HOW EPA VICTORIA AND EPA NSW IMPEDE ECOLOGICALLY SUSTAINABLE DEVELOPMENT

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Abstract

Neither EPA contains adequate expertise commensurate with its responsibilities in on-site wastewater management (OSWM). The EPA of Victoria has decided not to accept AS/NZS 1547, and has developed its own curious and unscientifically based prescriptive guidelines. If one were to follow these guidelines, it would mean that roughly 90% of Victoria would be deemed unfit for OSWM. This must drive people onto the sewer, which is generally less ecologically sustainable than OSWM.

NSW EPA has taken a different course. Because it has yet to appreciate that OSWM will become a major focus of its work, it has retreated from its former activity in this field through legislative and administrative means. However, it cannot wholly succeed in not being involved, but because of its decreasing involvement, its understanding of OSWM must decrease, so that its decisions and determinations do not always correspond with the actual level of risk. As a result, the EPA is frequently forcing public and private bodies to undertake costly sewerage works, with the environmental effects not always being beneficial, and too often being adverse. The cost is that Ecologically Sustainable Development is impeded.

Keywords

AS/NZS 1547, EPA, ESD, NSW, on-site wastewater, on-site, sustainability, Victoria

1 Introduction

All governments of Australia subscribe to the principles of ecologically sustainable development. This commitment is expressed in several Acts in both Victoria and NSW.

This paper provides examples to illustrate our thesis: that in the field of on-site wastewater management (OSWM) the Environment Protection Authorities (EPAs) of Victoria and New South Wales impede ecologically sustainable development (ESD). We think that this stems partly from a lack of corporate self-confidence of their roles in OSWM, and from not having adequate staff with a good grounding in this field.

It is inevitable and natural that EPAs should be confronted and perhaps attacked by proponents of development of industry, and there is a danger that this can lead to a siege mentality. If this is coupled with a reduction in funding, there may be a temptation to compensate for this by avoiding the more difficult tasks and issues, and attacking easy targets.

Like many of their counterparts in other States, the challenges faced by both agencies in protecting the environment have been steadily increasing, while over the last decade the funding supplied by government has been ever more constrained. This has often meant that their staffs have been stretched and under-resourced. This seems to have lowered morale so that turnover of staff has increased, and expertise has reduced.

The field of OSWM can entail understanding soil physics, groundwater hydrology, microbiology, wastewater engineering, plant physiology, thermodynamics and sociology, to name a few disciplines. To an under-resourced, under-trained bureaucrat, having to gain an appreciation of these would seem a daunting task. This may explain the historically ambivalent involvement of the Environmental Protection Authority of NSW (EPA-NSW) in this field, and the strenuous adherence of the Environmental Protection Authority of Victoria (EPA-Vic) to what we shall show below is a simplistic, prescriptive, unscientific, and illogical approach. Both strategies are adverse to the principles of ESD.

It has become increasingly apparent that OSWM can fulfill a useful role in urban areas that were traditionally serviced by centralised sewerage. Properly designed and operated on-site systems are usually cheaper than centralised sewerage, and can result in much less pollution. They can also recycle the water more efficiently.

To explain, centralised sewage treatment plants must have an EPA licence to discharge to a watercourse. This licence allows them to pollute the watercourse, albeit occasionally: properly designed on-site systems do not pollute. Centralised systems are substantially more expensive than on-site systems. Centralised systems that produce the same environmental outcomes as on-site systems can be 2 to 5 times as costly. If a single on-site system fails, it is less of a hazard to people and the environment than if a centralised system fails. If the household is healthy, there will be no disease in the wastewater, while the sewage in a centralised system always contains pathogens. An on-site system will normally fail slowly, providing advance warning, while failures of centralised systems can be catastrophic. Localised on-site systems are much more conducive to recycling than centralised systems. These advantages of on-site systems render them more sustainable than centralised systems.

While we acknowledge that there are still areas where centralised sewerage is more appropriate than OSWM, such as in high-density urban areas, recent advances in technology and management systems for OSWM have reduced the areas dominated by centralised systems substantially.

Neither EPA has yet appreciated that OSWM should be a major focus of its concerns, and neither have officers with qualifications and experience in this field.

2 Environmental Protection Authority of NSW

EPA-NSW seems to have pursued a strategy of concentrating on point-source pollution. This has resulted in an increasing abrogation of its responsibilities in the field of non-point source pollution. Three major generators of non-point source pollution are poor agricultural practices, stormwater pollution and on-site wastewater management. This paper deals with the third of these – effluent from on-site wastewater management systems.

EPA-NSW acknowledged in a personal communication in 1992 that it needed to improve control of non-point sources. But until now its scattered approach suggests that this is not a core concern. Where it has had to be involved, it has all too frequently acted from a basis of ignorance as will be illustrated below.

3 Standards and Guidelines

With all other pertinent regulators, EPA-NSW and EPA-Vic were invited to join the Joint Standards Australia/Standards New Zealand Committee WS13/3 preparing AS/NZS 1547 (2000). After a year or so, EPA-NSW did send a delegate. It was gratifying to observe how this delegate started to make pertinent contributions, to the effect that the Standard needed to ensure that on-site systems do not pollute and that they do promote the concept of ESD. Unfortunately after about three meetings, no EPA-NSW delegate turned up any more.

Not only did it curtail its contribution towards this Standard becoming a means of helping us all move towards ESD, but the opportunities for the EPA-NSW to learn more about on-site wastewater management were reduced.

EPA-Vic also sent a delegate episodically, the last only 3 years after the work of the Committee started. It seems that EPA-Vic disagreed with how to assess the capability of land for applying wastewater, but it did not argue its case in the Committee. We understand that EPA-Vic voted against the Standard.

We find too, that it ignored the findings of the substantial body of knowledge and experience within the Australia – New Zealand Committee, and proceeded to develop its own idiosyncratic land-capability rating system. The rating system developed by EPA-Vic is substantially at odds with the Standard's guidelines and it has steadfastly refused to provide the empirical and scientific basis on which it relies.

4 Assessing Land Capability in Victoria

The recent Information Bulletin (Publication 746) issued by EPA-Vic has the effect of minimising the areas in Victoria where on-site systems may be installed. The EPA defended it on the grounds that AS/NZS 1547 did not address Victorian land and soil conditions adequately. The Bulletin uses factors such as annual rainfall, annual pan evaporation, soil structure, sodicity and salinity to rate the capability of future sites. Any single factor in this table can be used to condemn a site. Many of these factors are unwarranted or irrelevant: only two of the 15 are valid. Here are some examples.

The rating table says that all areas receiving more than 1000 mm of rain are considered to be "very poor" and hence incapable of being used for a standard trench system. Many OSWM systems throughout Victoria work well where rainfall exceeds 1000 mm. Were this not the case, it would have been known worldwide long ago. This factor disqualifies perhaps 20% of the State. Even more than 750-mm rainfall results in Class 4 'poor' and hence also unsuitable according to EPA. This covers half the State.

Massive soil structures, i.e. single-grained soils are out, disqualifying much of the Mallee. Yet we know that massive soils can have a very high micro-porosity and be excellent for effluent disposal and purification.

Salinity, measured as more than 4 dS/m would not preclude very many grasses, shrubs and trees, yet it would eliminate much of the irrigation land in Northern Victoria for OSWM. *Non - saline* soils with ECe from 0.8 to 2 dS/m are regarded as only moderately satisfactory.

Seasonal water tables including perched watertables are to be deeper than 5 m for the land to be classed as "very good", and as "very poor" if less than 1.5 m deep. For a site to be "fair" there should be no saturation of the soil at depths less than 2 m. It would not be difficult to prove that after a heavy rainfall, almost all areas in the State have a perched water table at the surface. Brouwer (1982) showed that absorption and treatment continued even if there was a periodic perched water table.

This Bulletin shows ignorance of soil physics, and contains inconsistencies and illogical conclusions. For example, on Pages 6 and 14 a Rating of 4 "poor" means that the land is suitable for on-site systems but very high engineering inputs and close supervision would needed. However, on Page 10 the readers are advised that Rating 4 should be deemed as unsuitable or "very poor". Which shall it be? Also, on the one hand the rating table states that increasing amounts of stones in a soil reduce the amount of soil available for wastewater remediation, and that increasing depth of soil increases the opportunity for remediation. Yet, this rating system does not allow increased soil depth to compensate for increased stoniness.

Sodicity, soil shrinkage and permeability are incorrectly defined. Sodicity is defined as "the amount of sodium in the soil" instead of as the percentage of exchangeable sodium on the cation exchange complex (CEC). This means that of two soils, the one with a low "content" but a high relative proportion of sodium on the CEC, will be more sodic than the other soil with a high "content" but a low proportion of sodium. Shrinkage is defined as a change of 'state' between wet and dry conditions. Is 'state' a synonym for volume? Permeability is simply "the rate at which water moves through a soil profile", in contradiction to Darcy's Law.

This Bulletin received only cursory public input. We know of no Victorian consultant practising in the field of OSWM who was invited to comment. Nor are we aware of comments by any relevant experts in the Victorian universities, CSIRO or the Department of Natural Resources and Environment.

5 Water balance

A few years ago, EPA-NSW was a member of an Inter-Departmental Committee that was preparing the NSW Government Guidelines for On-site Sewage Management for Single Households (DLG, 1998). We are not privy to what transpired at this Committee, but we do know of one contribution that EPA-NSW made to this document. This was on how to do a water-balance calculation. We know that this was a contribution by EPA-NSW because it was copied from a draft document of the EPA-NSW (1995) "Draft Guidelines for the Utilisation of Treated Effluent by Irrigation".

This draft document was never published in final form, we suspect, in part, because it had been so heavily criticised. One of the main points of criticism was the method for calculating the water balance. Despite this criticism, the EPA put this method forward as part of its technical contribution to the Guidelines.

In p. 23 of the Draft Guidelines and p. 117 of the Guidelines, we read that the expression for water balance is Equation 1, when it should be as in Equation 2.

$$\text{precipitation} + \text{applied wastewater} = \text{evapotranspiration} + \text{percolation} \quad (1)$$

$$\text{precipitation} + \text{applied wastewater} = \text{evapotranspiration} + \text{percolation} + \text{runoff} \quad (2)$$

The Draft Guidelines state that there should be no runoff of effluent, yet the true meaning of Equation 1 is that there should not even be runoff of rainwater. Thus, the land-application area needs to be very large. It is not surprising therefore, that the Guidelines states (p.11) that residential developments require at least 4000-5000 m^2 per household to reduce impacts in the medium to long term.

As a result, we have had councils, such as Blue Mountains, advising that properties with areas less that 4000 m^2 need to have pump-out. Pump-out is an expensive energy-wasting option that the Guidelines advise against (p. 124). The intransigence of EPA-NSW has thus resulted in Councils requiring on-site systems to be installed that were contrary to ESD.

In the meantime, EPA-Vic has also adopted this concept of a water balance. The Draft Guidelines "Domestic Wastewater Management in Sewered Areas" are based on the principle that plants must use all wastewater and nutrients, and therefore the effluent must be stored in seasons that rainfall is adequate. There shall be no percolation of effluent to a groundwater table, except for rainfall. How one can design a system that will allow rainwater to bypass water from effluent being held in the soil is not explained.

The storage requirement for a three-bedroom home in the Melbourne area works out to be 240,000 L. The cost of this will help ensure that people who wish to treat and reuse their effluent in their gardens will not be tempted to try.

6 Incomprehension of Darcy's Law

EPA-Vic has frequently insisted that soil permeability testing must be carried out during a time in winter when the soil is saturated. It seems EPA-Vic does not understand that *in situ* 'above the water table' soil permeability tests require the soil to be unsaturated, since the test result is used to indicate the performance of a land-application system in unsaturated soil. To continue to insist that the whole soil should be saturated for the test means that it does not understand application of Darcy's Law to this method.

7 Warrumbungle National Park

About 10 years ago, the National Parks and Wildlife Service of NSW (NPWS) installed sewage-detention ponds in Warrumbungle National Park to treat its wastewater. Figure 1 shows the layout of the ponds. Sewage was pumped to the ponds from the amenities blocks. There were three ponds and none were lined.

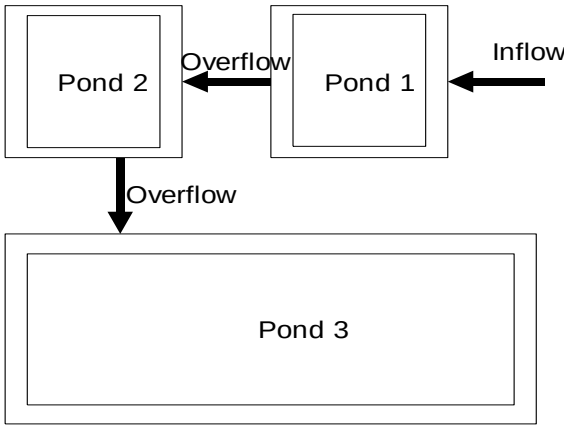

Figure 1. Layout of Ponds at Warrumbungle National Park

The sewage was designed to flow from Pond 1 to Pond 2 to Pond 3, evaporating along the way. However, the evaporation and the seepage through the bottom were such that Pond 2 never overflowed into Pond 3.

When EPA-NSW saw these ponds, it declared that this was unsatisfactory, as the ponds must be polluting the groundwater. NPWS sought a review its options. The Options Report advised that while the ponds should not have been designed and built the way they were, it was quite likely that the ponds were no longer polluting. In the same way that a clogging layer under a conventional absorption trench will develop to a sufficient thickness to treat the effluent (Figure 2), so a clogging layer must have developed under the ponds and would now be treating the sewage sufficiently to ensure that the groundwater was not polluted. (Figure 3).

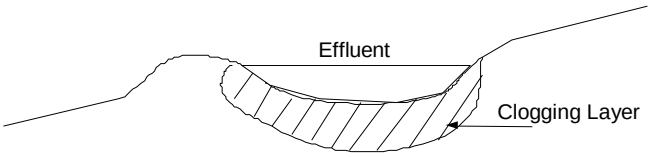

Figure 2. Clogging Layer Develops under Conventional Absorption Trench

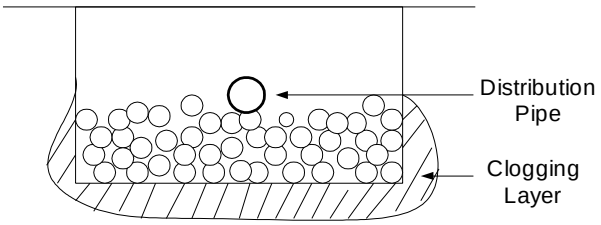

Figure 3. Clogging Layer Develops under Pond

EPA-NSW did not accept this. It stated that this would only be deemed satisfactory if we could demonstrate that there was no pollution. (This would have been extremely costly.) It stated however, that it would agree to the ponds being lined and then any overflowing effluent being pumped to trenches. When it was pointed out - at length - that this would be merely replicating what was going on right now but at extra cost, this was not appreciated.

NPWS was not in a position to challenge this in the Land and Environment Court. The work therefore had to be done, because the knowledge of this field within EPA-NSW was deficient.

8 Technical Deficiencies

Over the years, EPA-Vic has seen fit to: -

- use a town planner with no expertise in soil science to argue for large minimum lot sizes;
- use a chemist to research effluent evaporation, when the skills required soil physics;
- have a quantum physicist erroneously rewrite a guideline for soil testing (EPA-Vic, 1975);
- ignore valuable university research on Victorian on-site systems (Brouwer, 1982; Day, 1982);
- decline an invitation to a lecture by Professor Johan Bouma of Wisconsin University, a world authority on the management of domestic effluent, held at La Trobe University;
- assemble a committee with little scientific expertise in this field to produce the current prescriptive, illogical, inconsistent and erroneous guidelines (EPA-Vic, 1996).

9 Wallis Lake

In November 1996, about 400 people contracted hepatitis from eating infected oysters from Wallis Lake, and one person died. In the subsequent court action (Ryan v. Great Lakes Shire Council, 1999) the Court found the State of NSW had breached its duty of care. Part of that breach was sheeted home to the performance EPA-NSW. The Court also heard evidence that some caravan parks had discharged raw sewage into Wallamba River

EPA-NSW had been severely and publicly chastised, and it acted precipitately. It checked all the caravan parks along the Wallamba River and found that the effluent coming from many of them was too high in pollutants. (This is a little surprising, given that at that time, all these caravan parks had EPA licenses.) It then pressured these caravan parks to connect to the sewer. When caravan park owners protested that all they needed to do was upgrade their on-site systems, EPA-NSW responded by letting the owners understand that their troubles would be fewer if they connected to the sewer.

As a result, the caravan parks connected to the sewer at great cost. Yet, as is well known, a properly designed and functioning on-site system does a better and cheaper job in removing pollutants from effluent than conventional reticulated sewerage. These caravan parks are on ground that is of sand, where the groundwater is only a few metres below the surface. Nevertheless, quite standard techniques, such as mounds and evapotranspiration-assisted trenches and beds, can prevent the groundwater becoming polluted.

In contrast, the sewage treatment plant at Pacific Palms which now takes the sewage from these caravan parks regularly pollutes, as EPA-NSW must know. After all, it issued a licence for it to do so.

10 Administrative Elimination of the Problem of Pollution from On-Site Systems

It was heartening that in 1992, EPA-NSW, had recognised that it needed to deal with non-point source pollution. However, as time has passed, little has happened. In fact, if anything, it has retreated from its involvement, at least for on-site systems.

EPA-NSW used to require licenses for all on-site systems with more than 10 equivalent persons (EP). As such, it was the lead agency for on-site systems larger than a household, such as caravan parks. The Protection of the Environment Operations Act that replaced the Clean Waters Act required EPA licenses only for sewage-treatment plants with a capacity of more than 2,500 EP. While this had the beneficial effect of taking EPA-NSW out of the business of issuing licenses for thousands of small commercial operations that did not discharge directly to watercourses, EPA-NSW did not follow this up with activities to provide policy leadership.

Indeed, EPA-NSW has been quite rigorous in its administrative elimination of the problem of pollution from on-site systems. We cannot find the issue mentioned in the State of the Environment Report for 2000 (EPA, 2000). Much space is devoted to centralised sewerage, a 20th-Century technology.

11 Discussion

The EPA of Victoria appears to act from a superficial knowledge of on-site systems. Too many of its staff seem to be unaware of the scientific and technical literature. It is therefore not surprising that its new guidelines are prescriptive, illogical and inconsistent.

Because EPA–NSW has kept itself only peripherally involved in on-site sewerage, it has not retained the skills to deal with issues adequately when they arise. When this is coupled with a siege mentality, it is liable to react vigorously to any perceived possibility of pollution, when its perceptions lack professional underpinning.

EPA-NSW strategy of concentrating on point-source pollution has the advantage that it is much easier to deal with organisations than individuals. One also gets better publicity by chasing the big polluters with one's scarce resources than by spreading one's effort widely on many cases of non-point source pollution. It has yet to fully appreciate that by putting more emphasis on non-point sources, it will reduce the problems more than just by its direct interaction with polluters.

Its preoccupation with point sources is a short-term expedient that must become counter-productive. The community starts to think that low-level discharge of pollutants doesn't matter, because EPA-NSW doesn't seem to be worrying about it either.

If the EPA is quite visibly chasing big polluters, and providing little leadership with non-point source pollution from OSWM, the community will quite naturally take its cue from this.

On the whole therefore, the performance of neither EPA in the field of OSWM can yet be seen to be helping to promulgate ESD.

12 Conclusions

The Victorian and NSW Governments should increase funding for their EPAs to attract and maintain staff who are educated and experienced in the field of on-site wastewater management.

It is to be hoped that each EPA will soon recognise that OSWM fosters ecologically sustainable development.

References

AS/NZS 1547(2000) On-site domestic wastewater management. Standards Australia and Standards New Zealand, Sydney and Wellington.

Brouwer, J. (1982). Septic tank effluent absorption systems near Melbourne - Land capability and design. PhD Thesis La Trobe University.

Day, K.J. (1982). On-site treatment and disposal of household wastewater with particular reference to sealed evapotranspiration systems. MSc Thesis La Trobe University.

DLG (1998) Environmental and Health Protection Guidelines: On-Site Sewage Management for Single Households, NSW Department of Local Government, Bankstown.

EPA-NSW (1995) The utilisation of treated effluent by irrigation. Draft Environmental Guidelines for Industry. Environmental Protection Authority, Sydney.

EPA-NSW (2000) State of the Environment Report. Environment Protection Authority of NSW, Sydney.

EPA-Vic (1975). Soil test in relation to effluent absorption. Environment Protection Authority of Victoria, Melbourne.

EPA-Vic (1996). Code of Practice – Septic Tanks. Environment Protection Authority of Victoria, Melbourne.

EPA-Vic (2001). Domestic wastewater management in sewered areas. Draft of 14 March 2001.

EPA-Vic (2001) Domestic Wastewater Management Series: Land capability assessment for onsite domestic wastewater management. Environment Protection Authority of Victoria Publication 746, Melbourne.

Ryan v. Great Lakes Shire Council (1999) FCA 177 (5 March 1999).