Section Six

Selecting an On-site Sewage Management System

6.1 INTRODUCTION

The developer or landholder can use the information generated by the site evaluation (see Section 4) to help choose the best on-ste sewage management system for the site. It is important when choosing a system to ensure that the **most limiting** site and soil features are identified and used as a basis for selection.

Various combinations of on-site system processes are possible, and not all on-site sewage management processes may be suitable or desirable at all sites. For example, some local councils will not allow the use of septic tanks with absorption trenches or pump-out facilities in their areas.

A thorough knowledge of available systems is needed - including their operation and performance - to make sure that the correct system is selected for the site. (See Section 5 for information on the various wastewater treatment and land application systems and their management.)

It might be helpful to start from the site and soil constraints and work 'backwards' through the treatment train. That is:

- decide on an appropriate land application system based on site and soil features
- work out the required effluent quality, based on the site sensitivity and land application area design
- finally, choose the treatment and ancillary systems needed to achieve the effluent quality.

6.2 IMPORTANT CONSIDERATIONS

6.2.1 GENERAL

When you are selecting an on-site sewage management system, many important issues need to be considered, including:

- the sustainability of the chosen system
- the expectations of the future residents of the development and their likely commitment to proper operation and maintenance of the system
- site suitability, including environmental sensitivity
- system reliability and the quality of service offered by the manufacturer (if any)
- the availability of service agents in the area and their quality of service
- system cost

- system lifespan:
  - would on-site management be a long-term management strategy, or only an interim measure before connection to a centralised sewerage system?
  - would the chosen system need to be replaced or refurbished?
- the cumulative public health and environmental impacts of present and possible future on-site sewage management systems within the catchment
- the development of contingency plans in case of system failure
- the impact of the system on the amenity of the area.

6.2.2 CLIMATE

In some areas of New South Wales, heavy rainfall patterns make it difficult to apply effluent to land for some or all of the year without contaminating run-off from the site. In these cases, alternative options for on-site sewage management are needed; the initial option to consider is to provide some form of centralised sewerage system.

Other suitable options might require greater commitment by the resident, or changes to the design, such as a larger land application area. Remember that the performance objectives of the guidelines must be met, and this means containing all pollutants on-site.

Apart from sewering the development, which has the dual benefit of allowing more appropriate management of wastewater and smaller block sizes, it may be possible to investigate the following:

- **Decrease the hydraulic and nutrient load.** The implementation of wastewater and nutrient reduction initiatives such as the use of low phosphate detergents, composting toilets, effluent recycling, and water-saving shower heads, taps and appliances, can lead to significant reductions in irrigation area and wet weather storage requirements.

- **Provide on-site wet weather storage.** If wastewater cannot be applied to land (because of the possibility of surfacing and run-off of wastewater) for a small period of time, consider putting in on-site wet weather storage. This storage must be in the form of enclosed tanks to ensure public health protection. A balance between irrigation area size and volume of storage can be achieved by considering rainfall patterns and optimum irrigation levels, although a minimum storage capacity of three days is recommended.

  Also consider installing soil moisture sensors attached to automatic pumps; these ensure that treated wastewater is applied at the appropriate time and rate to prevent irrigation when the ground is saturated. If wet weather storage facilities are provided, then they must be managed properly, and this includes ensuring that the storage facility is empty when it is not being used. For wet weather storages to work well the householder needs to be committed to their management. To estimate the wet weather storage volume needed, see the water balance methods explained in Section 4 and Appendix 6.

- **Treat effluent to a higher level.** It might be possible to reduce the pollutant load transferred to the soil by treating the effluent to a higher level. Options include using recirculating sand filters, sand mounds, or amended soil structures. Wet weather storage will generally still be required. Councils may need to undertake an analysis of the risk to the environment and public health from permitting a given level of wet weather discharge in order to allow area and storage trade-offs to be made. This might require some form of catchment or LGA modelling to ensure an informed decision is reached.

- **Increase the size of the land application area.** In certain climates it might be possible to increase the size of the land application area, thus reducing the application rate and possibly reducing the wet weather storage requirement. Although some compromise may be achieved, the storage should not be reduced below a three-day minimum. Manage the irrigation area carefully so that effluent is applied evenly to minimise the likelihood of topsoil erosion and effluent run-off.

- **Investigate other technologies and management practices.** These should focus on containing all pollutants within the boundary of the premises without disposal to groundwater. It may be necessary to find new ways to apply systems or processes such as sealed evapotranspiration mounds, waterless composting toilets, effluent recycling systems, advanced instrumentation, and process control, to suit special circumstances.

- **Investigate partial on-site sewage management systems.** Instead of providing a large wet weather storage, a small storage might be sufficient for the drier periods of the year, with a pump-out and treatment at a central location provided for excess effluent in the wetter periods when irrigation cannot be used. This will need to be done with the cooperation of the local sewerage operating authorities.

6.2.3 WASTE STREAMS

When you are selecting an on-site sewage management system it is important to be aware of the individual waste streams that make up the total waste stream. These individual streams are often described as blackwater (flushing toilet waste and human excreta) and greywater (kitchen, bathroom and laundry wastes). Each of these can be managed separately or together when you are choosing the components of a treatment system. If you are considering separate systems, it is important to ensure that **both** streams are managed to conform with the performance objectives of these guidelines (for example, if a composting toilet is to be installed, then you must plan to manage the greywater separately).

6.2.4 SYSTEM COMBINATIONS

Different combinations of treatment and land application systems can be used for the **same** waste stream. Not all unit processes are compatible (for example, chlorinating septic tank effluent is not an efficient process because of its high suspended solids content). A competent professional should investigate the integration and compatibility of systems. With all system combinations, the waste stream should be managed to conform to the performance objectives of these guidelines.

Table 16 shows typical combinations of treatment and application systems. This should help in the selection of an appropriate sewage management system.

Table 16: On-site Sewage Management System Combinations

Effluent Management System	Human Waste Treatment Device	Possible Waste Stream(s)	Also requires	Optional Processes in Sensitive Areas
Subsurface irrigation	AWTS	Total Wastewater	Septage removal Wet weather managment protocol	Disinfection Constructed wetland
	Septic Tank	Total Wastewater or greywater or blackwater	(a) recirculating sand filter or (b) amended soil system or (c) sand mound Septage removal Wet weather managment protocol	Disinfection Constructed wetland
	Wet composting toilet	Total Wastewater and food wastes	(a) recirculating sand filter or (b) amended soil system or (c) sand mound Compost burial on-site Wet weather managment protocol	Disinfection Constructed wetland
	Waterless composting toilet	Human excreta and food wastes	Compost burial on-site Excess liquid should be managed as per total wastewater stream	
	Greywater treatment device	Greywater	Septage removal Wet weather managment protocol	Disinfection Constructed wetland
Surface spray, trickle and drip irrigation	AWTS	Total Wastewater	Disinfection Septage removal Wet weather managment protocol	Constructed wetland
	Greywater treatment device	Greywater	Disinfection Septage removal Wet weather managment protocol	Constructed wetland
Soil absorbtion (conservative design approach must be adopted)	AWTS	Total Wastewater	Septage removal	Disinfection and Constructed wetland
	Septic Tank	Total Wastewater or greywater or blackwater	Septage removal	Disinfection Constructed wetland Recirculating sand filter Amended soil system Sand Mound
	Wet composting toilet	Total Wastewater and food wastes	Compost burial on-site	Disinfection Constructed wetland Recirculating sand filter Amended soil system Sand Mound
	Waterless composting toilet	Human excreta and food wastes	Compost burial on-site Excess liquid should be managed as per total wastewater stream	
	Greywater Tank	Greywater	Septage removal	Disinfection Constructed wetland
Pump-out system or common effluent system (pump-out systems are not usually viable in the long-term)	AWTS	Total Wastewater	Septage removal Effluent storage (for pump-out)	
	Wet composting toilet	Total Wastewater and food wastes	Compost burial on-site Septage removal Effluent storage (for pump-out)	
	Septic Tank	Total Wastewater or greywater or blackwater	Septage removal Effluent storage (for pump-out)	
	Waterless composting toilet	Human excreta and food wastes	Compost burial on-site Excess liquid should be managed as per total wastewater stream	
	CES pre-treatment device	Total wastewater	Septage removal	
	Greywater Tank	Greywater	Septage removal Effluent storage (for pump-out)	