ON-SITE WASTEWATER ASSESSMENT FOR PROPOSED RESIDENTIAL DWELLING ON 132-144 MAYFAIR ROAD, MULGOA, NSW

LOT 3 DP 260373

LGA: PENRITH CITY COUNCIL

OWNER: HEATHER GAMPE

20 July 2017

Our ref: 2391ww

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1. ASSESSMENT CRITERIA

The owners of Lot 3 DP 260373, located on 132-144 Mayfair Road, Mulgoa, proposes to construct a new 5-bedroom dwelling on this approximately 10.05-Ha property located in the Penrith Local Government Area. This assessment was undertaken for a proposal to install an Aerated Wastewater Treatment System (AWTS) for wastewater treatment and subsurface irrigation for treated wastewater disposal.

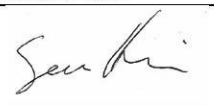
Harris Environmental Consulting was commissioned by the owner to undertake this Soil and Site Assessment for On Site Wastewater Management in accordance with:

- Penrith City Council's On- Site Sewage Management Policy (nominated irrigation areas for soil types);
- Environment and Health Protection Guidelines (1998) On-site Sewage Management for Single Households (Department of Local Government); and
- AS/NZ 1547:2012 On-site wastewater management (Standards Australia, 2012).

Figure 1 Location of proposed house site

Source: NSW SixMaps

2. SITE INFORMATION

Owner/postal address	Heather Gampe
Project manager	Lesley White Jennings at Better Built Homes E: Lesley@betterbuilthomes.com.au P: 1300 100 922
Size of property	10.05-Ha
Legal title	Lot 3 DP 260373
Local Government	Penrith City Council's On- Site Sewage Management Policy (nominated irrigation areas for soil types);
Proposed development:	5-bedroom residential dwelling
Water supply	Tank Water
Wastewater load assumptions	120L/person/day for tank water
Design wastewater load	1 master (2 persons/room) 4 bedrooms (1 person/room) = 6 potential persons = 720L/day
Surface and Subsurface Irrigation area	667m^2 for 5 bedrooms and clayey soil (see appendix II)
Proposed wastewater treatment	AWTS
Proposed wastewater of disposal	Subsurface irrigation
Date site assessed:	29/06/2016
Date report prepared:	20/06/2017
Site assessor:	 Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC) Sean Harris

3. SITE ASSESSMENT

Climate	Wallacia Post Office Rainfall Station (median annual 872mm) Badgerys Creek evaporation (median 1557 mm)
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
Exposure	Southern aspect, full sun and wind exposure
Slope	8-12% slope, Moderate limitation
Landform	Convex Side slope, minor limitation
Run-on and seepage	No evidence of moisture tolerant grasses or wet areas; minor limitation
Erosion potential	Minor evidence of sheet erosion; minor limitation
Site drainage	No evidence of poor drainage; minor limitation
Fill	No evidence of fill; minor limitation
Domestic groundwater	No groundwater bores within 100m; minor limitation
Buffer distance from wastewater management system	Permanent waters : 100m+ Intermittent waters : 40m+ Boundary of premises: 3-6m+ Swimming pools: 3-6m+ Buildings: 15m+
Surface rock	Minor surface rock; minor limitation
Area available	Effluent management area is available

4. SOIL ASSESSMENT

Method	Shovel/crowbar			
Depth to bedrock (m)	1000mm; moderate limitation			
Depth to high soil watertable	No subsoil mottling; no free water, minor limitation			
Coarse (%)	No 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	*Gymea Soil Landscape (Erosional)* *Sideslopes* *Hawkesbury Sandstone (Medium to coarse-grained quartz sandstone with minor shale and laminite lenses.)* *Yellow duplex (yellow-grey clayey subsoils)*			
Surface rock	No surface rock in proposed irrigation area, but evident at break of slope – see Photo 2; minor limitation			
Bulk density	Permeable, well drained soil profile; moderate 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			
Nitrogen and Phosphorus output values	TN output value of 25mg/L and a critical loading rate of 27mg/m^2/day. TP output value of 12mg/L			
Soil profile:	Layer 1		DLR	DIR
	Texture Colour Depth Structure Coarse frag.	Clay loam Black 0-300mm Well structured No	NA	NA
	Layer 2		DLR	DIR
	Texture Colour Depth Structure Coarse frag.	Medium clay Red 300-1000mm Well structured No	NA	NA
	Layer 3			
	Texture Colour Depth Structure Coarse frag.	NA	NA	NA

*Design Irrigation Rate for clayey soils, and 35mm/week for sandy soils. DIR in mm/week

5. SUMMARY OF SOIL AND SITE CONSTRAINTS

There are no significant soil or site constraints that would prevent the installation of an Aerated Wastewater Treatment System (AWTS) for wastewater treatment and subsurface irrigation for treated wastewater disposal onsite.

It is proposed that a new 5-bedroom residential dwelling will be constructed on this approximately 10.05-Ha rural property located in the Penrith Local Government Area. It is proposed a new subsurface irrigation area will be installed to the south of the proposed dwelling in a location compliant with all buffers and set back distances in accordance with Penrith City Councils DCP, appendix IV of this report. This includes locating the proposed effluent disposal area more than 40m from the downslope drainage depression and 3m from the upslope dwelling.

During the initial onsite wastewater disposal sub division plan prepared by Harris Environmental Consulting, the soils on site were found to range between 200 and 300mm of a well-structured clay loam at the surface gradually increasing in depth moving downslope along the northern side of the proposed subdivision. Beyond 200-300mm to 1000mm+ a well-structured medium clay was encountered.

The clay loam to medium clay soil profile has ideal permeability and nutrient absorption properties for this method of wastewater treatment and disposal onsite. This assessment assumes the proposed effluent disposal area will be fully grassed following completion of the proposed development.

Photo 1 Onsite soil assessment and soil profile (test pit one)

Photo 2 Onsite soil assessment and soil profile (test pit 2)

Photo 3 Landform and terrain typical of sites

Figure 2 General Site Plan

Description: Proposed new 5-bedroom dwelling on Lot 3 Mayfair Road, Mulgoa, NSW	Owner: Heather Gampe	Date: 20/06/2017	Our Ref:2391ww

Site Features:

Slope/Runoff	8-12%	Property boundary	
Proposed dwelling		0.5m contour lines	
Proposed driveway		100mm pvc pipe	
Proposed 667m^2 subsurface irrigation area		25mm poly pipe	
Proposed domestic AWTS		Poly manifold pipe	
		Poly drip lines	

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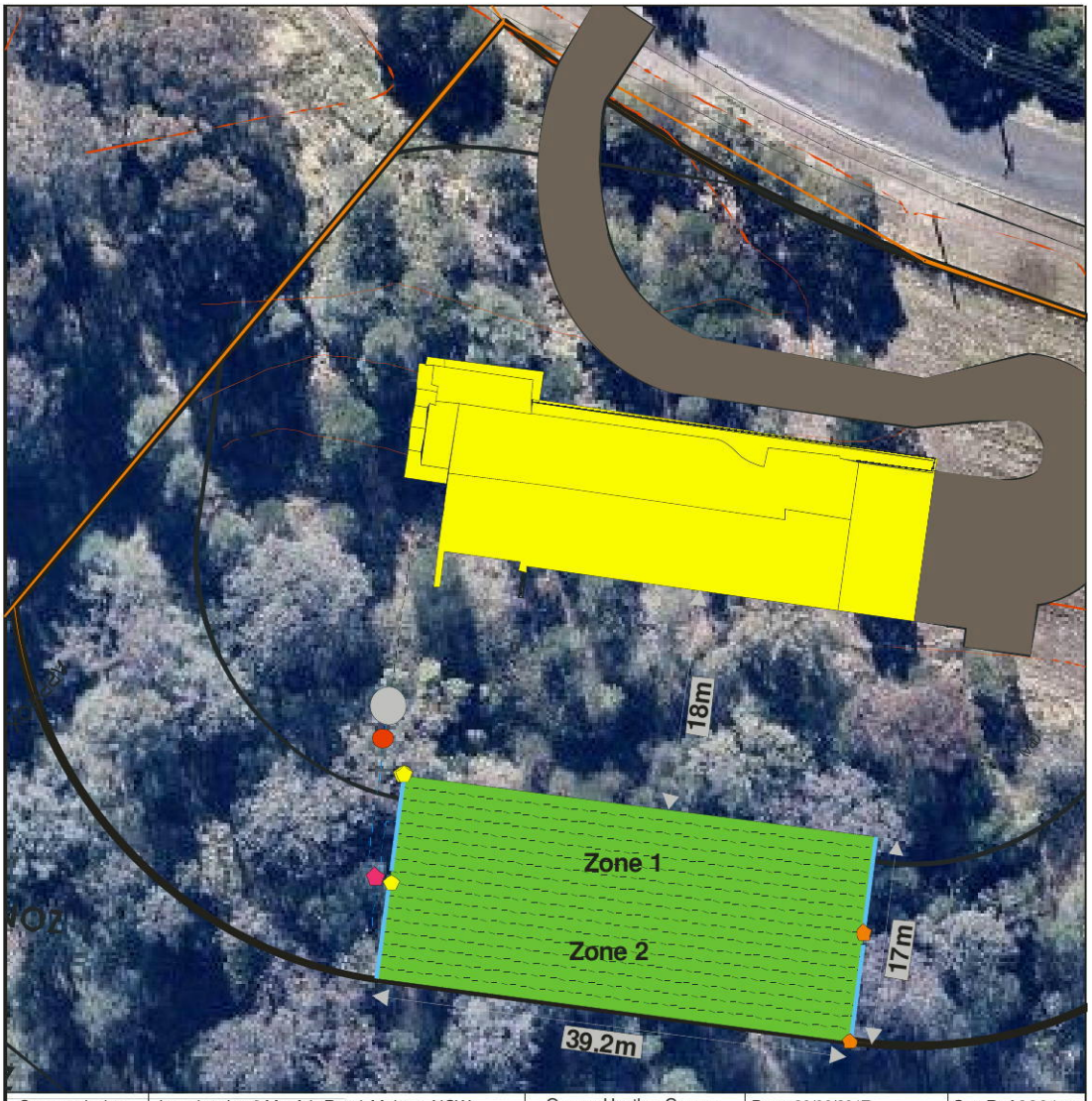
Figure 3 Irrigation Site Plan

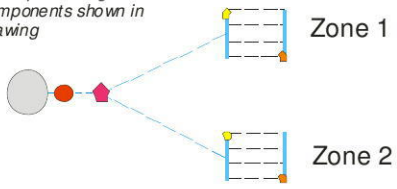


System design	Location: Lot 3 Mayfair Road, Mulgoa, NSW	Owner: Heather Gampe	Date: 20/06/2017	Our Ref:2391ww

Site Features:

- Slope/Runoff 8-12%
- Proposed dwelling
- Proposed driveway
- Proposed 667m² subsurface irrigation area
- Proposed domestic AWTS
- Disc filter or 100-150 micron filter
- Automatic water rotor or gate valve
- Air release valves at high points
- Check valves for periodic flushing
- Property boundary
- 0.5m contour lines
- 100mm pvc pipe
- 25mm poly pipe
- Poly manifold pipe
- Poly drip lines

Concept drawing of components shown in drawing



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6. PROPOSED METHOD OF WASTEWATER TREATMENT

6.1 A domestic AWTS has capacity for 10 persons, which would be sufficient for the proposed **5-bedroom house (6 person).** The owner must provide Council with the AWTS manufacturer's specifications of the Sewage Management Facility. (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).

6.2 The AWTS manufacturer will provide 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.

6.3 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);

6.4 Upon approval from **Penrith City 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 City Council** following each quarterly service

6.5 The location of the AWTS is shown on the Site Plan below the proposed shed so a toilet can be installed in the shed. The location of the AWTS should be decided in conjunction by 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 shown on the Site Plan was selected because:

- it is downslope of the buildings from where wastewater is generated;
- at least 2.5m away from the building
- at least 5m from the property boundary
- at least 6m downslope from any in ground water storage tanks.

6.6 AWTS installation must comply with the manufacturer's recommendations, AS/NZS 3500.2:2003 Plumbing and Drainage Part 2 Sanitary Plumbing and Drainage' and Council requirements.

6.7 The sewer pipe between the house, AWTS and irrigation area must be buried at a depth that provides protection against mechanical damage or deformation, in accordance with 'AS/NZS 3500(Set):2003 Plumbing and Drainage Set'. Table 1 shows the minimum pipe depth for trafficable areas.

Table 1 Minimum pipe depth for trafficable areas

Location	Minimum depth of cover (mm)
Where subject to heavy vehicular traffic	500
Where subject to light vehicular traffic	450
Elsewhere	300
Source:'AS/NZS 3500:2003 Table 3.4 Minimum Cover for Buried Piping'	

7. REQUIRED IRRIGATION AREA

In accordance with Table 3 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 tank water supply:

- 5 bedroom dwelling will require an 667m^2 irrigation area.

8. IN HOUSE WATER MANAGEMENT

8.1 This assessment assumes standard water conservation practices in accordance with the requirements needed to comply with BASIX. This assumes that water efficient choices are made when purchasing and installing:

- clothes washing machines
- dishwashers
- flow controllers
- toilet (lavatory equipment)
- showers
- taps for use over a kitchen sink, bathroom basin, laundry tub etc
- urinal equipment.

8.2 For further information on the Water Efficient Labelling Scheme, which is recognised by BASIX as the measure of an efficient product, go to *http://www.savewater.com.au/products/product-labelling*. *http://www.waterrating.gov.au/*

9. METHOD OF IRRIGATION

9.1 667m^2 of subsurface irrigation is required. The irrigation area will be split into two roughly equal zones that are used on each pump cycle rotation.

10. SUMMARY

This assessment recommends the following:

- Install domestic Aerated Wastewater Treatment System to treat wastewater from proposed residential dwelling;
- Install 667m^2 subsurface irrigation for the proposed 5 bedroom residence; and
- Install subsurface irrigation, as described in the Appendix and shown on the Site Plan.

11. 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 Policy

Appendix I Subsurface irrigation

i) The irrigation area should be split into zones of 200 to 300m^2.

ii) Each zone is to receive an even proportion of wastewater, using a sequencing valve, such as a water rotor or similar.

iii) 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).

iv) 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.

v) 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).

vi) 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.

vii) 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.

viii) 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.

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

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

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

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 Extract from PCC Draft Sewage and Greywater Policy

2.1.6 Dual Occupancies and Secondary Dwellings

Each dwelling within a dual occupancy is to be serviced by its own OSSM system. Secondary dwellings may be serviced by an existing OSSM system where it can be demonstrated to the satisfaction of Council that the system and the site have the capacity to manage effluent effectively.

If a dual occupancy or secondary dwelling is proposed, the OSSM system must comply with the requirements of Table 2 and Table 3 or a Wastewater Assessment Report is to be provided.

In addition, adequate provisions are to be made for any existing system on the site. The site must have sufficient land available for the replacement or alteration of the existing system if it were to fail in the future. Part 2 of this policy will be used to determine whether sufficient land is available.

If a site is unable to provide sufficient land for the future replacement or alterations of the existing system, a Wastewater Report is required to be submitted for the development. This Wastewater Report is to be prepared in accordance with the requirements of this policy and must also provide sufficient assessment and recommendations on the future replacement or alteration of the existing system, taking into account the proposed development.

Appendix IV Extract from PCC Draft Sewage and Greywater Policy

System	Buffer Distances
All OSSM systems (including tank)	• 250 metres to domestic groundwater well • 100 metres to permanent surface waters (e.g. rivers, creeks, streams, lakes etc) • 40 metres to other waters (e.g. dams, stormwater easements, overland flow paths, intermittent waterways and drainage areas etc) • 15 metres from an in-ground water tank • 1 metre from the drip line of native trees and shrubs • For tank – minimum 1.5 metres from dwelling
Surface spray irrigation	• 15 metres to dwellings • 6 metres if area up-slope and 3 metres if area down-slope of buildings, driveways and property boundaries • 3 metres to paths and walkways • 6 metres to swimming pools and recreational areas
Surface drip and trickle irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of dwellings, swimming pools, property boundaries, driveways and buildings
Subsurface irrigation	• 6 metres if area up-slope and 3 metres if area down-slope of dwellings, swimming pools, property boundaries, driveways and buildings
Absorption system	• 12 metres if area up-slope and 6 metres if area down-slope of property boundaries and dwellings • 6 metres if area up-slope and 3 metres if area down-slope of swimming pools, driveways and buildings

Notes: (1) Additional buffer distances may be required as identified during Council's assessment of the development proposal.