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FAILING SCHOOL SEWAGE SYSTEMS ENDANGER PUPILS HEALTH

When it comes to sewage disposal city schools have it lucky. They may moan about the Council rates or 'pan charges' but at least when the toilet is flushed, the delightful material leaves the school premises and becomes the Councils responsibility.

No such luck for a rural (or unsewered) school. Not only do they have to dispose of the sewage on site but they also have to do it in a way that is not a danger to their pupils' health. Add to this the fact that most rural schools are still using old septic tanks with gravity disposal fields and, with the every increasing demands on the school budget, sewage issues are usually put on the back burner.

However, just as there has been a push to upgrade school water supplies, sewage treatment and disposal is next on the list. In the near future school Boards of Trustees will be asked to obtain a Resource Consent for their sewage system and all the indications are that over 90% of them will not comply.

Obtaining correct advice on what work needs to be undertaken to improve the existing system or upgrade to a sewage treatment system is essential. This item is intended to assist BOT's understand what is required, indicate some of the pitfalls and show how to verify the quality of advice being offered.

SEWAGE SYSTEM PROCESSES

Primary Treatment

There are only two treatment processes recognised in the NZ Standard (AS/NZ 1547:2000). There is Primary (septic tank) or Secondary (sewage treatment plant) treatment where the effluent quality is BOD:TSS 20:30mg/litre or better.

With Primary (anaerobic) treatment up to 45% of the treatment is achieved by separation within the septic tank with the effluent flowing into the disposal field where the remaining treatment is provided by the natural organisms occurring in the soil.

Primary treated effluent is discharged, either by gravity into soakage trenches or pumped into Low Pressure Effluent Dosing (LPED) trenches. Pumped LPED systems achieve even effluent distribution and are more efficient than gravity soakage trenches although the treatment process is the same.

A critical design consideration with primary (septic tank) systems is that the effluent must be distributed evenly into the soil at a rate the soil can **absorb and treat**. As the disposal field is effectively acting as the secondary treatment system, it should be set aside as a designated area and be fenced off.

Secondary Treatment

Secondary treatment is provided within the plant by an additional treatment process (after the primary chamber) where aerobic organisms are concentrated in the secondary treatment chamber. Secondary treated effluent is usually pumped directly into the soil through trickle irrigation tubing.

To be successful the secondary treatment process must achieve a balance where the primary (anaerobic) effluent is bought into contact (over the required time period) with sufficient organisms to consume the harmful bacteria and produce a benign effluent which complies with AS/NZS 1547:2000.

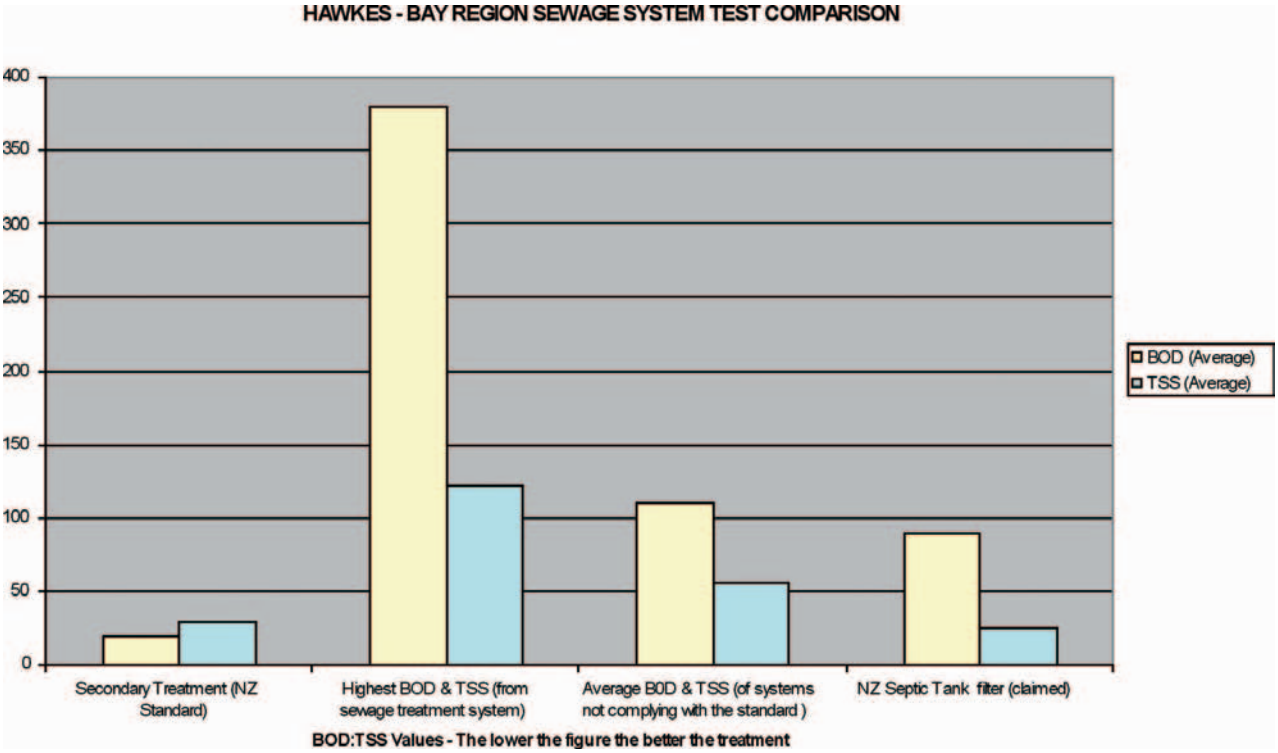
The most common treatment process used to provide secondary sewage treatment in school and domestic situations is an aerated package treatment plant. Alternatively some systems use zeolite or foam. Unfortunately most of these systems fail to produce secondary treatment and Councils (and some engineers) are signing systems off as complying with the Standard without carrying out even the most basic tests and verification procedures.

Tests Reveal Most Sewage Treatment Systems Fail

The alarm bells are beginning to ring in official circles as performance data results from secondary sewage treatment plants show that not all secondary treatment systems are performing as required. For example in Hawkes Bay a council monitoring programme, running since 2001, has shown that only 17% of secondary sewage treatment systems actually produce secondary treated effluent.

[Note: Secondary treated sewage is defined in AS/NZS 1547:2000 (page 15) as being equal or better than 20 g/m3 biological oxygen demand (BOD) and 30 g/m3 suspended solids (TSS)]

In the Hawkes Bay BOD levels from sewage treatment systems as high as 380 g/m3 and TSS levels of 122 g/m3 were recorded. The **average** effluent quality of the failed systems was 5 times the allowable level and the effluent quality from many systems was **no better than effluent from a septic tank.**



It would appear that some treatment plant manufacturers cannot be relied upon to accurately report the treated effluent quality that their systems will produce and that the cheaper sewage treatment systems are producing the worst results. Council approval, environmental awards and professional letters of support are not guarantees that the system will perform as required. These tests are of systems that are distributed New Zealand wide.

These findings could have serious consequences for schools that have already installed 'packaged' sewage treatment systems. Not only could the systems require frequent and expensive maintenance (and probably early replacement) but the disposal areas, which may be under or near play areas, may be a health hazard as the effluent may be similar to that from a septic tank.

Serious Health Risk From Failing Sewage Treatment Systems

The consequences from failing sewage treatment systems can be fatal, and that is not an overstatement.

The public perception is that septic tanks are dirty unpleasant objects to be avoided and to keep the children away from. However with sewage treatment systems, and particularly the claims made about their performance, the public perceive that the treatment has been completed in the plant and that the effluent is harmless. Some manufacturers have even gone so far as to say the treated effluent is fit to drink.

Effluent from sewage treatment systems is often irrigated around children play areas. As we all know children usually play at ground level and below and are not known for washing their hands when they should.

With some treatment plants performing no better than a septic tank, and the effluent being irrigated around the school play areas, how long will it be before there is a serious outbreak or disease and possibly the loss of life.

If the BOT has chosen the cheapest sewage system, and 'saved, some money in the process, what will all that be worth if events go horribly wrong. And if the Hawkes Bay test results are an accurate indication then it is, regrettably, only a matter of time.

Where to Obtain Independent Advice on Sewage Systems

Regretfully there is no obvious answer. To date Professionals (engineers), Councils and Plumbers have not (collectively) responded adequately to the changing technology of modern sewage treatment systems and cannot be relied upon, simply by virtue of their profession, position or trade, to offer appropriate advice.

For instance, the failing sewage systems uncovered in the Hawkes Bay Regional Council monitoring programme have professional letters of support. One has even been awarded a Council environmental award.

Plumbers, while having some knowledge of septic tank installation, have no trade training in the design or operation of a secondary sewage treatment system. At best they can be an agent for system manufacturer but not only does that take away their independence they may also advise to install a system (for which they are agent) that the Hawkes Bay test shows will not produce secondary treated effluent.

Councils are hindered in offering accurate advice on sewage systems as their consent staff are generally either builders (who have no trade knowledge of sewage systems) or plumbers (who, at best, only have trade knowledge of septic tank installation).

Fortunately there is a growing awareness in Councils, Professional Bodies and Government of the lack of performance and verification of sewage treatment systems. However it is likely to be up to 5 years before any meaningful progress is made in this area.

For those who followed the 'leaking building' saga, all the signs of official ignorance and cover up are also evident in the current situation affecting sewage systems and regretfully this issue may only attract sufficient political traction after there is an outbreak of disease (and possible death) that demands action.

In the meantime BOT's are largely left to their own devices in making decisions in this area. However there are a number of steps they can take to significantly reduce this risk for their schools.

Ask Questions and Demand Answers

When considering sewage system reviews or upgrades school BOT's, would be well advised to draw up a check list of questions and demand written answers from their sewage system designer.

While a number of questions could be asked here are some examples for starters:

- Who designed the sewage treatment system?
- What qualifications does he/she/they have?
- Can they demonstrate a track record in engineering design?

- Does the system produce secondary treated effluent (as defined in AS/NZS 1547:2000)

- What testing of the sewage system has been carried out? (Note: As it takes up to 3 years for the primary chamber of a treatment system to reach full loading, results declared before this time can be premature and misleading)

- How many systems have been tested? (Note: A grab sample, especially if taken less than 3 years after installation, is only an indication and not conclusive. Don't risk your pupils health on a single, or even a handful of results)

- How long has the system been tested for? (Note: Be cautious of new systems that have not been tested for at least 3 and preferably up to 5 years)

- Has the system been modified or changed recently and if so why? (Note: Although it is to be expected that a system will be upgraded from time to time, be cautious of 'new' treatment media or frequent upgrades as this could be due to failure of existing designs and/or inadequate testing.)

- Is the secondary treatment process completed within the treatment chamber before being pumped to the disposal field? (Note: At least one treatment system has a return pipe from the irrigation line back into the treatment chamber where 75% of the effluent is returned for 'further treatment'. As up to 25% of the effluent is discharged into the soil after only one treatment cycle is this a septic tank or sewage treatment system?)

- Is the treatment process timer controlled or is the sewage treated at the same rate it is produced? (Note: As sewage is produced at varying rates, for instance at play and lunchtimes, sewage systems that try to treat fluctuating volumes can be more fragile and produce corresponding fluctuating levels of treatment)

- Are there any independent (Engineer or Council) tests and reviews of the system? (If the system has credibility then a number of engineers and Councils should be prepared to state their confidence, in writing, that they have tested and/or approved the system. These letters may also help in spreading responsibility if the system later fails to produce secondary treated effluent.)

- Write to the Engineers and Councils directly asking them to state what testing and verification process they have undertaken prior to their granting approval and do they still stand behind the system? (Note: Also check that the system, and treatment media, they have tested or approved is the same as that being currently marketed)

If the system designer is unwilling, or unable, to provide satisfactory answers to this line of questions then it could be an indication that the sewage system may not produce secondary treated effluent as required.

The question each school should ask is "should they take the risk"?

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