REF: 4600WW

VERSION [1.0]

JULY 27, 2021

SOIL AND SITE ASSESSMENT FOR ONSITE WASTEWATER DISPOSAL

264-270 MOUNT VERNON DRIVE, MOUNT VERNON, NSW

LGA: Penrith

Lot 1 DP 1246952

CLIENT/ PROJECT MANAGER: Divya Verma, Project Co-ordinator, Bathla

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VERSION CONTROL

Title	Soil and Site Assessment for Onsite Wastewater Disposal			
Site address	264-270 Mount Vernon Drive, Mount Vernon, NSW			
Description	Proposed on-site wastewater management system			
Created By	Pichamon Sarakan B.Env Engineering (UOW)			
Date Created	22/07/2021			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
[1.0]	P.S.	Issue for client review	27/07/2021	Complete
				-
				-

Limitations

The findings and recommendations in this report are based on the objectives and scope of work outlined above. Harris Environmental Consulting 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 Site and Soil Assessment for On-site Wastewater Management was prepared by Harris Environmental Consulting at the request of Divya Verma, Project Co-ordinator, Bathla . It relates to the construction of a dwelling plus staff quarters. The development will have 5 bedrooms, 2 guest bedrooms and staff quarters to accommodate 3 staff on Lot 1 DP 1246952 at 264-270 Mount Vernon Drive, Mount Vernon, NSW.

Fieldwork was undertaken by Harris Environmental Consulting (HEC). 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 report was prepared to demonstrate that the proposed wastewater management system can achieve compliance with the relevant requirements for on-site wastewater management.

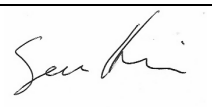
Harris Environmental Consulting prepared this Soil and Site Assessment for On-Site Wastewater Management in accordance with:

- 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 THE SITE

Source: SixMaps

2. SITE INFORMATION

Project manager:	Divya Verma, Project Co-ordinator, Bathla P: 0412 973 559	
Size of property:	16-ha	
Legal title:	Lot 1 DP 1246952	
Local Government:	Penrith Council	
Water supply:	Town	
Wastewater design load and daily wastewater (L/day):	Number of bedrooms in the proposed dwelling (assume 2 persons per bedroom and 150L/day per person).	5 bedrooms plus 2 guest bedrooms = 7 bedrooms
	Number of bedrooms in the proposed staff quarters	3 bedrooms = 3 staff
	Total number of residents	17 persons
	Total wastewater load	17 persons x 150L/day
	Total design wastewater load	**2550L/day**
Proposed wastewater treatment:	AWTS	
Proposed wastewater disposal:	Subsurface irrigation	
Date report prepared:	July 27, 2021	
Report prepared by	Pichamon Sarakan B.Env Engineering (UOW)	
Site assessor:	 Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC) Sean Harris	

3. SITE ASSESSMENT

Climate - rainfall	Horsley Park Equestrian Centre AWS Rainfall Station (median annual: 724.7mm)
Climate - evaporation	Badgerys Creek (median 1557mm)
Flood potential	Proposed wastewater treatment system is above 1 in 100 year flood level; minor limitation. Proposed wastewater disposal area above 1 in 20 year flood level; minor limitation.
Frost potential	The site is not known to be subject to severe frosts, minor limitation
Exposure	South western aspect; minor limitation
Slope	16-18% slope; moderate limitation for subsurface irrigation
Landform	Convex side slope, minor limitation
Run-on	Minor upslope catchment and stormwater run-on
Erosion potential	Minor erosion potential
Site drainage	Well drained, permeable soil profile; minor limitation
Evidence of fill	No evidence of fill; minor limitation
Domestic groundwater use	No known groundwater bores within 100m of the proposed irrigation area
Surface rock	Minor surface rock; minor limitation.
Area available for effluent disposal	Area available for effluent disposal within designated Effluent Management Area (EMA), minor limitation

4. SOIL ASSESSMENT

Method	Shovel/crowbar			
Depth to bedrock (m)	1000mm; minor limitation			
Depth to high soil water table	Minor orange subsoil mottling; no free water, minor limitation			
Coarse (%)	Minor coarse fragments in subsoil, minor limitation			
pH (soil/water)	pH 5.5-6; minor limitation			
EAT	3 (2); minor limitation			
Electrical conductivity	0.04 dSm, minor limitation			
Salinity hazard	The Department of Infrastructure, Planning and Natural Resources map of salinity hazard throughout Western Sydney shows the proposed irrigation area as having a **moderate salinity hazard**.			
Domestic groundwater use	The Department of Primary Industries Office of Water search of groundwater bores found there are **no known groundwater bores** within 100m of the proposed irrigation area			
Soil Landscape /GSG Facet Geological unit Great Soil Group	*Luddenham Soil Landscape* *Side slopes* *Wianamatta Shale (sandstone, siltstone and shale)* *Red Podzolic Soils - less fertile (granites and metasediment)*			
Surface rock	No surface rock in proposed irrigation area			
Bulk density	Permeable, well-drained soil profile; moderate limitation			
Phosphorus balance assumptions	Phosphorus uptake by grass growth assumed to be 30 kg/ha/yr, 8mg/m^2/day. P sorption 500mg/kg, which equals 6500kg/ha. Available soil depth is 1m soil depth, of which 30% of profile is available for P sorption (potential rage of 30-75%)			
Soil profile: (representative of the site)	Site 1			
	Layer 1		DLR	DIR
	Texture Colour Depth Structure Coarse frag.	Clay loam Black 0mm to 300mm Well structured No.		
	Layer 2		DLR	DIR
	Texture Colour Depth Structure Coarse frag.	Medium clay Tan 300mm-1000mm Weakly structured No		*12mm/week
	Site 2			
	Layer 1		DLR	DIR
	Texture Colour Depth Structure Coarse frag.	Light clay Tan 0mm-100mm Weakly structured No.		

	Layer 2			DIR
Soil profile: (representative of the site)	Texture Colour Depth Structure Coarse frag.	Medium clay Tan 100mm-1000mm Weakly structured 0-5% Coarse frag.		*12mm/week

*The slope of the proposed irrigation area is 16-18%. In accordance with Table M1 of ASNZ1547(2012), there is a 20% reduction in DIR for this slope. For medium clay at 500mm, a DIR is 15mm/week. With a 20% reduction, a DIR of 12mm/week is used. See Figure 2 below.

FIGURE 2 DIR REDUCTION FOR SLOPE

TABLE M2
RECOMMENDED REDUCTIONS IN DIR ACCORDING TO SLOPE

Slope	Reduction in DIR
Flat up to 10%	No reduction
10% to 20%	20%
20% to 30%	50%
> 30%	Advice required from a suitably qualified and experience person
NOTE: See Table 1.1 for conversion of slope per cent grade into slope angle and slope ratio.	

5. SUMMARY OF SOIL AND SITE CONSTRAINTS

There are no major soil or site constraints that would prevent the installation of a commercial Aerated Wastewater Treatment System (AWTS) for wastewater treatment and subsurface irrigation for treated wastewater disposal for the proposed dwelling. There is an existing dwelling on the property. The existing dwelling will be demolished.

The location of the proposed irrigation area will be installed to the north of the proposed dwelling. It is in a location that is compliant with the buffers and setback distances required by Shoalhaven City Council and DEC (2004) guidelines, this includes locating the proposed subsurface irrigation area more than 40m from drainage depressions, 6m upslope of property boundaries/dwellings/buildings and 3m downslope of property boundaries dwellings/buildings.

The clay loam to medium clay soil profile has ideal permeability and nutrient absorption properties for this method of wastewater treatment and disposal on site. This assessment assumes the proposed irrigation area will be fully grassed and the lawns managed, with clippings removed after mowing.

Photo 1 Onsite soil assessment and soil profile (site 1)

Photo 2 Onsite soil assessment and soil profile (site 2)

Photo 3 Looking north towards the proposed irrigation area and dam (to be decommissioned).

6. PROPOSED METHOD OF WASTEWATER TREATMENT

6.1 COMMERCIAL SEWERAGE MANAGEMENT FACILITY (SMF)

A commercial Aerated Wastewater Treatment System is proposed to treat wastewater from the proposed dwelling. The **design flow rate of 2550L/d** will be generated from the proposed development. The owner will need to lodge with the council an application to install and operate a Sewage Management System under the Local government act 1993, Section 68. Council will require the owner to have selected a SMF manufacturer and provide Council with the necessary plans and specifications including tank dimensions and capacity, operation and maintenance details, plus the installer's name, address, phone number and license number.

The SMF will be installed and maintained in accordance with Section 5 of the guidelines "Use of Effluent by Irrigation, DEC (2004). 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 and begin a thorough environmental monitoring program. Copies of the written service and monitoring reports should be lodged with Council following each quarterly service and following environmental monitoring.

Penrith Council is the approving authority, with the Department of Water and Energy (DWE) and NSW Health acting in an advisory role (to council) for processing section 68 approvals. Division 4 of The Local Government (General) Regulation 2005 provides details for the approval to operate as well as the broad performance standards and other criteria for approvals relating to the management of waste.

6.2 EFFLUENT QUALITY

Further to DWE (2008) and NSW Health Advisory Note 4 (2017) compliance values for low-risk effluent, the DEC (2004) sets out the classification of effluent for environmental management based on strength in Table 1. The commercial sewerage management facilities will be designed to meet and exceed the DEC (2004) compliance values for Low strength effluent. Where these values are in conflict with the DWE (2008) compliance values, the lesser value is to be used to assess the effluent. Exceedance of these values will require corrective action and further environmental management controls.

TABLE 1 Classification of effluent for environmental management (DEC (2004)

	Strength (Average concentration mg/L)[1]		
Constituent	**Low[2]**	**Medium**	**High**
Total Nitrogen	<50	50-100	>100
Total Phosphorus	<10	10-20	>20
BOD_5	<40	40-1,500	>1,500
TDS[3]	<600	600-1,000	>1,000-2,500
Other pollutants	Effluent with more than five time[4] the ANZECC and ARMCANZ (2000) long-term water quality trigger values for irrigation waters must be considered high strength for the purpose of establishing a strength class for runoff and discharge controls and will require close examination to ensure soil is not contaminated.		
Grease & Oil	Effluent with more than 1,500mg/L of grease and oil must be considered high strength and irrigation rates and practices must be managed to ensure soil and vegetation is not damaged.		

6.3 LOCATION OF TREATMENT SYSTEM

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

- The exact location of the AWTS is to be decided by the installer in consultation with the property owner.
- It is to 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.
- Shall be located above the 1% AEP (1:100) flood contour.

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.

6.4 PIPE

The sewer pipes between the proposed dwelling, 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 2 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 3 shows the minimum pipe depth for trafficable areas.

TABLE 2 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 3 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'	

7. SIZING EFFLUENT DISPOSAL AREA

In accordance with PCC (2014), the irrigation area has been calculated for the design wastewater load rather than the number of bedrooms in the proposed dwellings. The water and nutrient balance was set up with the following parameters:

- The water balance adopts an application rate of 12mm/week or 1.7mm/day (with a 20% reduction in DIR) for medium clay subsoil. Horsley Park Equestrian Centre AWS Rainfall Station and Badgerys Creek pan evaporation were used in the calculation. Wet weather storage is not required.
- The nitrogen balance (nominated area method) assumes the AWTS will reduce Total Nitrogen to 27mg/L. Vegetative uptake for the unmanaged pastures is assumed to be 120kg/N/ha/year which equivalent to 33mg/m^2/day.
- The phosphorus balance assumes the AWTS will reduce Total Phosphorus to 12mg/L, an assumed P-sorption of 500mg/kg which equates to 6500kg/ha. Crop uptake is assumed to be 12kg/ha/annum, which equals 3mg/m^2/day.
- The required irrigation area is the larger of the three methods (most limiting). See Table 3 for required irritation area for each proposed lot.

TABLE 4 REQUIRED IRRIGATION AREA

Required irrigation area (m^2)				
Wastewater design load (L/day)	Water balance (m^2)	Nitrogen balance (m^2)	Phosphorus balance (m^2)	Required area (m^2)
2550	2066	**2094**	800	2094

The largest of the three methods (most limiting) is required. For this site, the largest of the three methods is **2094m^2**. The proposed location and set back distances of the land application area relevant to the site are to be consistent with the requirements in the Conditions of consent, Penrith Council Development Control Plan and this report.

8. LOCATION AND METHOD OF IRRIGATION

- The proposed subsurface irrigation areas are located to the north of the proposed dwelling. The effluent disposal area must not occur within the minimum buffers and setback distances listed in Appendix IV. See Appendix for installation methods and the proposed location.
- 2094m^2 of subsurface irrigation is proposed.
- The installer is expected to make adjustments to the alignment of drip lines and the location of distribution lines to suit the site conditions.
- The installation and location of subsurface irrigation can be found in the Appendix.

- The Site Plans show the 2094m^2 irrigation area is split into **6 x 349m^2 zones**. However, the installer can install the 2094m^2 irrigation area into larger zones if the pump and AWTS has capacity.

9. SITE ACCESS AND SIGNAGE

Public access will be restricted from the proposed irrigation area to prevent direct contact with effluent. **The irrigation area will be fenced and signposted**. In all areas where the wastewater treatment or pipes run within areas of public access, all pipes and taps must be colour coded and/or signs marked, for example: 'EFFLUENT - NOT FOR DRINKING'. International diagram signs for non-English speakers will be necessary. Childproof taps should be used to prevent children from drinking non-potable water. Signs should be visible from the main point of access advising the type of reuse and any relevant restrictions to the public. Australian Standard, AS 1319–1994, Safety Signs in the Occupational Environment (Standards Australia 1994) should be referred to.

10. STORMWATER RUNOFF CONTROL

Stormwater runoff shall be managed in accordance with Section 5 DEC (2004). This includes runoff diversion measures to prevent uncontaminated runoff entering the irrigation areas.

Individual earth banks will be installed upslope of the proposed irrigation areas to prevent overland flow from entering the irrigation sites. The earth banks will discharge runoff to stable outlets that are outside of the irrigation areas.

11. SUMMARY

The purpose of this assessment is to assess whether on-site wastewater management can be undertaken on the subject lot to achieve the relevant assessment criteria. This assessment finds that on-site wastewater management can be undertaken for the development to meet the relevant assessment criteria.

This assessment recommends the following:

- Installation of a commercial Aerated Wastewater Treatment System capacity to treat at least 2550L of wastewater per day from the proposed dwelling and staff quarters; and

- Install 2094m^2 subsurface irrigation. The method of disposal is described in the Appendix and shown on the Site Plan.

12. 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.

APPENDIX I SUBSURFACE IRRIGATION

i) Wastewater is split into equal zones, each zone must receive an even proportion of wastewater, using a sequencing valve, such as a water rotor or similar.

ii) Immediately after the AWTS, a disc filter or a 100 to 150 micron filter is to be installed (ie, before the sequencing valve). The filter must be cleaned regularly (at least every 3 months).

iii) The distribution pipe from the AWTS to the water rotor shall consist of a 25mm uPVC or polythene pipe, buried 300mm underground. Where vehicles pass over the line, it should be 450mm for light traffic and 500mm for heavy traffic.

iv) Pressure compensating subsurface drip line is used with emitters and laterals at approximately 750mm spacing's (maximum of 1000mm) and buried to a depth of 100-150mm below finished ground level (in accordance with ASNZ1547:2012).

v) The drip line is to be impregnated with root inhibitor or include a tech filter that dispenses a root inhibitor (a chemical injector assembly or impregnated emitter tube) to protect drip line from root ingress.

vi) Air release valves should be located at the highest point and flush valves at the lowest point of each sub-surface zone and shall be contained within a durable protective housing with a lilac lid to indicate wastewater.

vii) Additional air/vacuum valves, pressure-reducing valves and non return / tube non-leakage valves are to be included into the design as needed. ie., where the effluent irrigation area is located above the treatment system or pump well, a non return valve.

viii) The system must have capacity to enable flushing to remove any suspended solids and organic growth that may accumulate.

ix) The effluent irrigation system should be tested to ensure there is uniform effluent delivery to all parts of the irrigation area.

x) The effluent management area must be fenced off from livestock and vehicles.

xi) The irrigation area should be vegetated with grass before commissioning. The grass within the irrigation should be mown on a regular basis and dispose of clippings outside the irrigation area.

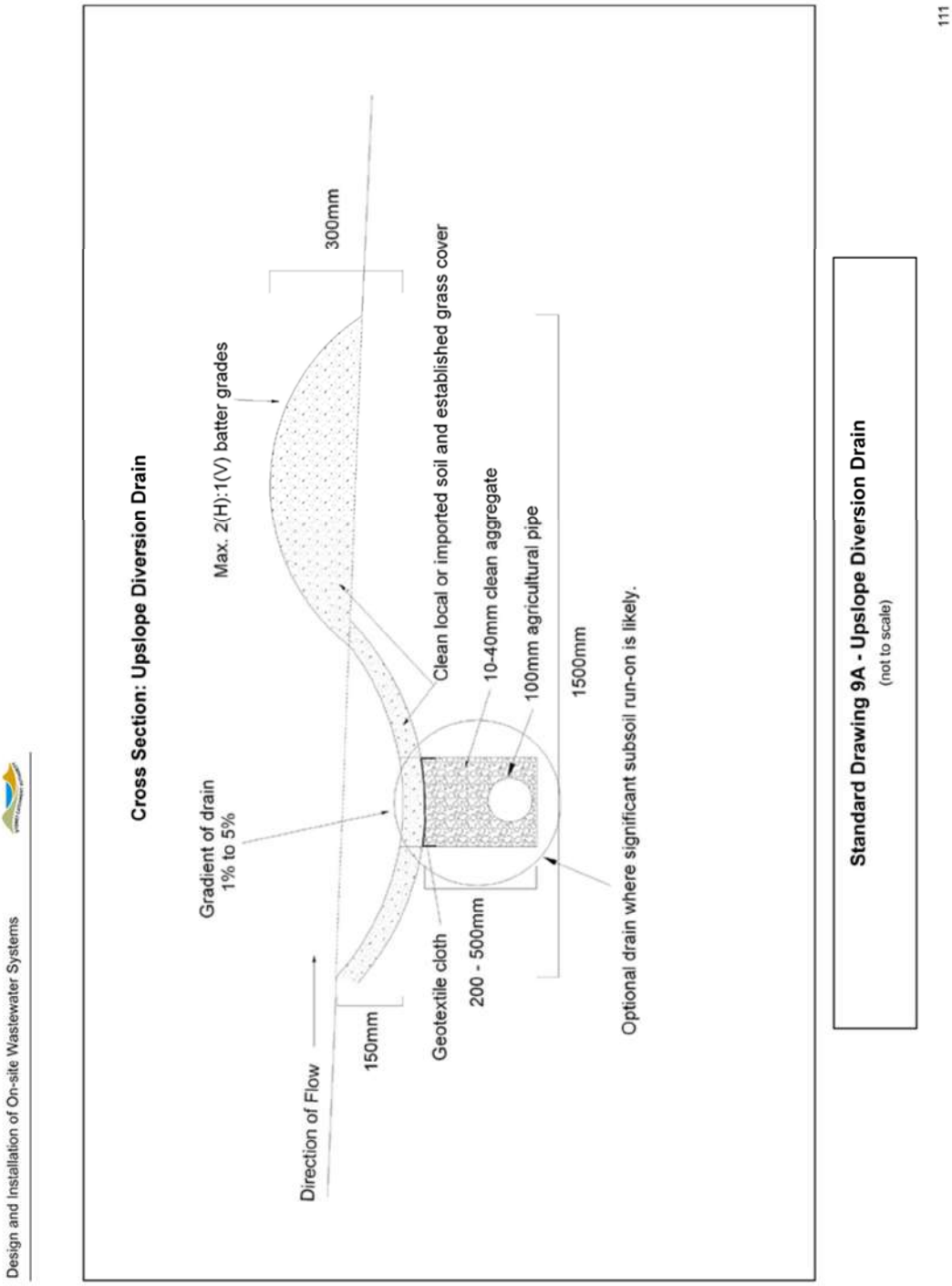
APPENDIX II GENERAL RECOMMENDATIONS FOR WATER USE

Chemical cleaning compounds and other chemicals that enter the treatment system should be low in phosphate non-antibacterial. Detergents low in phosphorus and sodium should be used to reduce salt and nutrient loadings.

Water conservation can reduce the volume of wastewater that needs to be treated and discharged on site. Water reduction fixtures will also be required to conform to BASIX, which requires a 40% reduction below average rates of water consumption. The following AAA-rated would help achieve this:

- Dual flush toilets (6/3L)
- Aerator taps
- Shower heads that limit flow to no more than 6L/minute
- Dishwashers that use no more than 18 litres per wash cycle
- Washing machines that use no more than 22 litres per dry kg of clothes

APPENDIX III STANDARD DRAWING 9A - UPSLOPE DIVERSION DRAIN



APPENDIX IV REQUIRED BUFFERS

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

Minimum required setback distances and buffers:

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
Subsurface irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of swimming pools, property boundaries, driveways and buildings
Spray irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of, property boundaries, driveways and buildings • 15 metres to dwellings • 6 metres to swimming pools
Domestic surface irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of driveways and property boundaries • 15 metres to dwellings • 3m to paths and walkways • 6m to swimming pools

APPENDIX V WATER BALANCE

Nominated Area Water Balance for Zero Storage

Site Address: **264-270 Mount Vernon, Mount Vernon**

INPUT DATA			
Design Wastewater Flow	Q	2550	L/day
Design DIR (from AS/NZ 1547,2000)	DIR	12	mm/week
Daily DIR		1.7	mm/day
Nominated Land Application Area	L	**2066**	m sq
Rainfall Data	Horsley Park Equestrian Centre AWS median		
Evaporation Data	Badgerys Creek		

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**
Rainfall	P	\	mm/month	64.2	92.2	53.8	59	21.6	52.2	26	26.6	22.2	48.7	57.2	61.4	**585.1**
Evaporation	E	\	mm/month	202	157	136	105	81	63	81	96	120	152	183	220	**1596**
Crop Factor	C			0.80	0.75	0.70	0.65	0.60	0.60	0.60	0.60	0.65	0.70	0.75	0.80	
INPUTS																
Precipitation	(P)		mm/month	64.2	92.2	53.8	59	21.6	52.2	26	26.6	22.2	48.7	57.2	61.4	585.1
Effluent Irrigation	(W)	(Q x D) / L	mm/month	38.3	34.6	38.3	37.0	38.3	37.0	38.3	38.3	37.0	38.3	37.0	38.3	**450.51**
Inputs		(P+W)	mm/month	102.5	126.8	92.1	96.0	59.9	89.2	64.3	64.9	59.2	87.0	94.2	99.7	1035.6
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	162	118	95	68	49	38	49	58	78	106	137	176	**1133.05**
Percolation	B	(DIR/7)xD	mm/month	53.1	48	53.1	51.4	53.1	51.4	53.1	53.1	51.4	53.1	51.4	53.1	**625.7**
Outputs		ET+B	mm/month	214.7	165.75	148.3	119.7	101.7	89.2	101.7	110.7	129.4	159.5	188.7	229.1	**1758.8**
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage	S	(P+I)-(ET+B)	mm/month	-112.3	-39.0	-56.3	-23.7	-41.9	0.0	-37.5	-45.9	-70.2	-72.6	-94.5	-129.5	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.00**
Largest M	**(V)**		mm	**0.00**												
		(V x L)/1000	m^3	**0.0**												

APPENDIX VI NITROGEN BALANCE

NITROGEN BALANCE				
SITE ADDRESS	**264-270 Mount Vernon, Mount Vernon**			
Daily volume	2550	L/day		
TN effluent conc	27.0	mg/L		
TN	0.06885	kg/d		
	25.13025	kg/yr		
Irrigation Area	**2,094**	**m2**	**0.2094**	ha
TN annual application rate	0.012	kg/m2/yr		
	120.0	kg/ha/yr		
TN Uptake (unmanaged land)	120	kg/ha/yr	33.70786517	mg/m2/day
TN available for leaching	0	kg/ha/yr		
Or for site	**0.00**	kg/yr	(120kg/ha/yr*10^6)/10^4/356	

APPENDIX VII PHOSPHORUS BALANCE

PHOSPHORUS BALANCE					
SITE ADDRESS	264-270 Mount Vernon, Mount Vernon				
Daily hydraulic load	2550	L/day			
TP effluent conc	12	mg/L			
TP effluent conc per day	30600	mg/day			
	11169	g/year			(500mg/kg/1000000)*(1.5g/cm3*1000)*(1m)
P sorption rate of soil	500	mg/kg	⇨	0.65	mg/m2
Bulk density of soil	1.3	g/cm3		**6500**	**kg/ha**
	1300	kg/m3		⇩	
Land application area	**800.0**	**m2**		(0.65*10000)	
Soil depth	1	m			
Volume of soil	800.000	m3			
Mass of soil	1040000	kg			
Total P sorption capacity	520000	g			
Vegetation	Grass				
P annual uptake by vegetation	12	kg/ha/yr	⇨	3.3707865	mg/m2/day
	960	g/yr		⇩	
Net annual P (in soil)	10209	g/yr		(12kg/ha/yr*1000000)/10000/356	
Life of system	50.9	years			

SITE PLAN: KEY

- PROPERTY BOUNDARY
- 100MM PVC PIPE
- 25MM (ID) POLY PIPE
- 5M CONTOUR LINE
- DRIP LINE
- DRAINAGE DEPRESSION
- PROPOSED EFFLUENT DISPOSAL AREA
- PROPOSED TENNIS COURT & PAVILION
- PROPOSED RESIDENTAIL DWELLING
- PROPOSED STAFF QUARTERS
- PROPOSED ACESS
- EXISTING DAM
- EXISTING DWELLING TO BE DEMOLISHED
- PROPOSED CONCEPTUAL AWTS LOCATION
- WATER ROTOR OR SIMILAR
- AIR VALE
- CHECK VALE

HARRIS

Issue:	Description:	Date	Drawn	Approved
A	Issue for client review	22/07/21	PS	SH

North

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Project:

PROPOSED DWELLING

LOT 1 DP 1246952
264-270 MOUNT VERNON DRIVE, MT VERNON, NSW
LGA: PENRITH

Drawing Title:

WASTEWATER MANAGEMENT PLAN DETAILS SHEET No.1

Drawn:	Date:	Paper Size:	Q.A. Check:	Date:
PS	22/07/21	ISO Expand A3	Complete	22/07/21
Designed:	Our reference:	Scale:	Dwg. No.	Issue:
PS	4600WW	1:1250	#1	A

SITE PLAN: KEY

- PROPERTY BOUNDARY
- 100MM PVC PIPE
- 25MM (ID) POLY PIPE
- 5M CONTOUR LINE
- DRIP LINE
- DRAINAGE DEPRESSION
- PROPOSED EFFLUENT DISPOSAL AREA
- PROPOSED TENNIS COURT & PAVILION
- PROPOSED RESIDENTAIL DWELLING
- PROPOSED STAFF QUARTERS
- PROPOSED ACESS
- EXISTING DAM
- EXISTING DWELLING TO BE DEMOLISHED
- PROPOSED CONCEPTUAL AWTS LOCATION
- WATER ROTOR OR SIMILAR
- AIR VALE
- CHECK VALE

HARRIS

Issue:	Description:	Date	Drawn	Approved
A	Issue for client review	22/07/21	PS	SH

North

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Project:

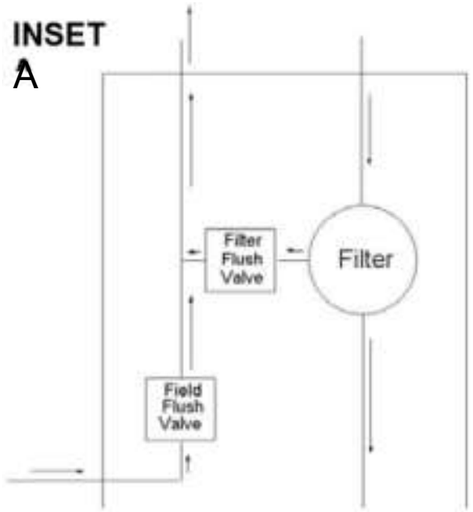
PROPOSED DWELLING

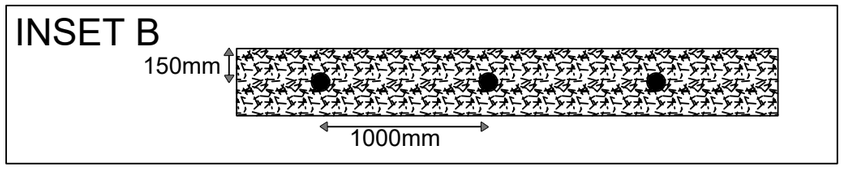
LOT 1 DP 1246952
264-270 MOUNT VERNON DRIVE, MT VERNON, NSW
LGA: PENRITH

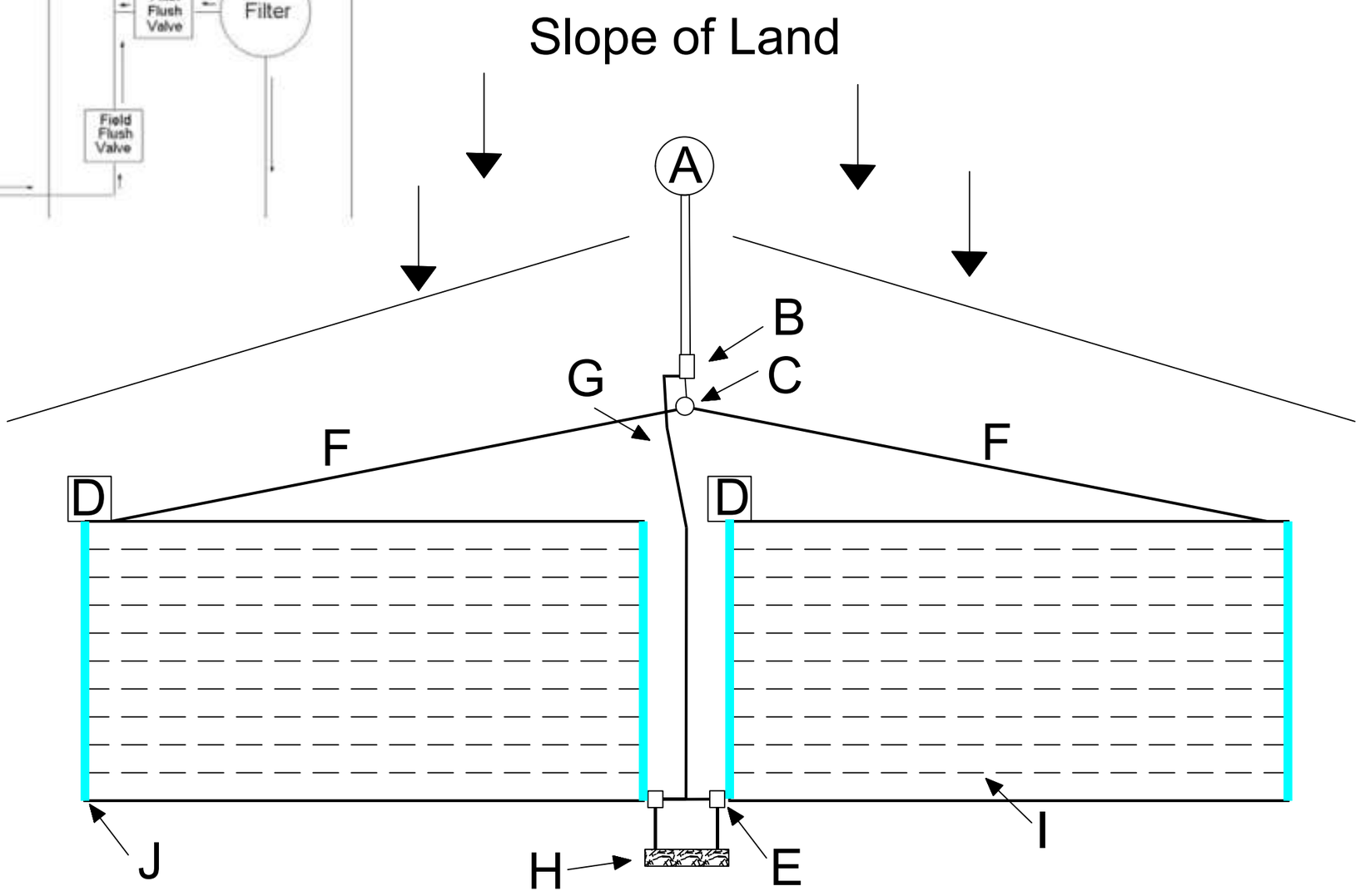
Drawing Title:

WASTEWATER MANAGEMENT PLAN DETAILS SHEET No.2

Drawn:	Date:	Paper Size:	Q.A. Check:	Date:
PS	22/07/21	ISO Expand A3	Complete	22/07/21
Designed:	Our reference:	Scale:	Dwg. No.	Issue:
PS	4600WW	1:600	#2	A







GENERAL DESIGN AND CONSTRUCTION

The irrigation area should be split into equal zones. Each zone is to receive an even proportion of wastewater, using a sequencing valve (C), such as a water rotor or similar.

A The irrigation pump must provide a minimum 20 m head and a flow rate that matches the design output of the selected dripline.

B Immediately after the AWTS, a disc filter or a 100 to 150 micron filter is to be installed (ie, before the sequencing valve).

C An automatic, hydraulically operated sequencing valve should be installed to deliver effluent evenly to the two areas.

D Air release valves must be installed at high points in each area. Additional air release valves may be required in undulating terrain.

E Check valves are required for each irrigation field to facilitate periodic flushing. It must be install at at the lowest point of each sub-surface zone and shall be contained within a durable protective housing with a lilac lid to indicate wastewater.

F Distribution pipes should be 25 mm uPVC or polyethylene pipe buried 300 mm below the ground surface.

G Flushing return manifold (See Inset A) should be 25 mm uPVC or polyethylene pipe buried 100-150 mm below the ground surface within the irrigation area. Outside this area, the pipe must be buried at a minimum of 300 mm depth.

H Where there are potential problems in returning irrigation field flush back to the treatment tank, a small (approximately 3 m x 0.6 m) absorption area sited below the effluent irrigation area can be used to accommodate the flushed effluent

I Pressure compensating subsurface drip line is used with emitters and laterals at approximately 800mm spacing's (min 600mm, maximum of 1000mm depending on soil type) and buried to a depth of 100mm below finished ground level (in accordance with ASNZ1547:2012).

J Distribution manifolds should be 25 mm uPVC or polyethylene pipe buried 300 mm below the ground surface.

Insert B: Cross-Section View

HARRIS

Issue:	Description:	Date	Drawn	Approved
A	HEC Standard Drawing		PS	SH

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Drawing Title:
SUBSURFACE IRRIGATION STANDARD DRAWING

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