NSW Onsite Wastewater Management Guidelines, 2025

Training for Regulators and Designers

System Sizing

Wastewater generation – Section 6.1

- Daily Hydraulic Load (L/day) = Design Occupancy (EP) x Design Flow Allowance (L/person/day)
- Always check the requirements of the local water authority when designing in a drinking water extraction area
- Design occupancy in domestic settings defined as the maximum potential future occupancy of a household based on the number of bedrooms

Design occupancy – Table 6-1

- Dwellings start at 3EP in the first bedroom, with 1EP per bedroom after (number of bedrooms + 2)
- Buildings with own toilet and laundry are classed as a separate household, starting at 3EP again
- Bedrooms are defined as any room that possesses the potential to be used as a bedroom in the future. This is up to the discretion of the council
- Commercial settings includes staff, visitors, guests
- Short term accommodation is based on available beds, not bedrooms

Design flow allowance

- Design flow allowances can be defined as the daily water use of a development per EP (L/person/day) that will be converted to wastewater
- Table 6-2 flows are based on basic water reduction fixtures (3-star WELS)
- Non-standard water fixtures (spa bath, kitchen food-waste grinders, etc.) are not recommended. If used, flows are to be adjusted to suit increases
- Short-term accommodation should use reticulated water supply flow allowance (150L/person/day)

Wastewater generation - scenario

- Daily Hydraulic Load (L/day) = Design Occupancy (EP) x Design Flow Allowance (L/person/day)
- 3-bedroom (5EP) + 2-bedroom house (4EP) = 9EP
- Rainwater tank supply = 120L/person/day
- Daily hydraulic load = 1,080L
- Internal use of bore water, use 150L/person/day
- Daily hydraulic load = 1,350L
- If the houses were used for short term accommodation, what would change?

Septic tank capacity – Section 6.2

- Septic Tank Capacity (L) =

  Daily Flow (L/day) + Accumulated Sludge (L)
- Daily Flow (L/day) = Maximum Users (EP) x Peak Flow (L/day)
- Accumulated Sludge (L) = Users (EP) x 80L/person/year x 5 Year Pump Out Cycle
- This allows for the use of NSW Health accredited smaller septic tanks, where economically viable

Sizing for other systems

- Collection wells – minimum of 7-days daily flow + 2-days emergency storage
- Aerobic sand and media filter systems – sized based on the most limiting of hydraulic and BOD loading rates and the media type and whether it is recirculating or not
- Constructed wetlands – volume of the wetland is based on a minimum 5-days of hydraulic retention time and related to the porosity of the gravel used in the wetland

Design loading and irrigation rates

- DLR and DIR are determined on the basis of the textural class and structure of the limiting layer
- DLR and DIR are based on the long-term application of effluent and its impact on the permeability of the soil, not just the indicative permeability of the soil
- Table 6-4 of the Guidelines compiles the DLR and DIR from Tables L1, M1 and N1 of AS/NZS1547:2012

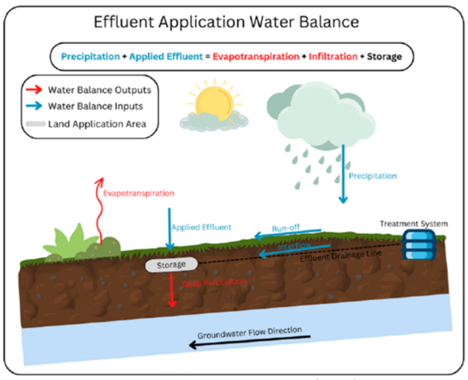
Effluent application area sizing

- The simplest method is the areal calculation, based on hydraulics, but not climate
- Only suitable for sites with no climatic constraints
- Area = Q (daily hydraulic load) ÷ (DLR or DIR)
- Scenario site has sand soils (Category 1), Q = 1,080L, secondary treated effluent
- DLR (beds) = 50mm/day and DIR (SSI) = 5mm/day
- Beds area = 21.6m² or SSI area = 216m²

Water balance

- Water balance modelling is to approximate natural water cycle processes using local climate data and applied effluent to determine the minimum EAA
- Water balances can be based on monthly or daily climate data
- Monthly balances are simpler and more conservative than daily balances
- Include rainfall, evaporation, crop factors, void space ratio, retained rainfall coefficient, DLR/DIR

Figure 6-1 Effluent application water balance



Water balance and in soil storage

- In soil storage in a water balance is only suitable for Category 3-6 soils and for absorption or ETA trenches and beds
- In soil storage for irrigation systems and highly permeable soils (Category 1 and 2) should be zero
- Wet weather storage in a tank is not suitable for a domestic OWMS

Scenario – water and nutrient balances

- Work through scenario water and nutrient balances for absorption beds and irrigation

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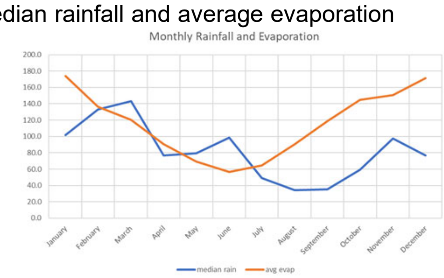
Climate data - Scenario

- SILO data drill for 30 years
- Median rainfall and average evaporation



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Nutrient balance and nutrient uptake

- Nutrient balance modelling is to approximate natural nitrogen and phosphorus cycle processes using local data to determine the minimum EAA
- Nutrient Uptake Area (NUA) is the area set aside surrounding and downslope of an EAA that allows for further nutrient reduction to background levels before reaching any sensitive receptors
- The NUA should be vegetated and protected from development and not extend into buffers

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Figure 6-2 Effluent application nutrient balance

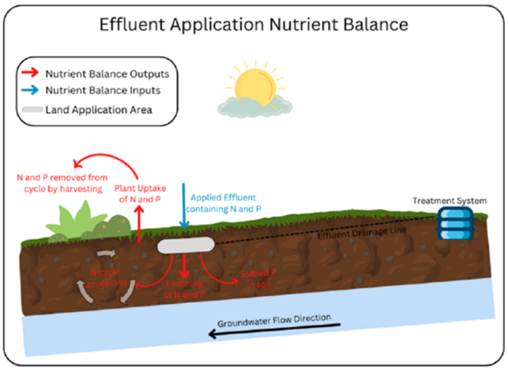

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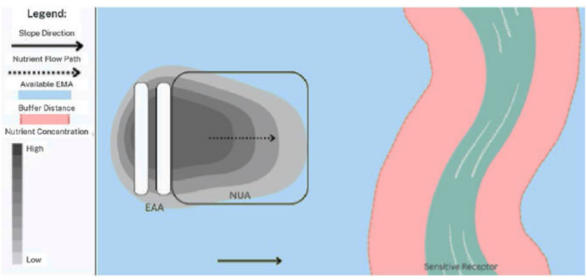
Figure 6-3 Nutrient transport under EAA



Nutrient Uptake Area (NUA)
= Nutrient Balance Area - Hydraulic Area

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Linear Loading Rate

- DLR assumes that there is no hydraulically limiting layer beneath the base of the EAA
- The Linear Loading Rate (LLR) should be used where there is a limiting layer, to ensure that the effluent cannot return to the surface as it travels downslope
- LLR takes into account slope, depth to limiting layer, soil texture and structure
- Table 6-5 of the Guidelines sets out LLR (L/m/day)

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Table 6-5 Linear Loading Rates

- A4 copy of table follows PowerPoint slides

Soil characteristics			Linear loading rates (litres/metre/day)[1]								
			Slope								
			<5%			5-10%			>10%		
			Depth of natural, unsaturated soil (cm)								
Soil category	Soil texture	Structure	20 - 30	31 - 60	>61	20-30	31-60	>61	20-30	31-60	>61
1	Gravels and medium-coarse sands	Structureless	50	62	75	62	75	87	75	87	99
	Fine sand and loamy sand	Structureless	43	56	68	50	62	75	62	75	87
2	Sandy loams	Weakly structured	43	56	68	50	62	75	62	75	87
		Massive	37	43	50	45	51	57	62	75	87
3	Loams	High/ moderate structured	41	47	53	45	51	57	48	55	61
		Weakly structured or Massive	25	29	32	30	34	37	34	40	46
4	Clay loams	High/ moderate structured	30	36	42	34	37	41	37	43	50
		Weakly structured	25	31	37	27	34	40	30	36	42
		Massive	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Linear Loading Rate calculations

- Single bed or end to end bed designs:

LLR = Design hydraulic load ÷ maximum EAA length along slope

- For beds placed in parallel (stacked) designs:

LLR = (Design hydraulic load ÷ total field area) x total downslope bed width

  - Where:
  - Total field area = (total downslope bed width + interbed spacing) x bed length
  - Total downslope bed width = the number of stacked beds x individual bed width

Linear Loading Rate - scenario

- Scenario absorption bed is 22m² area, Category 1 soil (fine), 2-5% slope, with a limiting layer within 1m of the point of application
- LLR must be <68L/m
- Option 1: Bed is 7m long and 3.2m wide
  - LLR = 1,080 ÷ 7 = 154.3L/m >68L/m ✗
- Option 2: Bed is 19m long and 1.2m wide
  - LLR = 1,080 ÷ 19 = 56.9L/m <68L/m ✓

Linear Loading Rate - scenario

- If the beds in Option 1 were split into 3 beds of 7m long and 1.1m wide, installed in parallel 1m apart:
- LLR = (Q ÷ total field area) x total downslope bed width
- Total downslope bed width = 3 x 1.1m = 3.3m
- Total field area = (3.3m + 2m) x 7m = 37.1m²
- LLR = (1,080 ÷ 37.1) x 3.3 = 96.1L/m, >68L/m ✗
- The beds would need to be 2.1m apart before LLR <68L/m (calculation methodology outlined following PowerPoint slides)

Linear Loading Rate - scenario

- Option 3, if there wasn't sufficient area available to have a bed of 19m long (Option 2), another option would be:
- 2 beds of 11m long, 1m wide, 1m apart: ✓
- LLR = (1,080 ÷ 33) x 2 = 65.5L/m, which is <68L/m
- It doesn't take a significant increase in length to reduce the LLR

Scenario – water and nutrient balances