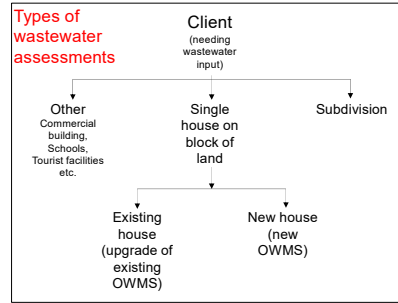


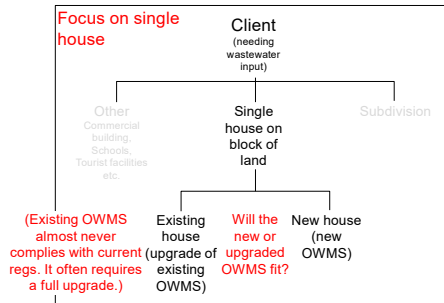
On-site Wastewater Management Training Course

OWMS's: Traps and Tips for Designers (Thoughts from a Tasmanian practitioner)

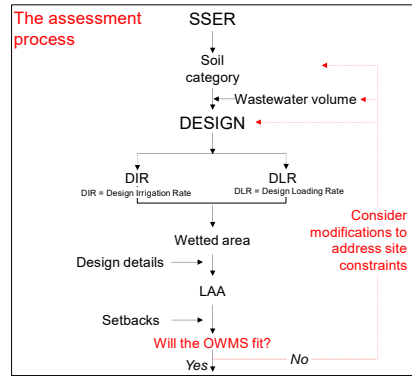
OWMS's: Traps and Tips for Designers



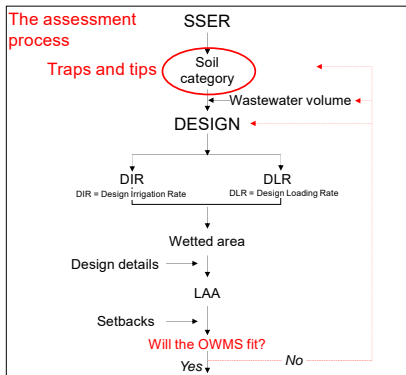
OWMS's: Traps and Tips for Designers



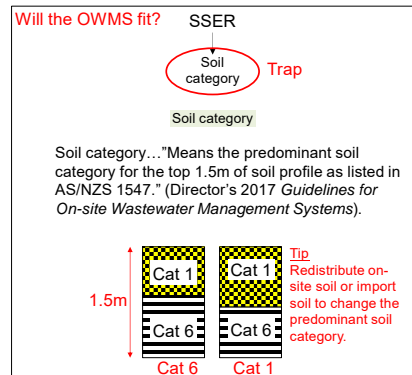
OWMS's: Traps and Tips for Designers



OWMS's: Traps and Tips for Designers



OWMS's: Traps and Tips for Designers



OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Traps and tips Soil category

Soil category	Soil texture	Structure	Indicative permeability (K _{sat})(m/d)	4	Clay loams	High/moderate structured	0.5 - 1.5
1	Sandy and sands	Structureless	> 3.0	5	Light clays	Weakly structured	0.12 - 0.5
		Weakly structured	> 3.0			Moderately structured	0.06 - 0.12
2	Sandy loams	Massive	1.4 - 3.0	6	Medium to heavy clays	Weakly structured or massive	< 0.06
		High/moderate structured	1.5 - 3.0			Strongly structured	0.06 - 0.5
3	Loams	Weakly structured or massive	0.5 - 1.5			Weakly structured or massive	< 0.06

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

Failing OWMS (Southern Tasmania)

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

Category 1 "SAND"

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

Category 1 "SAND"

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Will the OWMS fit? SSER

Soil category Trap

Category 1 "SAND"

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OWMS's: Traps and Tips for Designers

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Soil category Trap

SAND and "SAND"

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

SAND and "SAND"

SAND: very well sorted (one grain size); relatively high permeability; Category 1. Uniformity coefficient = 1

SAND with some silt: moderately sorted (several grain sizes); relatively low permeability; Category 5 or 6. Uniformity coefficient >6

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

SAND and "SAND"

This so-called fat sand has 12% silt but no clay. It's a true sand – not even a loam. Its measured permeability is less than 0.02m/day. This means it is Category 5 or 6 for sizing wastewater systems.

There are clear implications for designing OWMS's. Relying only on visual and/or tactile evidence to determine Soil Category could lead to serious undersizing. Permeability too ought to be measured in the field.

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

SAND and "SAND"

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Trap

SAND and "SAND"

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OWMS's: Traps and Tips for Designers

Will the OWMS fit? SSER

Soil category Traps and tips

Soil category	Soil texture	Structure	Indicative permeability (k _{sat}) [m/d]	4	5	6
1	Gravels and sands	Structureless (massive)	> 3.0	Clay loams	Highly structured	0.5 - 1.5
		Weakly structured	> 3.0		Weakly structured	0.12 - 0.5
		Massive	1.4 - 3.0		Massive	0.06 - 0.12
2	Sandy loams	Weakly structured	> 3.0	Light clays	Strongly structured	0.12 - 0.5
		Massive	1.5 - 3.0		Weakly structured or massive	< 0.06
3	Loams	High/moderate structured	1.5 - 3.0	Medium to heavy clays	Strongly structured	0.06 - 0.5
		Weakly structured or massive	0.5 - 1.5		Weakly structured	< 0.06

Trap and/or Tip

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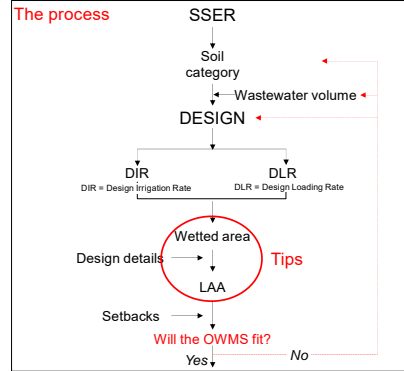
Will the OWMS fit? SSER

Soil category **Tip**

- As a risk mitigation approach to avoiding OWMS failure, assume that Category 6 and many Category 5 soils have effectively zero permeability for wastewater.
- In these soils, wastewater is mostly lost upwards via evaporation (E) and evapotranspiration (ET).
- In Tasmania, rates for E and ET range from about 1-2L/day/m² in winter, to 5 - 8L/day/m² in summer.
- Use a DLR or DIR at the winter end of the scale. (If you size an OWMS on a summer E or ET scale, it will likely fail every winter.)

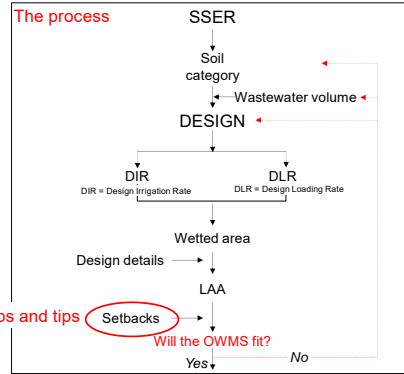
4	Clay loams	High/moderate structured	0.5 - 1.5
		Weakly structured	0.12 - 0.5
		Massive	0.06 - 0.12
5	Light clays	Strongly structured	0.12 - 0.5
		Moderately structured	0.06 - 0.12
		Weakly structured or massive	< 0.06
6	Medium to heavy clays	Strongly structured	0.06 - 0.5
		Moderately structured	< 0.06
		Weakly structured or massive	< 0.06

Trap and/or Tip



Wetted area and LAA
Tips

- For sizing the OWMS, the AS/NZS1547 equation* is:
Wastewater volume / application rate = wetted area**
* The water balance equation is a better approach (e.g., *Trench3.0*). ** Application rate = DLR or DIR.
- The **wetted area** is not necessarily the same as the **Land Application Area (LAA)**: "...an area of land used to apply effluent from a wastewater treatment unit and reserved for future wastewater application (where required)". (Director's 2017 *Guidelines for On-site Wastewater Management Systems*). Also, the footprint (the LAA) of some OWMS's may be larger than the wetted area.
- The LAA may be divided into separate sub-areas (e.g., LAA1, LAA2, etc) of any shape, size and location provided (a) all sub-areas are watered simultaneously, and (b) all setbacks are satisfied.

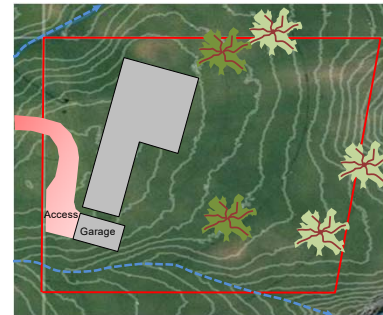


Setbacks

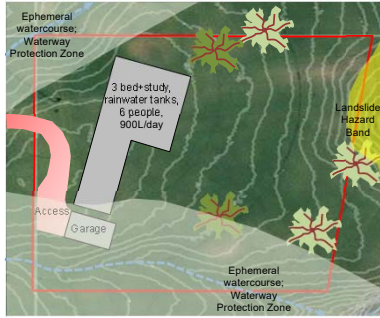
- | | |
|---|--|
| Horizontal setbacks from... | Vertical setbacks from... |
| <ul style="list-style-type: none"> buildings property boundaries downslope water bodies water bores | <ul style="list-style-type: none"> limiting layers (e.g., rock, Category 6 soil) Groundwater |



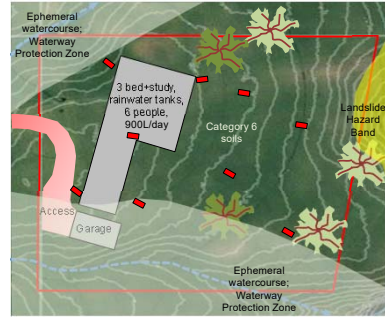
Setbacks



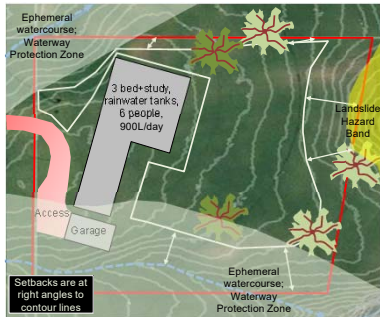
Setbacks



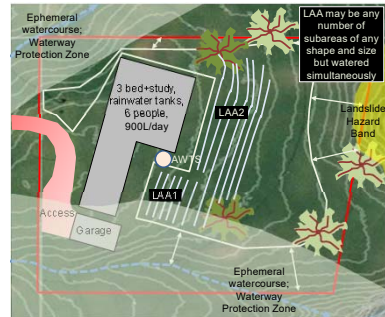
Setbacks



Setbacks



Setbacks

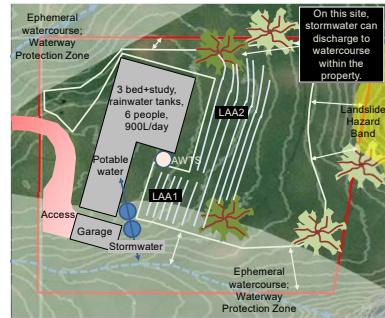


Setbacks

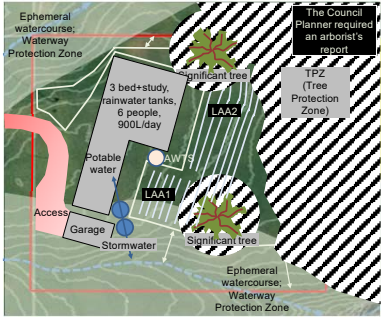
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| <p>Horizontal setbacks from...</p> <ul style="list-style-type: none"> • buildings • property boundaries • downslope water bodies • water bores • stormwater disposal areas • landslide hazard bands • significant (and other) trees • flooding, coastal erosion?, coastal inundation?, waterway protection zones? Karst? | <p>Vertical setbacks from...</p> <ul style="list-style-type: none"> • limiting layers (e.g., rock, Category 6 soil) • groundwater |
|---|--|

Traps and tips Setbacks →
 ↓
 Will the OWMS fit?

Setbacks

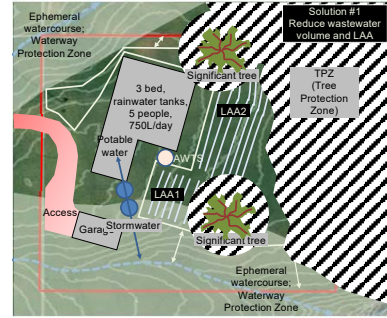


Setbacks



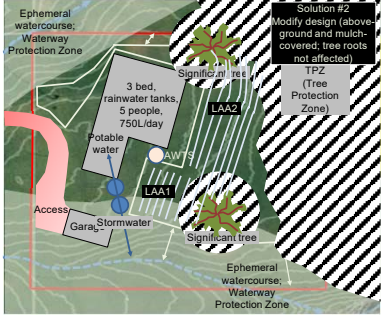
The Council Planner required an arborist's report

Setbacks



Solution #1 Reduce wastewater volume and LAA

Setbacks



Solution #2 Modify design (above-ground and mulch-covered tree roots not affected)

Who were the stakeholders?

New house...in olden days order of appearance...

- The Client
- Architect/designer
- **Wastewater Assessor (SSER & Design)**
- Council EHO
- Plumber/installer
- **Wastewater Assessor (to certify OWMS)**

Who are the stakeholders now?

New house...order of appearance confused...

- The Client
- Planner
- Bushfire Assessor
- Arborist
- Architect/designer
- **Wastewater Assessor**
- Council EHO
- **Council Planner**
- Surveyor
- Hydraulic Engineer
- Builder
- Plumber/installer
- **Wastewater Assessor**
- Building Surveyor

Traps and Tips Summary

- Sands and sands: Category 1 or Category 5, 6?
- Category 6 and 5: consider DLR, DIR similar to winter ET
- Wetted area not necessarily same as LAA
- LAA may be as separate sub-areas
- Wastewater assessment after bushfire, trees, etc.
- Setbacks: apply before designing the OWMS

Thank you

