two persons for a guest room and one person per additional bedroom. A study or any other room that has the potential to be used as a bedroom will be considered as an additional bedroom.

APPENDIX III REQUIRED BUFFERS

The following buffers must be applied when installing all onsite sewage management systems in accordance with the Penrith Council Development Control Plan

SYSTEM	BUFFER DISTANCES
All Onsite Sewage Management Systems	• 100 metres to domestic groundwater well • 100 metres to permanent surface waters (e.g. rivers, creeks, streams, lakes etc.) • 150m to SCA named rivers • 40 metres to other waters (e.g. dams, intermittent water courses, overland flow paths etc.) • 15metres from in-ground water tank • 1 metre from the drip line of native trees and shrubs
Surface spray irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of buildings, driveways and property boundaries • 15m to dwellings • 3m to paths and walkways • 6m to swimming pools
Subsurface irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of buildings, driveways and property boundaries
Absorption system	• 12m if area up-slope and 6m if area down-slope of property boundary • 6 metres if area up-slope and 3 metres if area down-slope of buildings, driveways and property boundaries

SITE PLAN: KEY

- PROPERTY BOUNDARY
- PROPOSED SUBDIVISION BOUNDARY
- 100mm PVC PIPE
- 25mm POLY PIPE
- 10M CONTOUR LINE
- PROPOSED EFFLUENT DISPOSAL AREA
- PROPOSED AWTS CONCEPTUAL LOCATION
- PROPOSED DWELLING
- PROPOSED POOL AREA
- PROPOSED DRIVEWAY
- EXISITING DWELLING
- EXISITING DRIVEWAY
- EXISITING SHED
- EXISITING TENNIS COURT

HARRIS

25.4m
52m
78.9m
19.5m
182.5m
5.7m
3.9m
32.3m
6.9m
49m
6.6m
13m
13m
32.5m

0 10 20 30 40 50 100

scale: – 1:1000

Issue:	Description:	Date	Drawn	Approved
A	Issue for client review	19.2.21	LH	SH

North

Client:

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Wastewater | Bushfire | Stormwater

Project:
PROPOSED DEVELOPMENT
LOT 45 DP 30266
1226 MAMRE ROAD, MOUNT VERNON, NSW
LGA: PENRITH

Drawing Title:
WASTEWATER MANAGEMENT PLAN DETAILS SHEET No.1

Drawn:	Date:	Paper Size:	Q.A. Check:	Date:
LH	19.02.2021	ISO Expand A3	Complete	19.02.2021
Designed:	**Our reference:**	**Scale:**	**Dwg. No.**	**Issue:**
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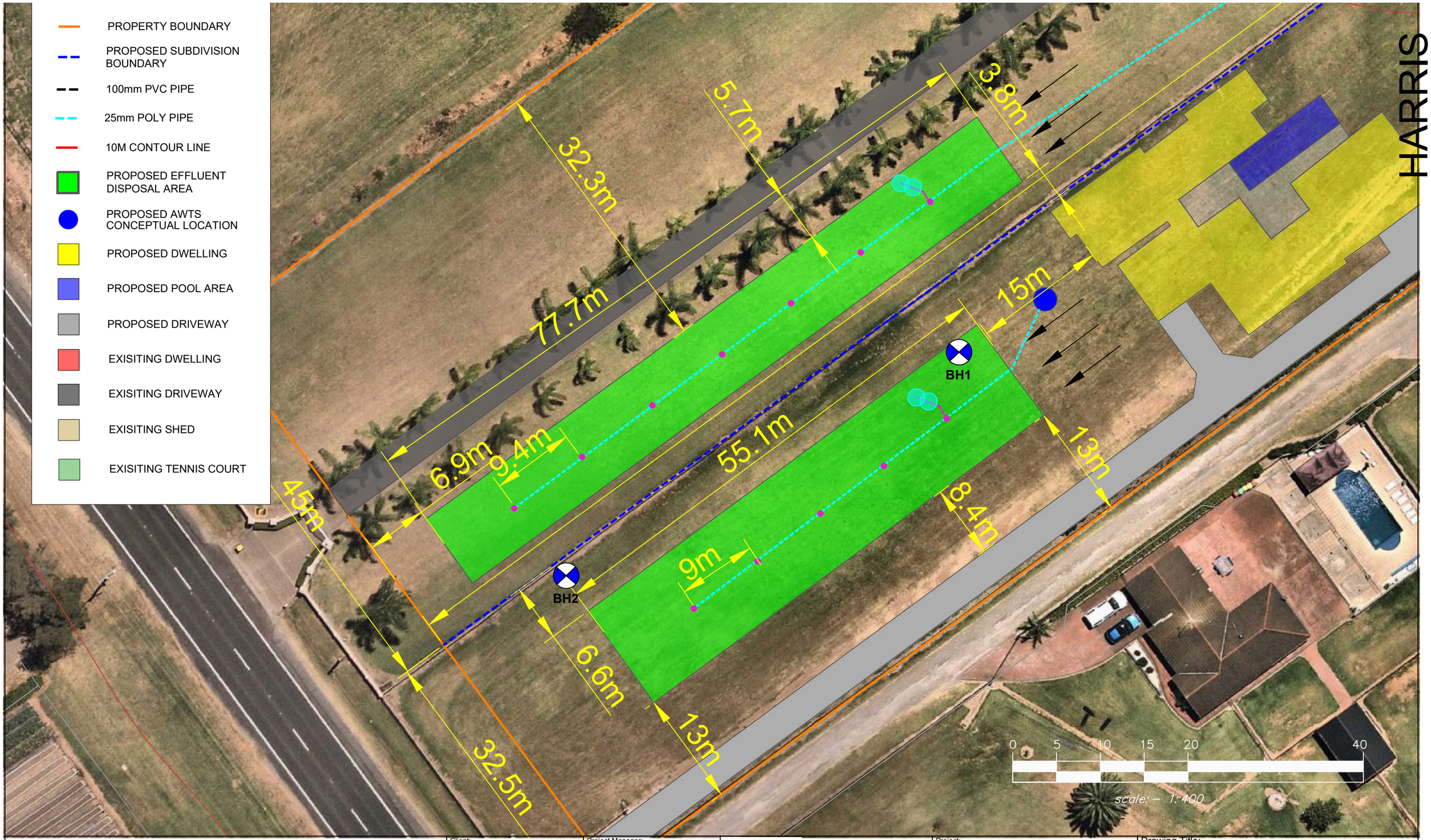

Issue:	Description:	Date	Drawn	Approved
A	Issue for client review	19.2.21	LH	SH

North

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Wastewater | Bushfire | Stormwater

Project:

PROPOSED DEVELOPMENT

LOT 45 DP 30266

1226 MAMRE ROAD, MOUNT VERNON, NSW

LGA: PENRITH

Drawing Title:

WASTEWATER MANAGEMENT PLAN DETAILS SHEET No.2

Drawn:	Date:	Paper Size:	Q.A. Check:	Date:
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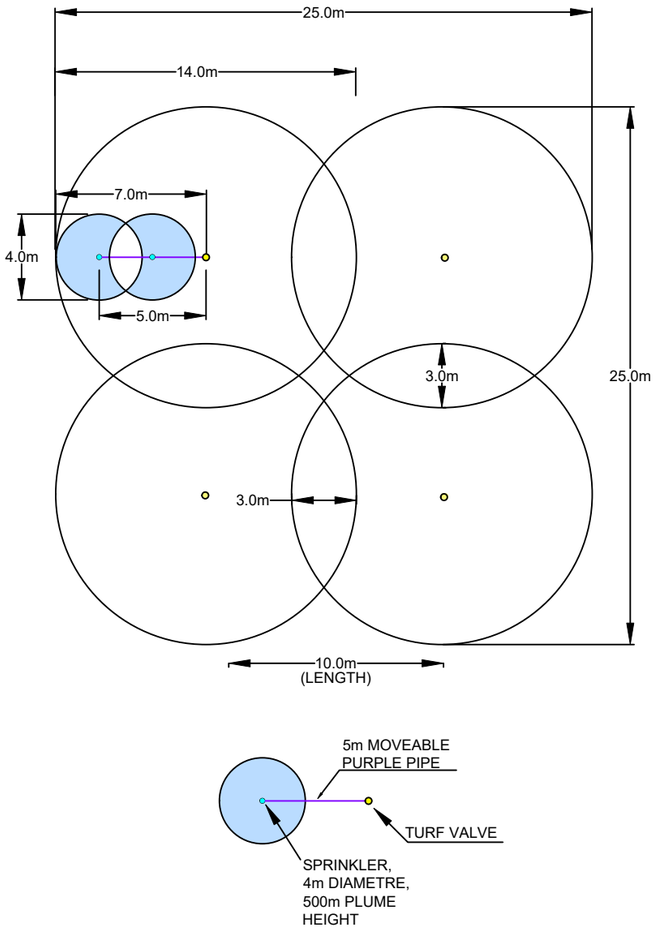
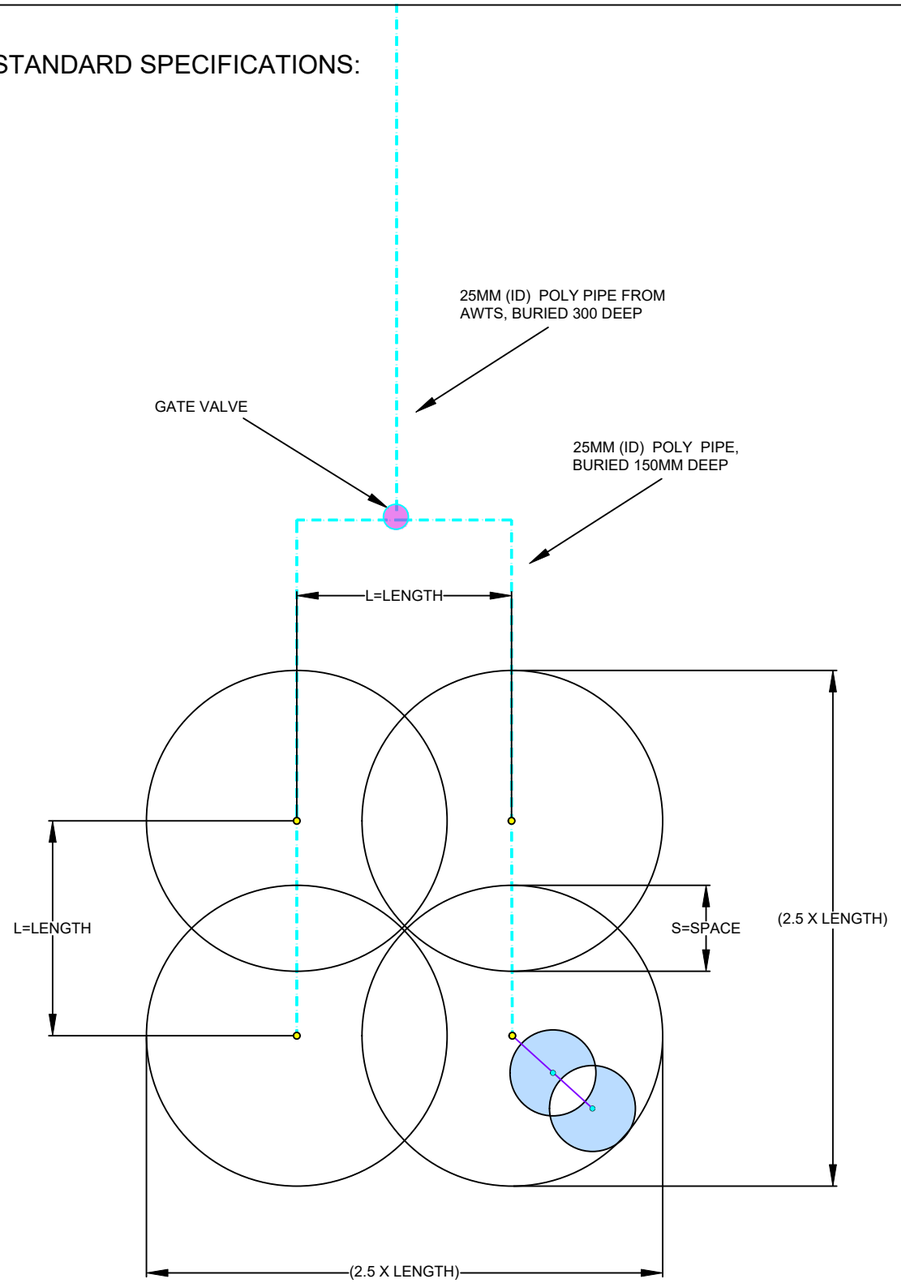
WORKED EXAMPLE:



Note: Installer to determine the turf valve spacing required for the site.

STANDARD SPECIFICATIONS:



Irrigation set up

a) A 25mm ID (32mm OD) distribution pipe shall run from AWTS to the irrigation area, buried to depth of 300mm. Where it is not possible to bury the pipe to 300mm, the pipe should be covered with 150mm of concrete;
b) Inside the irrigation area, the internal distribution pipe is buried to depth of 150mm;
c) Turf valves are to be connected along the internal distribution pipe at the required intervals. Depending on the size of AWTS pump / pump, ~ 2-3 sprinklers/ turf valves can operate with sufficient pressure. at the one time.
d) A 2-3m length of 19mm purple wastewater irrigation pipe is connected to the turf valve. A low plume wobbler / butterfly / rose sprinkler is to be mounted at end of this 19mm pipe.
e) The low plume sprinklers should not be capable of producing aerosols;
f) The throw on the sprinklers shall not exceed beyond the designated disposal area.

Management of irrigation area

g) The grass within the irrigation should be mown on a regular basis to ensure sprinklers can be seen through the grass and any breakage or leaks can be seen and repaired;
h) The effluent disposal area shall be clearly identified within the property by post or some other means.
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Issue:	Description:	Date	Drawn	Approved
A	HEC Standard Drawing		PS	SH

STANDARD DRAWING:

SEMI-FIXED SPRAY IRRIGATION

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Wastewater | Bushfire | Stormwater

Drawing Title:
ON-SITE WASTEWATER MANAGEMENT

Drawn:	Date:	Scale:	Q.A. Check: Date:	
PS		NTS		
Designed:	Our reference:		Dwg. No.	Issue:
PS				A