Table 7-1: Constraints to Total OWM

OWM Constraint	Description	Mitigation
Small lot size or limited available EMA	• Limited area for complete hydraulic and nutrient uptake within an EAA • Limited available buffers • EAA will likely have multiple uses due to limited space	• Minimise wastewater generation (water saving fixtures) • Source separation approaches (WCT systems and greywater recycling) • Improve effluent quality and reduce nutrients (e.g. advanced secondary STS with nutrient reduction) • Minimal footprint for treatment system and EAA • Nominate optimal exposure EAA if possible
Slope - flat or convergent	• Poor drainage • Run-on from surface and subsurface	• Divert all run-on, surface and subsurface • Modify the ground surface • Raised EAA options
Slope - moderate to steep	• Construction challenges • Erosion risk • Design and installation are critical • Future maintenance access	• Upslope diversion drains • Erosion and sediment controls • DIR/ DLR reductions • Pressure dosing for even distribution • Meet LLR requirements • Shallow and narrow trenches or irrigation lines to be installed along the contour • Benching where practical • Retaining wall designs may be suitable • May require geotechnical risk assessment/ advice
Slope instability or mass movement areas	• Onsite effluent application may increase risk of instability • System components may break or fail during movement events	• Minimise wastewater generation • DIR/ DLR reductions • May require geotechnical risk assessment/ advice
Flooding/ periodic inundation	• Water ingress into treatment system or can overload the system, add flood debris and cause system failure • Soil saturation following flood events	• Locate the treatment system and electrical components above the 1%AEP flood level • Locate the EAA above the 5%AEP flood level • Install a pressure seal on lid of treatment systems to prevent water ingress if within flood zone • Install electrical components in a raised position if unable to install treatment system above 1%AEP flood level • Tank anchoring is critical

OWM Constraint	Description	Mitigation
		• Pressure dosed EAA • Flood recovery plan for entire OWMS
Climate (area with heavy rainfall and evaporation)	• Reduced performance of systems that rely only on evaporation processes • Can cause additional run-on to enter the system	• Conservative design, including water balance • DIR/ DLR reductions if no water balance • Upslope diversion drains • EAA with good exposure • Pressure dosed subsurface irrigation preferred. Surface irrigation not recommended • Absorption systems or ETA systems with in-bed wet weather storage recommended • Downslope interceptor bunds/ drains to divert run-off to holding dam • Maintenance and oversight are critical
Climate (cold weather)	• Shallow pipes and components may freeze • WCT and surface installed tanks may operate less effectively • Decrease in efficiency in nutrient uptake • Reduced vial die-off	• Install distribution pipes at greater depth • Avoid shallow or surface pipe designs • Install WCT incorporating a heating element • Avoid surface installation of treatment tanks
Climate (bushfire prone areas)	• Higher chance of system failure from bushfire damage • Shallow PVC pipes may be damaged	• Concrete treatment systems preferred over plastic and fibreglass systems as concrete is more resilient to fire damage • Subsurface effluent application systems in maintained lawn areas • Signage or fencing to protect treatment system and EAA from fire truck damage
Shallow limiting layers (bedrock or water table)	• Limited buffers • Subsoil treatment processes can be short circuited before effluent enters the receiving environment • Groundwater pollution risk • Seepage risk	• Meet LLR requirements • Minimum of secondary treated effluent to reduce required buffers • Raised beds or mounds to increase buffer distance • Imported soil may be required, with its own limitations • Tank anchoring is critical (water table)
Low permeability soils (medium to heavy clays)	• More prone to waterlogging and surface seepage	• Specialist design including saturated hydraulic conductivity testing (category 5b, 5c and 6 soils) • Minimise wastewater generation • DIR/ DLR reductions • Pressure dosing for even distribution

OWM Constraint	Description	Mitigation
		• Alternate dosing between EAA areas (sequencing valve) (e.g. SSI zones or absorption beds) • Shallow application into higher permeability upper layers • Use of raised application methods, such as a sand mound to improve evapotranspiration
High permeability soils (sands and gravels)	• Low nutrient retention capacity • Higher risk to groundwater	• Improve effluent quality including disinfection and nutrient reduction processes • Shallow subsurface application with closely spaced irrigation lines and/ or emitters to maximise evapotranspiration, rather than deep soakage • Even effluent distribution critical across whole EAA as movement will be vertical • Pressure dosing for even distribution • Alternate dosing between EAA areas (sequencing valve) (e.g. SSI zones or absorption beds)
Environmentally sensitive areas[1]	• Protect from the risk of off-site export of contaminants of concern (COCs) contained in effluent.	• Conservative design, including water and nutrient balance • Improve effluent quality including disinfection (double disinfection) and nutrient reduction processes • Subsurface or subsoil application • Pressure dosing for even distribution
Fill or disturbed soil	• Uneven permeability • Uneven settlement • Poor structure	• Additional investigation for design • Careful fill placement and compaction techniques • DIR/ DLR reductions • Pressure dosing for even distribution • Flexible couplings for treatment system and pipework
Off-grid/ solar only sites	• Require no or low energy OWMS	• Energy use for electrical components should be considered in a solar budget, including for AWTS • Primary treatment with absorption system recommended • Passive dosing systems provide a no-energy best practice dosing option • Passive polishing systems can provide low energy options • Specialist guidance required if using DC pumps

NOTES

1. Environmentally sensitive areas include drinking water catchments, oyster aquaculture areas, RAMSAR wetlands, and sensitive groundwater.