Table 7-2: Advantages and Limitations of Conventional OWMS Components

OWMS Component	Advantages	Limitations
Treatment systems		
Septic tank	• Low energy requirement • Ability to handle shock or intermittent flows • Relatively cost effective to increase capacity • First step of passive polishing systems • Basic maintenance	• Primary treated effluent is highly infectious and polluting • Limited EAA options without additional treatment • Lower DLR for EAA, means larger footprint • Higher buffers for EAA • EAA requires greater soil depth
Wet Composting System (WCS)	• Low energy requirement • Viewed as “green” option • Ability to add kitchen scraps • Secondary accredited WCS available	• Majority of WCS accreditations are only for primary treatment currently • Primary accredited WCS limitations as for septic tanks • Limited ability to handle shock or intermittent flows as worms require a constant food-source
Waterless Composting Toilet (WCT) system	• Ability to handle shock or intermittent flows • Minimises wastewater generation • Little effluent to manage	• High operator hands-on maintenance requirements including compost application • Limited compost processes in cold climates • Requires separate kitchen wastewater and greywater management • Specialist management required for sites with large liquid loads
Aerated Wastewater Treatment System (AWTS)	• Higher quality effluent produced • Wide variety of AWTS are commercially available • Low operator maintenance inputs, “set and forget” which is good for rental properties • Greater EAA options • Reduced buffers for EAA • Can be cheaper installation cost than passive application options • Small treatment system footprint for 8-10 persons • Regular servicing provides additional oversight and knowledge • NSW Health accredited STS now tested for shock and intermittent flow	• Limited ability to handle shock or intermittent flows unless system designed for such (NSW Health accredited STS now tested for shock and intermittent flow) • Ongoing maintenance requirements including costs of service contract • High sensitivity of performance to poor maintenance • Continuous energy requirement. Specialist design for ‘off-grid’ sites required • Cost of power • Not all remote areas have service agents readily available
Aerobic Sand and Media Filter (ASMFS) system	• Higher quality effluent produced • Ability to handle shock or intermittent flows • Low energy requirement	• Sand may not be available locally • Maintenance often left to owner/ operator discretion, with variable results

OWMS Component	Advantages	Limitations
	• Greater EAA options • Reduced buffers for EAA • Minimal running cost • Custom sized to flows	• Costly damage to sand filter if primary treatment tank not maintained • Higher installation cost • Treatment system footprint can be larger as must include primary treatment prior to ASMFS
Constructed wetland	• Higher quality effluent produced • Low energy requirement • Viewed as “green” option • Basic owner/ occupant completed maintenance • Greater EAA options • Reduced buffers for EAA • Minimal running cost • Custom sized to flows • Nitrogen reduction	• Maintenance often left to owner/ operator discretion, with variable results • Costly damage to wetland filtration if primary treatment tank not maintained • High installation cost • Treatment system footprint larger as must include primary treatment prior to wetland and requires separate EAA
Passive polishing systems		
Mounds	• Can overcome shallow soil limitations (low permeability soils, shallow groundwater) • Passively improves effluent quality • Low health risk. Subsurface application provides separation to occupants • Primary or secondary treated effluent suitable	• Energy requirement as pressure dosing required • Higher installation costs Not suitable in moderate slope (>15%) areas due to risk of toe seepage • Mound can neutralise available space in smaller lots
Bottomless sand filter	• Can overcome shallow soil limitations (low permeability soils, shallow groundwater) • Passively improves effluent quality • Low health risk. Subsurface application provides separation to occupants • Primary or secondary treated effluent suitable	• Energy requirement as pressure dosing required • Higher installation costs Not suitable in moderate slope (>15%) areas due to risk of toe seepage • Mound can neutralise available space in smaller lots
Pipe, textile and sand systems (AES and Eljen)	• Passively improves effluent quality • Low health risk. Subsurface application provides separation to occupants • Primary or secondary treated effluent suitable • Can be installed in raised formation for shallow soils	• Limited installers

OWMS Component	Advantages	Limitations
Recirculating evapotranspiration channel systems	• Reduces effluent volume or no release option • Improved effluent quality • No limitation from shallow or no soils	• High cost of installation and initial pump out cycle prior to vegetation canopy establishment • Concentration of salts within no release option needs addressing in maintenance • High maintenance cost and specific maintenance regime • Relatively large footprint of pods with large vegetation canopy for most effective performance
Amended soil mounds	• Phosphorus reduction • Additional polishing treatment if correct sand media used	• No additional treatment • Poor effluent distribution in surrounding EAA • Limited effectiveness for clay soils
EAA systems		
Absorption systems	• Robust • Low energy requirement • Smaller footprint than irrigation • Accounts for wet weather storage and variations in flow • Long life, especially if pressure dosed • Low health risk. Subsoil application provides separation to occupants • Primary or secondary treated effluent suitable	• Large EAA in low permeability soils (medium to heavy clays) • Specific design required and potential for construction challenges in moderate slope (>15%) areas without specific design • Requires deeper soils • Higher installation costs than irrigation • Higher installation impact (construction and established trees)
Evapotranspiration Absorption (ETA) trench/ bed systems	• Low energy requirement • Smaller footprint than irrigation • Accounts for wet weather storage • Long life, especially if pressure dosed • Suitable for lower permeability soils • Low health risk. Subsoil application provides separation to occupants • Primary or secondary treated effluent suitable	• Beds not suitable in moderate slope (>10%) areas without specific design • Requires deeper soils • Higher installation costs than irrigation • Higher installation impact (construction and established trees)
Wick system	• Improved evapotranspiration over absorption alone • Reduced cost to equivalent ETA trenches or beds • As for absorption and ETA systems	• Risk of geotextile fabric clogging if installed at base of trench • As for absorption and ETA systems

OWMS Component	Advantages	Limitations
Subsurface Irrigation (SSI)	• Beneficial re-use of effluent suitable for lawn and garden areas • Can be installed around mature tree driplines • Relatively low cost • Low health risk. Subsurface application provides separation to occupants • Minimal construction impact • Pressure compensating drippers reduce the risk of slight variations in slope and zone shape • Minimal soil depth required	• Requires minimum of secondary treatment. Effluent is commonly disinfected • High quality effluent essential or blockages occur • Well maintained system required • Larger footprint • Not suitable in steep slope areas (>30%) without specific design • Moderate risk of damage due to shallow depth • Can have a shorter lifespan than trenches/ beds • Risk of freezing in cold climates
Surface Irrigation (SI)	• Minimal construction impact • Low cost • Beneficial re-use • Minimal soil depth required • Direct evaporation if not raining • Improved large droplet sprinklers available	• High health risk. Potential human contact with effluent, especially in small lots or highly trafficable areas • Requires minimum of secondary treatment and disinfection • Larger footprint • Larger buffers for EAA • Not suitable in heavy rainfall climate areas • Not suitable in moderate slope areas (>10%) due to risk of run-off, especially in wet weather • Risk of spray drift • High risk of damage • High risk of misuse (movable sprinklers) • Risk of freezing in cold climates

Table A5-4: Emergency Management of OWMS

Emergency Situation	Description	OWM Mitigation
Heavy rainfall	• Saturates soil and enters treatment system components • Increased run-on and runoff in EAA	• Seal components against water entry • Reduce ground surface around treatment system and surcharge gully • Maintain good stormwater diversions and cut-off drains for subsoil moisture above treatment system and EAA • Fill in any dips or hollows in EAA to encourage stormwater runoff • Avoid use of flooded OWMS components • Pump out flooded components using a liquid waste contractor. Refill to 2/3 full with fresh water following pump out

Emergency Situation	Description	OWM Mitigation
Flooding	• Flood water ingress in treatment system including sediment • Damage to electrical components • Solids carryover to EAA • Flood waters saturate EAA	• Prepare for flood event by turning off electrical components and seal off low-lying openings where practical • During flood event, avoid contact with contaminated flood water and minimise water usage within house • Avoid use of flooded OWMS components • Pump out flooded components using a liquid waste contractor. Refill to 2/3 full with fresh water following pump out • Contact service technician and/or licensed plumber for system recommissioning before using again after a flood • Check for pipe blockages within house and OWMS delivery lines • Check for potential hydrostatic uplift of tanks • Dry out electrical control and/or fuse boxes and contact a licensed electrician before turning on again. May require replacement of submerged electrical components • EAA may need to be replaced or refurbished in the event of solids carryover • Spray irrigation nozzles or subsurface drippers should be checked and replaced
Bushfire	• Damage to structural integrity of tanks (particularly plastic and fibreglass) • Damage to PVC pipes and plastic irrigation pipework (surface and shallow subsurface) • Pumps and electrical component damage • Use of wastewater or effluent for firefighting water source	• Reduce flammable items around OWMS • Install a sign on the treatment tank to clearly identify that it is not suitable for firefighting water source • Prepare for bushfire event by turning off electrical components • During bushfire event, minimise water usage within house • Avoid use of damaged OWMS components • Contact service technician and/or licensed plumber for system recommissioning before using after a bushfire • Check for tank damage • Check for pipe blockages and damaged pipes within house and OWMS delivery lines • Contact a licensed electrician before turning on electrical components • Spray irrigation nozzles, shallow pipes or subsurface drippers should be checked and replaced
Electrical outages	• Reduced treatment system performance	• Contact a licensed electrician before turning electrical components on again • Contact service technician and/or licensed plumber for system recommissioning