REF: 4261WW

VERSION [1.0]

MARCH 23, 2021

SOIL AND SITE ASSESSMENT FOR ONSITE WASTEWATER MANAGEMENT

14 MOUNT VERNON ROAD, MOUNT VERNON, NSW

LGA: Penrith

Lot 123 DP 32140

Project manager: Brian Longbottom

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VERSION CONTROL

Title	Soil and Site Assessment for Onsite Wastewater management			
Site address	14 Mount Vernon Road, Mount Vernon, NSW			
Description	Proposed dwelling			
Created By	Sean Harris Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC)			
Date Created	23/03/2021			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
[1.0]	L.H.	Issue for client review	23/02/2021	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 development on 14 Mount Vernon Road, Mount Vernon, NSW. The proposed development is for a 4-bedroom dwelling.

Fieldwork was undertaken by Harris Environmental Consulting (HEC) on the 19th March 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 to propose a new Aerated Wastewater Treatment System (AWTS) for wastewater treatment and the installation of subsurface irrigation for treated wastewater disposal.

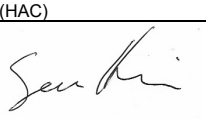
Harris Environmental Consulting was commissioned by the owner to undertake this Soil and Site Assessment for On-Site Wastewater Management in accordance with:

- 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

2. SITE INFORMATION

Project manager:	Brian Longbottom E: atjarchitects@outlook.com M: 0414 774 116	
Size of property:	~1 ha	
Site address:	14 Mount Vernon Road, Mount Vernon, NSW	
Legal title:	Lot 123 DP 32140	
Local Government:	Penrith Council	
Water supply:	Town	
Wastewater design load and daily wastewater (L/day):	Proposed dwelling: 4 bedrooms	DESIGN FLOW: **1200 L/day**
Proposed wastewater treatment:	AWTS	
Proposed wastewater disposal:	Subsurface irrigation	
Date site assessed:	March 19, 2021	
Date report prepared:	March 23, 2021	
Report prepared by	Sean Harris Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC)	
Site assessor:	 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, partially shaded
Slope	5-8% slope, minor limitation
Landform	Sideslope, minor limitation
Run-on and seepage	Moderate upslope stormwater run on; minor limitation
Erosion potential	Minor erosion potential
Site drainage	Moderate to well drained soil profile; minor limitation
Evidence of fill	No evidence of fill; 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 a depth of 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 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 effluent management area			
Geological unit: Soil landscape:	Wianamatta Group - Sandstone, siltstone and shale. 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:	Layer 1		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Clay loam Grey/brown 0-400mm Moderately structured NA	NA	NA
	Layer 2		DIR	DLR
	Texture Colour Depth Structure Coarse frag.	Light clay Tan/brown 400-1000mm Moderately structured NA	3mm	NA

5. SUMMARY OF SOIL AND SITE CONSTRAINTS

There are no major soil or site constraints that would prevent the use of proposed Aerated Wastewater Treatment Systems (AWTS) for wastewater treatment and proposed area for subsurface irrigation area for wastewater disposal.

The dam at the rear of the property restricts the available land for irrigation, however there is suitable area available outside of the 40m buffer. The location selected is compliant with all other buffers as set out by Penrith Council.

The light clay subsoil has suitable properties for this method of wastewater treatment and disposal.

Photo 1 On-site soil profile assessment

Photo 2 Site landform and landscape

Photo 3 Site landform and landscape

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:

- 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.

6.3 Installation of pipes

The sewer pipes between the proposed secondary 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 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'	

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 dwelling on town water will require a 695m^2 irrigation area.

8. LOCATION AND METHOD OF IRRIGATION

Subsurface irrigation is proposed for the new dwelling. The proposed 695m^2 is split into two areas, one located north, behind the proposed dwelling and one to the east of the dwelling.

The installation and location of subsurface irrigation can be found in the Appendix. The Site Plans show the 695m^2 irrigation area is split into two areas due to the required buffer from the dam in the rear of the property. The area to the north of the dwelling is 390m^2 and the area to the east of the dwelling is 305m^2. The two irrigation areas are proposed as they meet all the required buffer distances. The areas will be serviced by a waster distribution box to alternate the treated effluent flow between each area.

9. SUMMARY

This assessment recommends the following:

- Installation of an Aerated Wastewater Treatment System capable of treating 1200L/day; and
- Installation of 695m^2 subsurface irrigation 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 SUBSURFACE IRRIGATION

i) If 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 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

Issue:	Description:	Date	Drawn	Approved
A	Issue for client review	24/3/21	LH	SH

North

N

Client:

Project Manager:

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Wastewater | Bushfire | Stormwater

Project:

PROPOSED DWELLING

LOT 123 DP 32140
14 MOUNT VERNON ROAD, MOUNT VERNON
LGA: PENRITH

Drawing Title:

WASTEWATER MANAGEMENT PLAN DETAILS SHEET No.1

Drawn:	Date:	Paper Size:	Q.A. Check:	Date:
LH	24.03.2021	ISO Expand A3	Complete	24.03.2021
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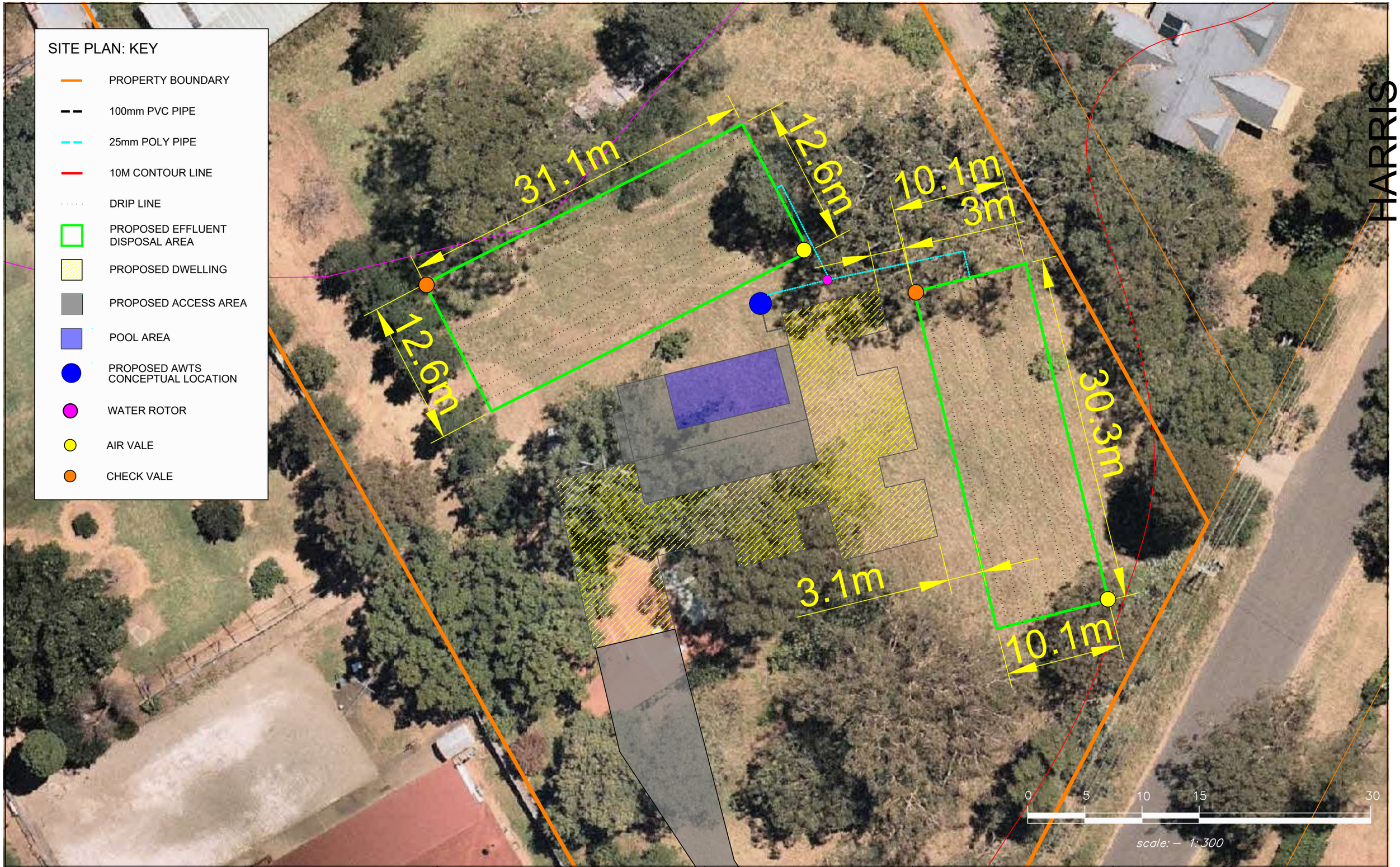

Issue:	Description:	Date	Drawn	Approved
A	Issue for client review	24/3/21	LH	SH

North

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Wastewater | Bushfire | Stormwater

Project:

PROPOSED DWELLING

LOT 123 DP 32140
14 MOUNT VERNON ROAD, MOUNT VERNON
LGA: PENRITH

Drawing Title:

WASTEWATER MANAGEMENT PLAN DETAILS SHEET No.2

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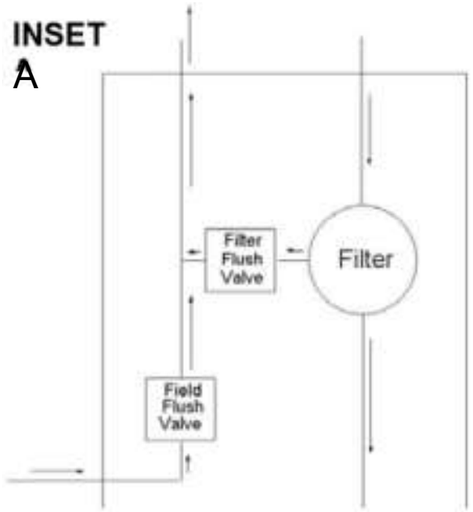

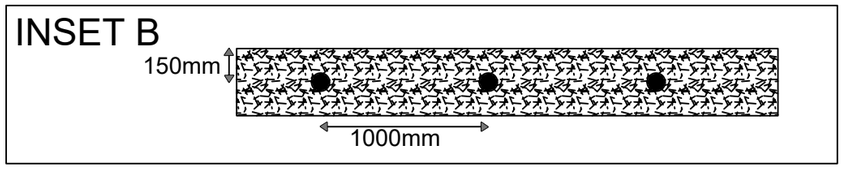

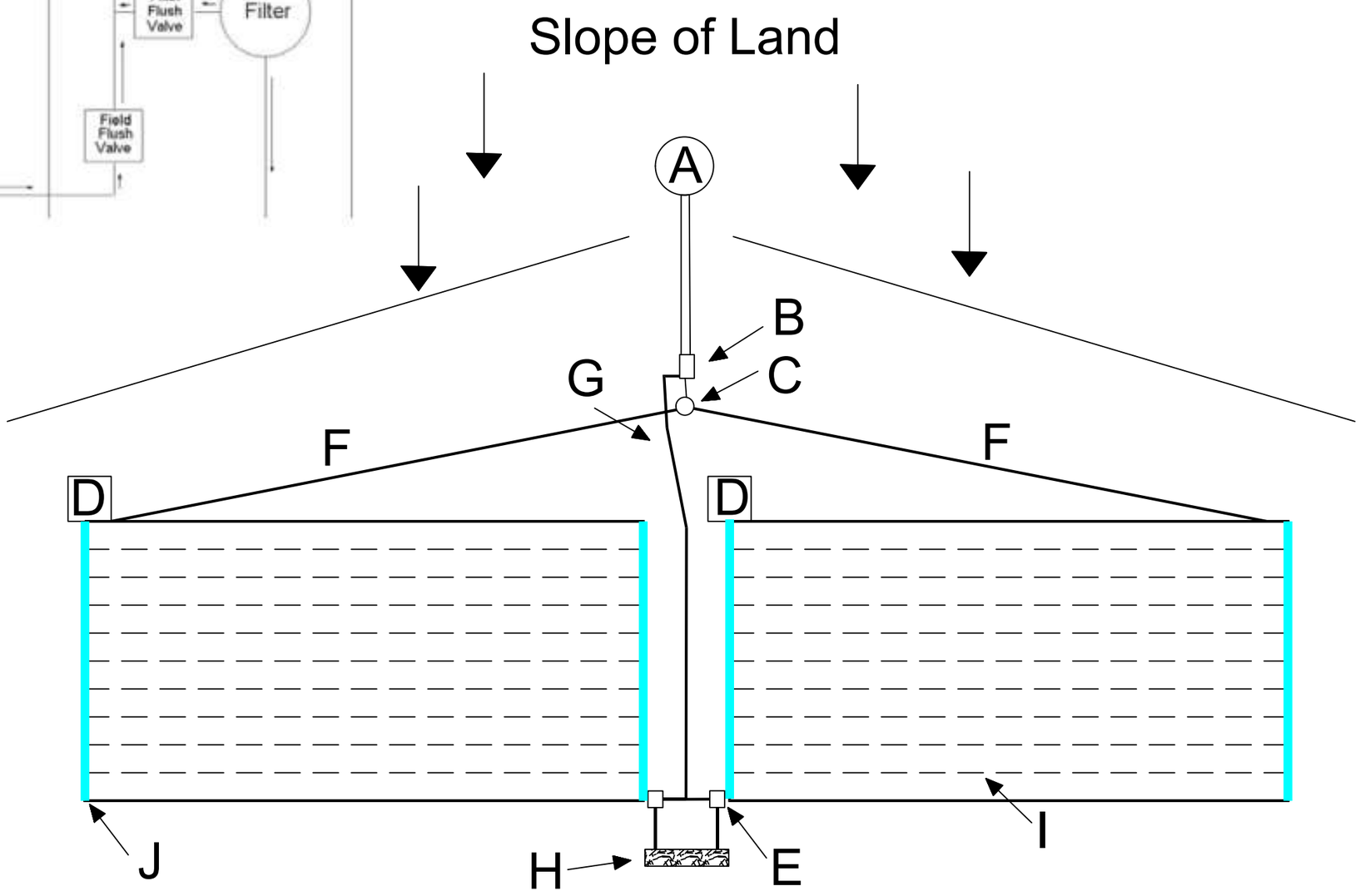

GENERAL DESIGN AND CONSTRUCTION

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

North

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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