**On-site Wastewater Management Training Course Day 1 FAQs**

**On-site Wastewater Generation**

Q: 1) Do EP rates change for different types of development? e.g. Sydney Water shows EPs for different forms of developments

2) Do councils or authorities provide EPs we need to follow or will it always be better to determine ourselves?

A: 1) Yes EP rates vary for different types of developments. Most Sydney Water EPs would be for sewered developments and may be different to EPs used for development with On-site wastewater systems. The Australian/New Zealand Standard AS/NZS1547:2012 and the various State Codes and Guidelines present figures for different types of developments. For residential developments, they may be based on occupancy per bedroom. For non-residential developments they are often estimates which try to identify an equivalent number of persons, relative to a residential development.

2) Councils often require use of particular figures which may be based on a Standard, Guideline or Code or on figures historically used by that Council. Again there is variation so it is best to check what local regulators require.

**Septic Systems**

Q: Looking at primary treatment systems from a shellfish quality point of view in the Abrolhos Islands, WA. Saltwater likely used to flush toilets into primary treatment vessels on the shoreline. Under occupancy and saltwater probably reduced effectiveness of these systems. How would it be possible to assess their function?

A: All primary systems (if working properly) will generate sludge. This is resistant biological material or inorganic solids (grit) that will continue to accumulate over time. Any system designer/installer that says differently is being deceptive. In low loading systems, the time before de-sludge is required may be many years (5-10+).

Q: Is it suitable to have a septic tank in front of an AWTS? Does the septic tank work as a suitable balance tank if the AWTS is slightly small for the daily load?

A: Retaining a septic tank 'in front' of an AWTS (assuming it's not a 2-tank system) has the potential to rob the AWTS of the BOD load it has been designed to cater for. This can cause problems associated with under-loading such as foaming and poor settling characteristics.

A2: Yes, but it depends on the AWTS being used, as some have another tank for the septic waste inside. Need to check which AWTS is to be used, but some form of primary treatment of the waste is essential.

*I'm referring to a single tank AWTS.*

*We have a few historical systems like this.*

A: The septic tank remains a displacement system (volume in = volume out), so it will not provide 'balancing' in the operative sense. It can protect against surges, but if you need flow balancing, there will need to be some timed release provision.

*Q: In SA, authorities and SA Health won't allow a septic tank to be fitted in front of an AWTS, is this consistent across the Country? The current SA Health Code (which is being revised, so maybe this will change) BOD loading rates need to be increased by 40% if direct sewer to AWTS, so could be helpful in some sites.*

A: Thanks, I agree (see my previous answer). It is particularly problematic when the AWTS design relies on the BOD load (e.g. activated sludge processes).

A2: Some AWTS have relatively small primary chambers and this may result in too high a flow of organic material to the aeration chamber for aerobic processes to adequately handle. Also treatment of high volumes of organic material at the aeration stage may result in significant sludge generation, which again the sludge return system may not be able to cope with terribly well - it is all a matter of balance!

Q: Are there overflow provisions for septic tanks?

A: Typically a septic tank would "overflow" into the land application system, the trench or bed. Very high throughflows increase the likelihood of solids transfer to the trench or bed which will increase the potential for clogging of the soil. An outlet filter can help protect the drain field from solids carry-over.

**Other Primary Treatment Systems**

Q: How do we deal with vermiculture systems and the resultant compost?

A: The worm casts and sludge accumulate in these wet systems. It has to be removed, usually when the annual maintenance occurs. I don't know what contractors actually do with it, but typically it should be buried. With greywater reuse by diversion whether gravity or pumped, it too should be subsurface. I know in fact in many situations it is not, but the public health view is that it should go subsurface because it has essentially not been treated.

Q: With the gravity diversion does it need to be subsurface?

A: Generally, untreated (greywater) or Primary treated (effluent) should be disposed of subsurface.

**Sand and Media Filters**

Q: Would a sand filter be suitable for areas that are primarily clay loam?

A: Lined sand filters are not limited to specific soil types as the treated effluent would then go to a separate land application area with DLR or DIR selected according to the soil. Bottomless sand filters need to be sized such that their basal area is appropriate for the soil at the relevant loading rate for the soil. The effluent can, however, be loaded at the Secondary loading rates described in Table L1 of AS/NZS1547:2012.

Q: Do you have to have a wood chip covering layer? Is this solely for a visual purpose or does it serve a purpose?

A: Surface finish is optional; the sand filter can be open or covered. Woodchip or gravel are common options, but also some are turf covered.

Q: If you had a wet climate, and you went for a contained (not bottomless) sand filter, would you have to put a rain guard structure over the top to keep extra load out?

A: That is an option as keeping heavy rain out is important. A cover would, however, reduce evaporation. Cost often discourages covers. I have seen some in wet areas of New Zealand which appear to work well. Another option to shed rainfall is a domed or sloping turf cover.

Q: How long do the foam or fabric filters last before they need to be changed?

A: The foam has a very long service life. It becomes a bit discoloured, but can be hosed down occasionally to remove any biofilm which builds up. The same applies to fabric.

A2: All materials such as foam or fabric (or anything that accumulates organic material) have a finite life which depends on effluent quality and loading rate. Typically their life should be in the order of some years. Of course, maintenance will help with the life of any system.

**Treatment Wetlands**

Q: Can subsurface flow systems be used as a sports field?

A: Subsurface irrigation can be used for that purpose. We have been involved in a number of projects where irrigation of sports ovals and recreation areas are used for effluent reuse. It makes sense as they are typically well exposed to sun and wind and regularly maintained.

A: The surface of the wetland needs to remain open to the atmosphere for oxygen transfer and the plants (reeds) provide an important function in treatment processes, so removing the plants and covering the wetland would be counter-productive I'm afraid.

Q: Does anybody know the life of the plants? Or are you better off trying to keep younger plants that are more active for the process?

A: It all depends on the species. As most are rhizomes, they will spread by tuber roots and re-populate areas where density is lower. As with all plants, they will go through ebbs and troughs in growth. Slow-down in winter is common and is a contributing factor to performance.

Younger plants will grow faster as they establish themselves but research/experience shows plants will always quickly return to a consistent growth rate. Resource utilisation (particularly nutrients) is surprisingly low as wetlands are good recyclers.

Q: Are you required to remove plants if they get too large and manage the space?

A: Active management of the plants (i.e. harvesting) is not necessary. They are largely self-regulating, although some species will always tend to dominate. Biomass harvesting has been trialled as a way to increase nutrient uptake/capture, but has largely been abandoned as a management process.

A: Like most biological systems, diversity is key and provides robustness in the event of disturbance. Management is usually required to reduce the mass of species that start to dominate the system. There are a number of techniques that have been developed to assist, such as flooding of the bed.

Q: Has mosquito/insect breeding been a problem for these types of systems?

A: With surface flow wetlands, yes. That is why subsurface-flow wetlands are more common nowadays, particularly for smaller domestic systems.

Q: Would going on holidays for weeks at a time and not producing waste be a major problem for this system?

A: Not really. The system would have a hydraulic reserve in the bed and would still receive rainfall, so drying out shouldn't be an issue. Wetlands are not dependent on wastewater inputs, we merely utilise their benefits for wastewater treatment. The plants will find the nutrients they need regardless.

A: Thanks for the interesting discussion on this topic. There have been lots of glasshouse type studies looking at where the nutrients go either in plant uptake or adsorption into the media. Adsorption into the media is likely to be very low where it is large and coarse and plant uptake is limited anyway. Plants like extra nutrient and as we know they respond very well to soluble fertilisers. They have a limit though and any which they don't need or is surplus to the system will pass through the wetland. What this means is that we have to acknowledge the limitations of these systems in terms of removing nutrients this way.

**AWTS**

Q: What would be considered suitable documentation to confirm nutrient reduction levels of the newly accredited AWTS? (When not specified on the accreditation).
We have received documents from a couple of manufacturers with graphs and average influent and effluent rates of Phosphorus and Nitrogen – is this sufficient? (Results have included Phosphorus reduction down to 7.48mg/L).
We have consultants relying on these values to propose a smaller area for nutrient uptake. Can we accept this?

A: My view is that I would only accept nutrient removal performance data that relates to that specific model. They should have it and be able to provide it if they have been through the testing process. I will see what others have to say on this as they are more familiar with the AWTS accreditation process.

*Q:* We have only been applying those values to the applications/sites proposing that particular AWTS. Otherwise we apply a standard value for expected effluent quality. But these results are often being provided by the manufacturer via email, etc. there is no formal certificate or data analysis. Is this okay to accept?

A2: I would agree as most, if not all manufacturers, have removed any reference to nutrient removal efficiency (or values) from the accreditation. In most cases, I think it is reasonable to assume 30mg/L N and 10mg/L P is achievable in a properly sized and maintained AWTS.

Q: Can you please give an example of when a secondary treatment system like a sand filter might be more appropriate or preferable to an AWTS, noting that both still need an appropriately sized discharge area.

A: A sand filter might be preferred if a more passive system is sought, or power availability limited. Sand filters generally show more consistent performance than AWTS and are better able to deal with intermittent loads, so are better suited for intermittently occupied premises such as holiday homes.

Q: So to confirm, if it’s not listed on their accreditation then we can’t use those values?

A: Most manufacturers have little or no nutrient data. Always, nutrient output is related to input, so percentage reductions are not reliable in determining absolute outputs. I would agree that 30mg/L N and 10mg/L P would be reasonable expectations, so unless a designer can provide actual

representative test data that verifies improved performance, no further concessions in land application area design should be accepted.

**Soil Assessment**

Q: Is DLR based on soil permeability or infiltration?

A: Soil permeability can be measured in the field or lab and is usually done with clean water. The DLR which is used in design is much lower than clean water permeability and is based on the development of a biomass (i.e. clogging) as effluent is loaded throughout the system.

Q: Where soils have been extensively mapped and characteristic for an area can this information be assumed without site specific tests?

A: I would be cautious about that approach. Soils can vary broadly from the norm, within relative short distances. State and regional level mapping is high-level. It is mostly mapped from vegetation indicators and satellite imagery and backed up with limited ground-truthing. But, for sanity checking, assuming broad soil descriptions from the database is a reasonable approach to take, particularly if you're a regulator trying to make sure a consultant isn't fudging the results.

A2: Soils mapping is commonly on a broad scale, yet soils vary considerably within broadly mapped soil groups. The benefit of site specific soil tests are that they capture the actual soils on which the effluent will be applied. Equally soils mapping does not always describe soil textures and it is textural class which is used in assigning loading rates. In my opinion, site specific tests are more reliable, but in the absence of site specific tests, soils mapping can provide useful guidance. It is important to understand the nature of the limiting layer in wastewater design; this is usually a subsurface layer, 600mm below the point of application. Care must be taken if soil mapping has been done for agricultural purposes, as this may just describe surface soils.

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