ON-SITE WASTEWATER ASSESSMENT FOR PROPOSED 5 LOT SUBDIVISION OF LOTS 1, 2, 3 & 4 DP 2603737 AND LOT 12 DP 610186 ON MAYFAIR ROAD, MULGOA, NSW

LGA: PENRITH CITY COUNCIL

PROJECT MANAGER: MLJ CONSTRUCTION

5 July 2016

Our ref: 1908ww

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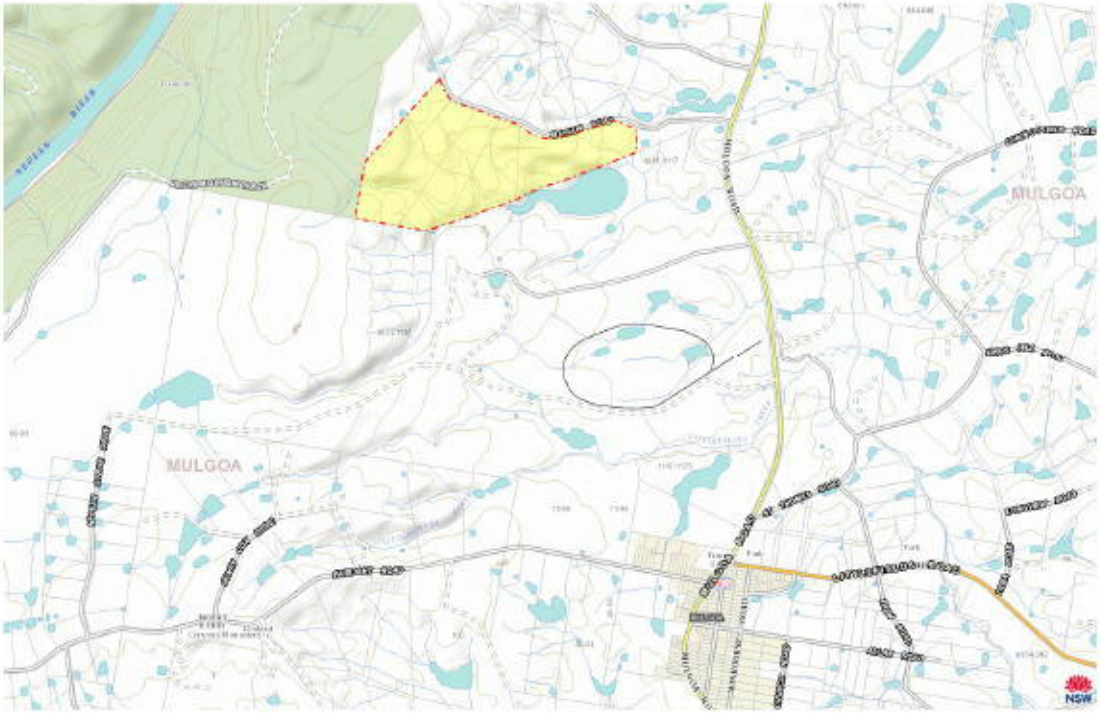
1. ASSESSMENT CRITERIA

This Site and Soil Assessment for On-site Wastewater was prepared by Harris Environmental Consulting at the request of MLJ Constructions. It relates to the 5 lot subdivision of Lots 1, 2, 3 & 4 DP 260373 and Lot 12 DP 610186 on Mayfair Road, Mulgoa. Field work was undertaken by Mr Sean Harris on the 29th of June 2016. 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 proposed to install an Aerated Wastewater Treatment System (AWTS) and subsurface irrigation area for each of the mentioned lots.

Harris Environmental Consulting was commissioned by the planner 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); and
- AS/NZ 1547:2012 On-site wastewater management (Standards Australia, 2012).

Figure 1 Location



Source: SixMaps

3. SITE INFORMATION

Project manager	**Leigh Jolly at MLJ Construction** PO Box 1232 Camden, NSW 2570 P: (02) 4654 5613 M: 0413 997 955 E: leigh@mlj.com.au
Site addresses	Lot 4 DP 610186 on 145-156 Mayfair Road, Mulgoa Lot 3 DP 610186 on 132-144 Mayfair Road, Mulgoa Lot 2 DP 610186 on 119-131 Mayfair Road, Mulgoa Lot 1 DP 610186 on 106-118 Mayfair Road, Mulgoa Lot 12 DP 610 186 on 44A Mayfair Road, Mulgoa
Size of property	Lot 4 = 9.585 ha Lot 3 = 10.05 ha Lot 2 = 10.40 ha Lot 1 = 9.497 ha Lot 12 = 5.077 ha
Local Government Area	Penrith City Council
Catchment	Drains to Mulgoa Creek
Water supply	Tank water 120L/person/day
Wastewater design load	Assume 4 bedrooms (1 master and 3 single rooms) Therefore 5-person equivalent households. Flow assumed at 120 litres person per day (BASIX requires standard water reduction fixtures) Total Wastewater load per lot = 5 x120 = 600L/day
Assumed method of treatment	AWTS
Assumed method of effluent disposal within Effluent Management Area (EMA)	Subsurface irrigation
Date site assessed:	29/06/2016
Date report prepared:	5/07/2016
Site assessor:	 Sean Harris Msc Env Science (UOW), Grad dip Nat Res (UNE), BscAppSc, Agriculture (HAC)

4. SITE ASSESSMENT

Weather conditions	Dry at time of site assessment
Climate	Wallacia Post Office Rainfall Station (median annual 872mm) Badgerys Creek evaporation (median 1557 mm)
Flood potential	Treatment systems above 1 in 100 year flood level; minor limitation; Land application systems above 1 in 20 year flood contour, minor limitation
Exposure	Southern to Eastern aspect, full sun and wind exposure at each of the proposed lots
Slope in proposed EMA	Lot 4: 8-10% slope; Moderate limitation Lot 2: 8-12% slope; Moderate limitation Lot 2: 12-15% slope; Moderate limitation Lot 1: 12-15% slope; Moderate limitation Lot 12: 10-15% slope; moderate limitation
Landform	Convex side slope
Run-on and seepage	Moderate potential for runon and seepage; moderate limitation
Erosion potential	No evidence of sheet or gully erosion; minor limitation
Evidence of fill	Naturally occurring soils; no evidence of fill within the site of proposed irrigation areas, minor limitation
Domestic groundwater use	No groundwater bores within 100m+
Required buffer distance available from EMA to:	Permanent waters : 100m+ Intermittent waters : 40m+ Boundary (up-slope/down-slope): 3-6m Buildings (up-slope/down-slope): 3-6m
Surface rock	Minor surface rock
Area available for effluent disposal	Subsurface irrigation area is available after allowing for buffers at each lot.

5. SOIL ASSESSMENT

Method	Shovel/crowbar		
Depth to bedrock (m)	>1000mm; minor 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	Minor surface rock in proposed irrigation area		
Bulk density	Permeable, well drained soil profile; moderate limitation		
Phosphorus balance assumptions	TN output value of 25mg/L and a critical loading rate of 27mg/m²/day. TP output value of 12mg/L		
Soil profile: (representative of site)	Layer 1		DIR
	Texture Colour Depth Structure Coarse frag.	Clay loam Black 0-300mm Well structured No	35 (mm/week)
	Layer 2		DIR
	Texture Colour Depth Structure Coarse frag.	Medium clay Red 300-1000mm Well structured No	15* (mm/week)

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

6. 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 either spray or subsurface irrigation for treated wastewater disposal on each of the proposed lots.

The soils on site 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.

It is proposed for all lots that subsurface irrigation will be the most suitable method of disposal. The proposed subsurface irrigation areas will be compliant with all buffers and set back distances in accordance with Penrith City Councils DCP, appendix IV of this report. The dwelling sizes are assumed to be equivalent to a 4-bedroom dwelling.

It is expected the subsurface irrigation areas will be fully grassed following completion and lawn clippings removed following mowing.

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

7. METHOD OF WASTEWATER TREATMENT

7.1 A domestic AWTS (capacity for 10 persons) is required for each lot. 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).

7.2 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.

7.3 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);

7.4 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

7.5 **The proposed location of the AWTS is conceptually shown on the Site Plan but there are other locations that are equally suitable, so this should not be considered a fixed location.** 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.

7.6 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.

7.7 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'	

8. AREA REQUIRED FOR EFFLUENT DISPOSAL

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:

- 4-bedroom residential dwelling will require an 556m² subsurface irrigation area.

9. IN HOUSE WATER MANAGEMENT

9.1 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.

9.2 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/*

10. SUMMARY

The purpose of this assessment is to assess whether on site wastewater management can be undertaken on the proposed lots to achieve the relevant assessment criteria. This assessment finds that on site wastewater management can be undertaken at the location adjacent to each indicative building site.

The assessment was based on the use of an Aerated Wastewater Treatment System, assumed 4-bedroom residence and tank water supply.

This assessment recommends the installation of 556m² of subsurface irrigation for each of the proposed 4-bedroom dwellings.

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).

Appendix I Installation of Subsurface irrigation

i) The irrigation area should be split into equal 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.

xii) 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 3*

Table 3 Sizing of domestic Aerated Wastewater Treatment Systems (AWTS) Effluent Disposal Areas

Sizing of AWTS Effluent Disposal Areas			
Unsewered Penrith Suburbs	**No. of Bedrooms**	**Surface and Sub-Surface Irrigation Areas (m^2)**	
		Reticulated Water	Tank Water
Sandy Soil Types ***eg Agnes Banks - east of Castlereagh Road. Castlereagh - north of Devlin Road and east of Castlereagh Road.***	**4 or less**	873	700
	5	1048	838
	6	1223	978
Clay Soil Types ***Most other areas***	**4 or less**	695	556
	5	833	667
	6	972	778

Notes: *(1) The Effluent Disposal Area (EDA) is based on nutrient balances as they are considered to be the most limiting factors in these areas.*

(2) Figures 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.*

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

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.

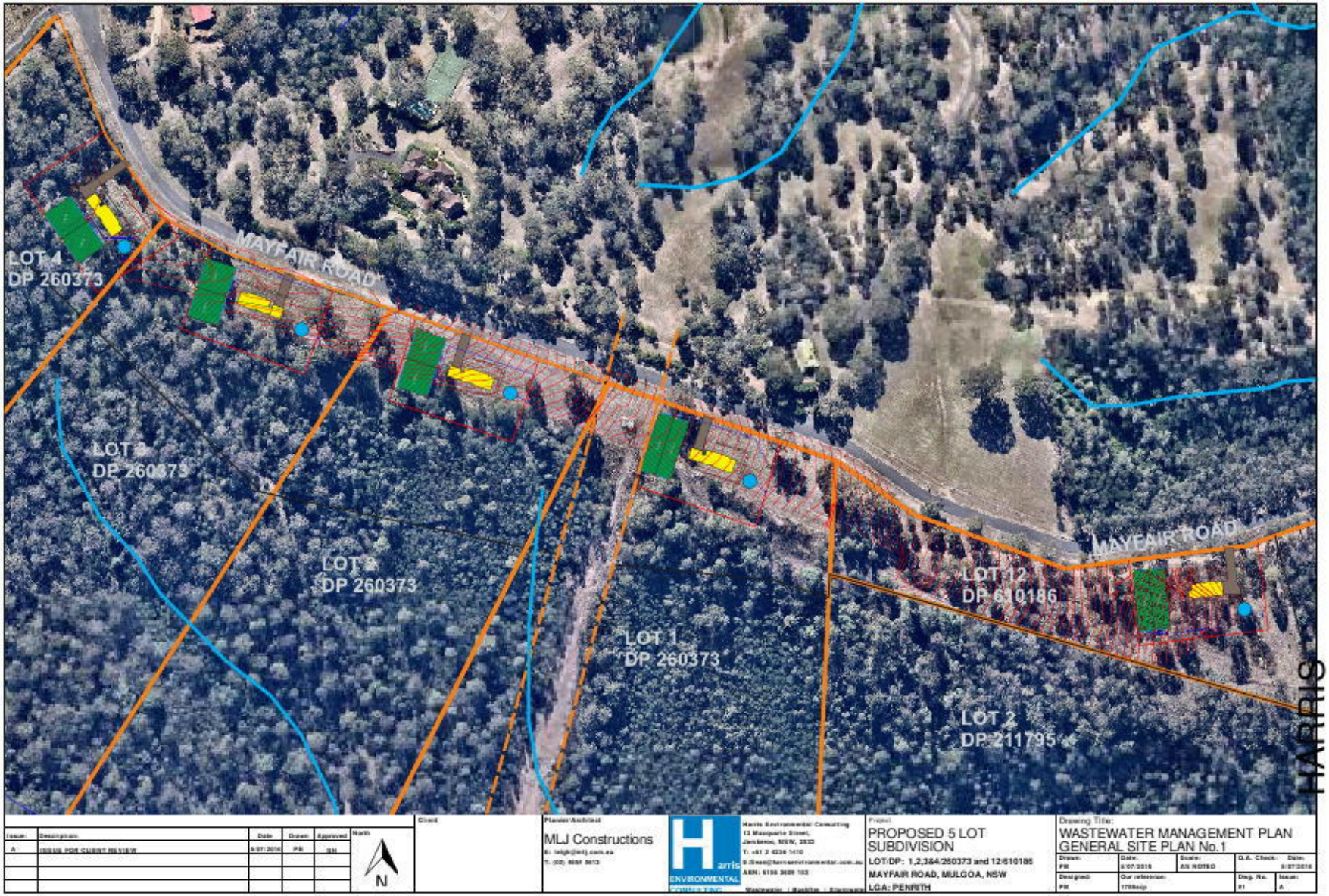
In addition, adequate provisions are to be made for any existing system on the site. The site must have sufficient land available for the replacement or alteration of the existing system if it were to fail in the future. Part 2 of this policy will be used to determine whether sufficient land is available.

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*



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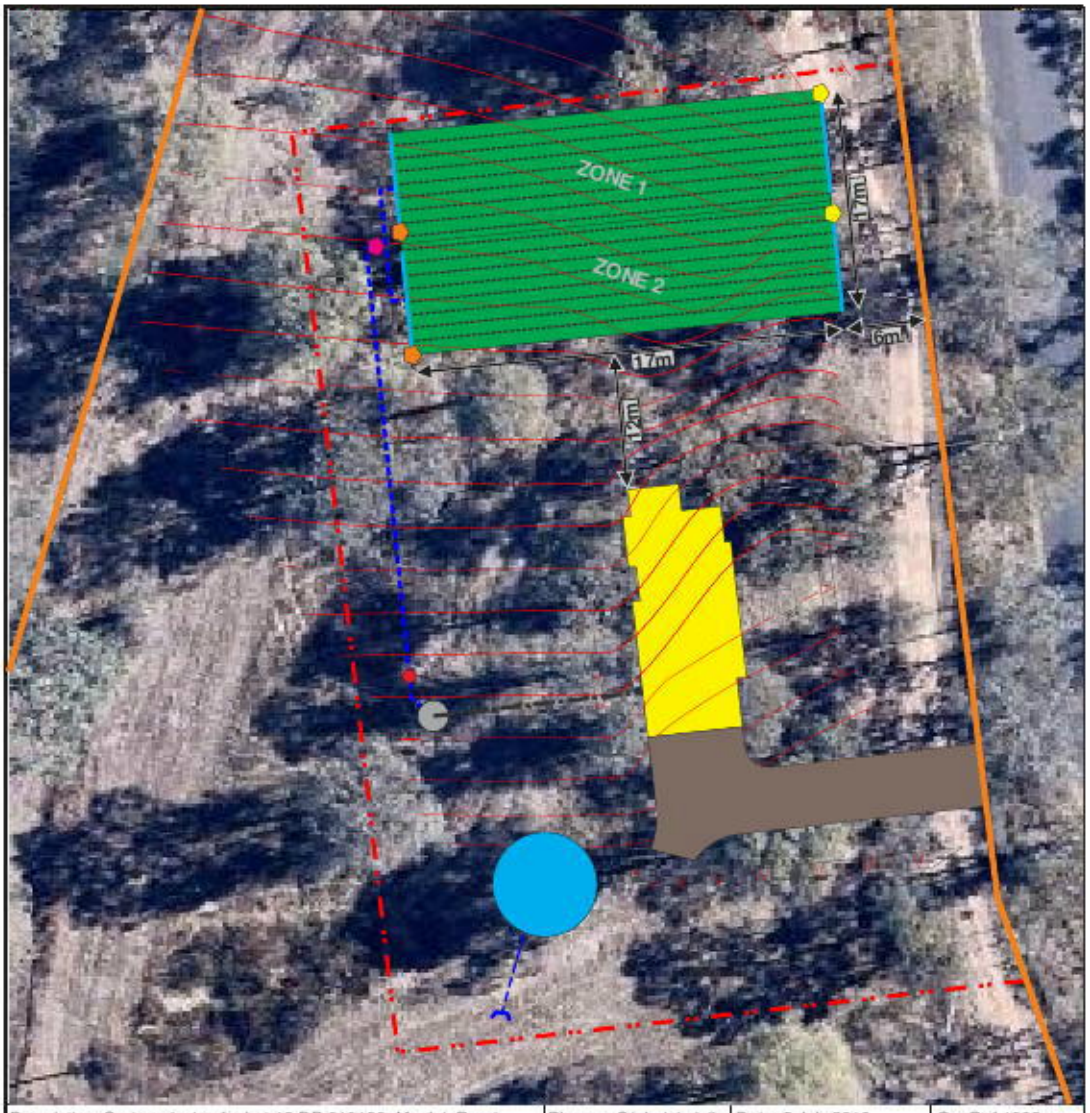
Appendix V System Design for Lot 12 DP 610186 Mayfair Road

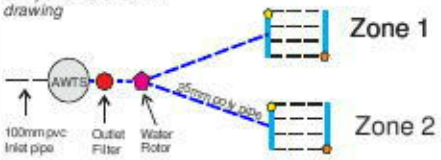


Description: System design for Lot 12 DP 610186, Mayfair Road, Mulgoa	Planner: C/- Leigh Jolly	Date: 5 July 2016	Our Ref:1908ww

Site Features:

- Slope/Runoff 3%
- Residential dwelling
- Proposed driveway
- Proposed 556m² subsurface irrigation area
- Above ground rainwater tank
- Proposed 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
- Extent of tree clearing
- 0.5m contour lines
- 100mm pvc pipe
- 25mm poly pipe
- Manifold Poly Pipe
- Poly drip lines

Concept drawing of components shown in drawing



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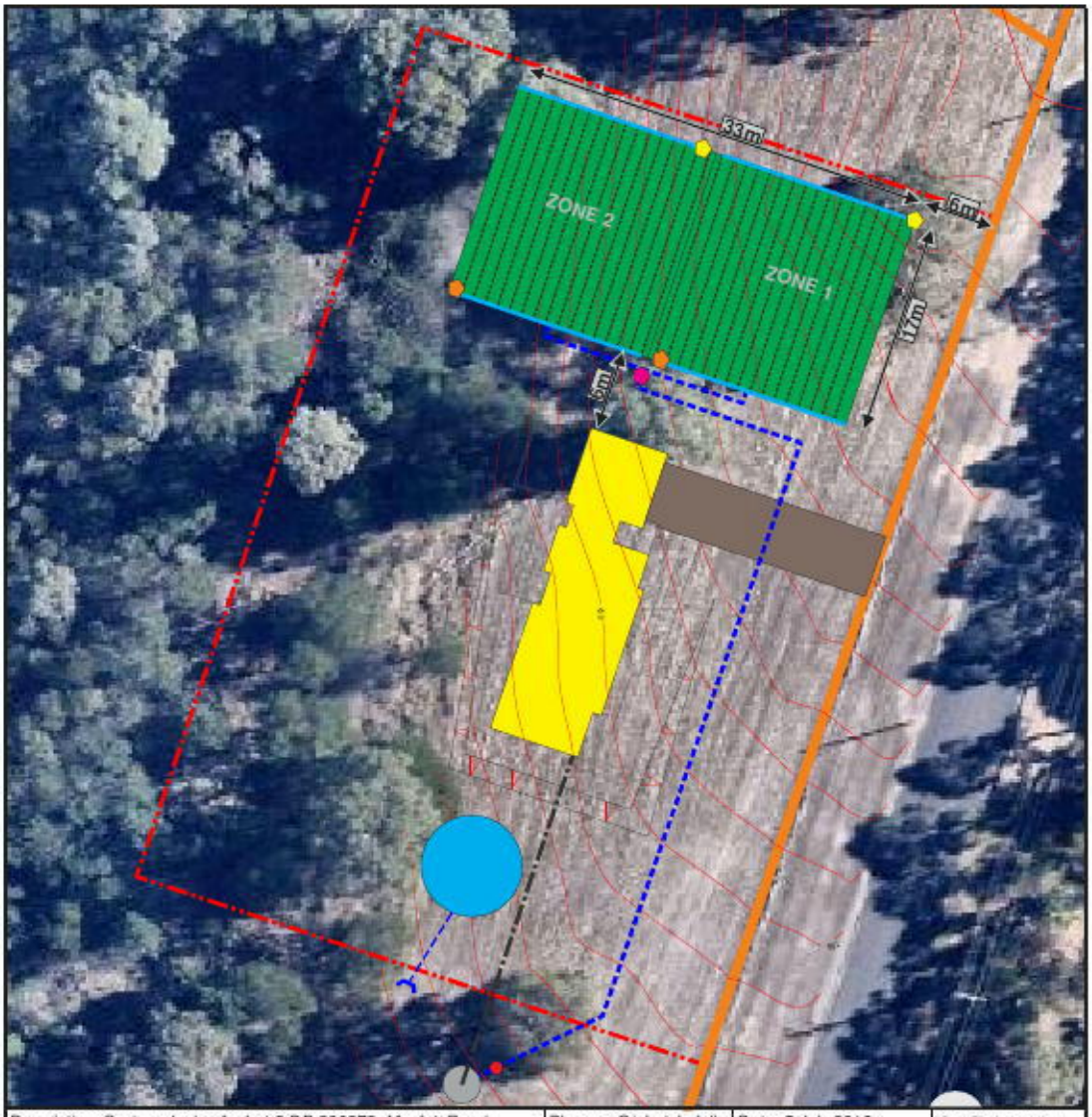
Appendix VI System Design for Lot 1 DP 260373 Mayfair Road

Appendix VII System Design for Lot 2 DP 260373 Mayfair Road



Description: System design for Lot 2 DP 260373, Mayfair Road, Mulgoa	Planner: C/- Leigh Jolly	Date: 5 July 2016	Our Ref:1908ww

Site Features:

- Slope/Runoff 3%
- Residential dwelling
- Proposed driveway
- Proposed 556m² subsurface irrigation area
- Above ground rainwater tank
- Proposed 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
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- 25mm poly pipe
- Manifold Poly Pipe
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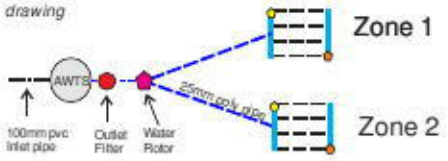

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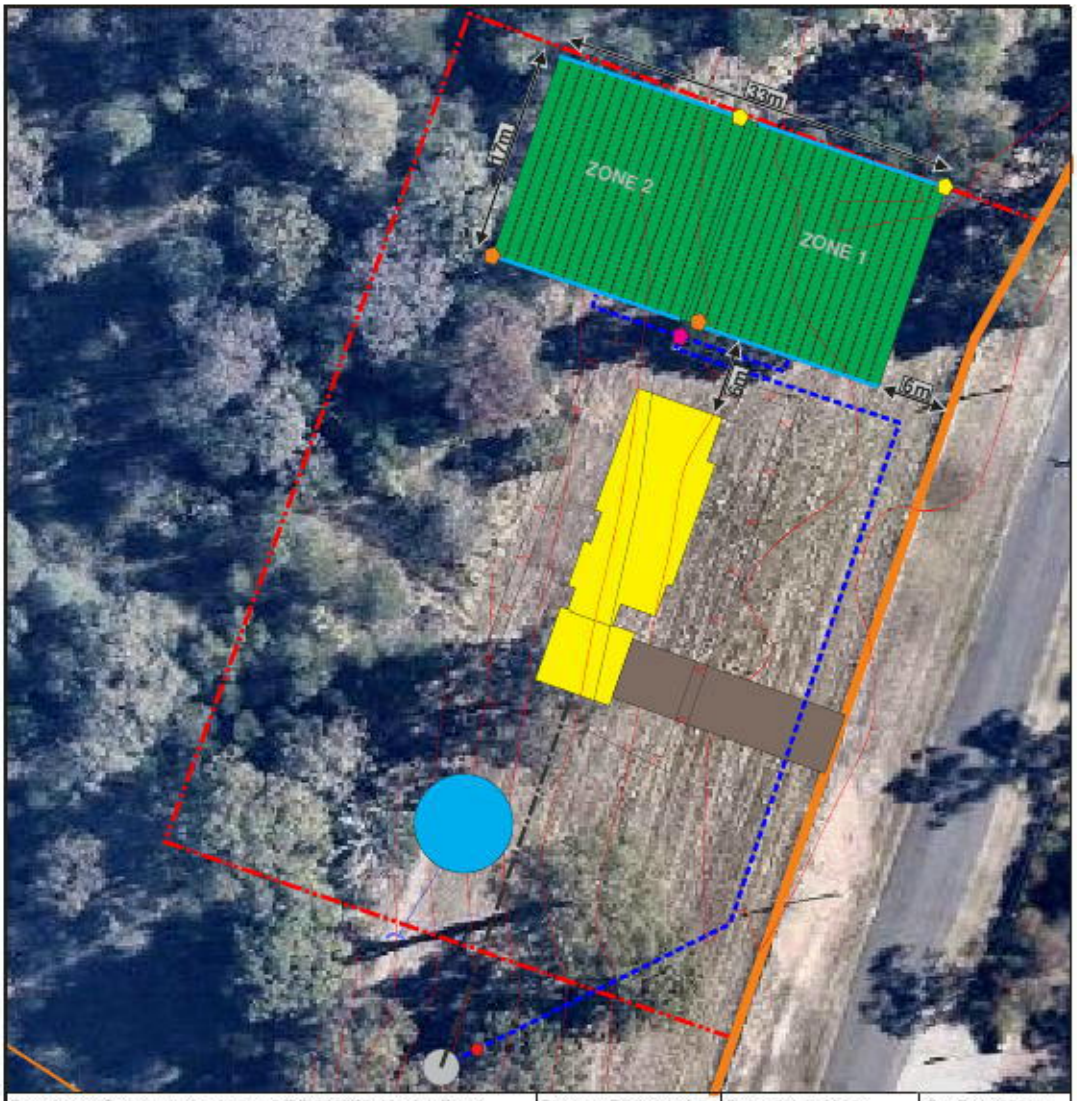
Appendix VIII System Design for Lot 3 DP 260373 Mayfair Road



Description: System design for Lot 3 DP 260373, Mayfair Road, Mulgoa	Planner: C/- Leigh Jolly	Date: 5 July 2016	Our Ref:1908ww

Site Features:

- Slope/Runoff 3%
- Residential dwelling
- Proposed driveway
- Proposed 556m² subsurface irrigation area
- Above ground rainwater tank
- Proposed AWTS
- Disc filter or 100-150 micron filter
- Automatic water rotor or gate valve
- Air release valves at high points
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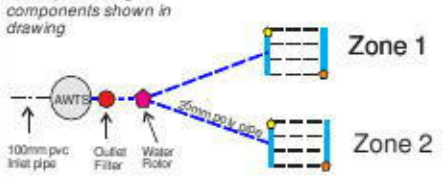

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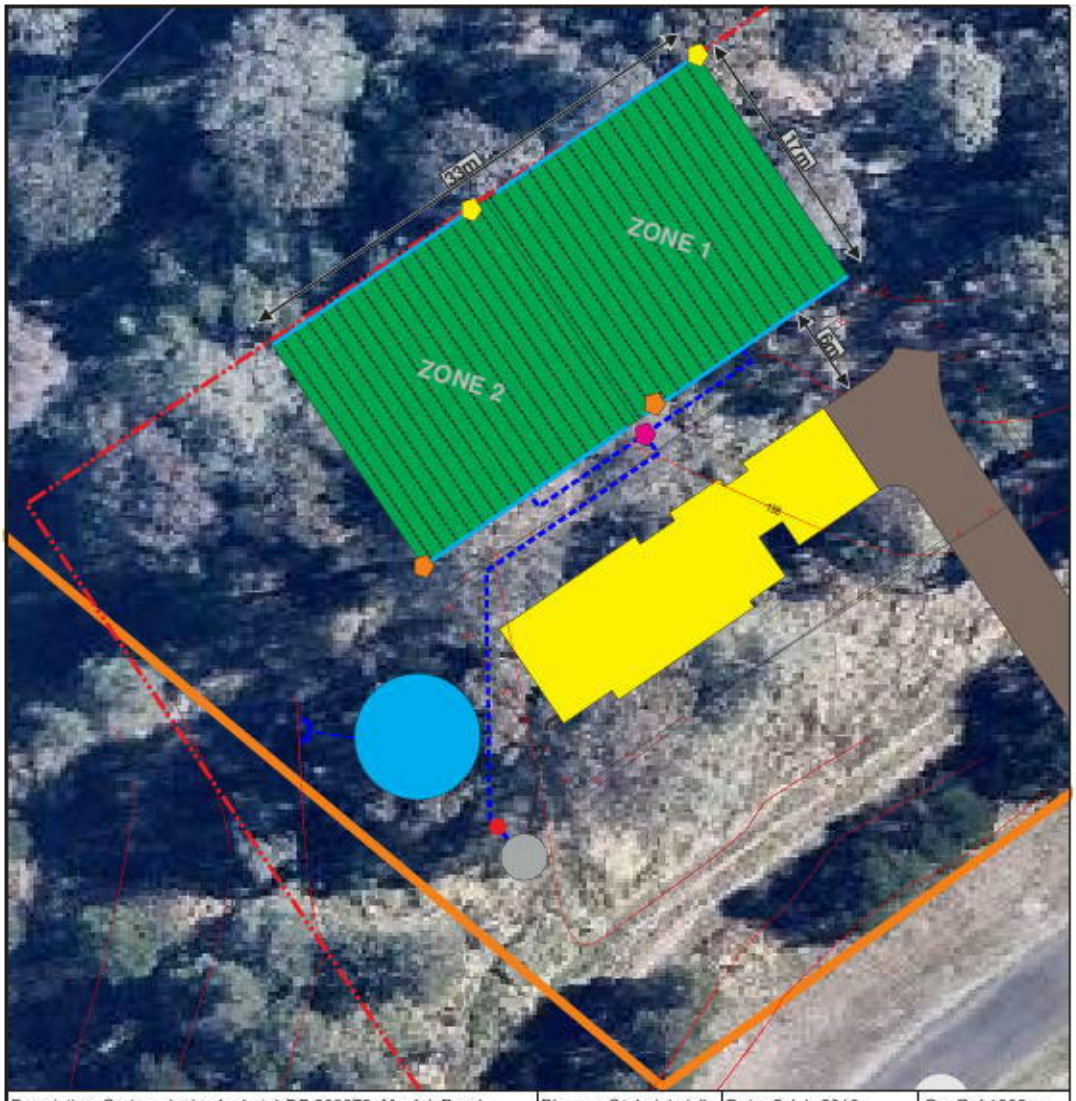
Appendix IX System Design for Lot 4 DP 260373 Mayfair Road



Description: System design for Lot 4 DP 260373, Mayfair Road, Mulgoa	Planner: C/- Leigh Jolly	Date: 5 July 2016	Our Ref:1908ww

Site Features:

- Slope/Runoff 3%
- Residential dwelling
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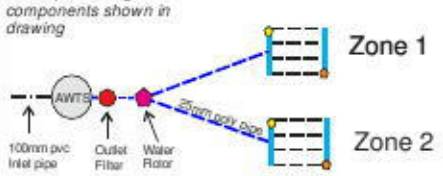

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