

# Innovative, cost-effective solution for the school sanitation crisis



Lloyd Govender, project engineer, BORDA SA

Daily, thousands of South African learners face unsafe, poor sanitation at schools and are often forced to use unlawful and unsafe pit toilets. In some of these cases, decentralised wastewater treatment systems (DEWATS) are a viable option. **By Kirsten Kelly**

**D**EWATS provide the sweet spot between waterless on-site sanitation and conventional sewers with centralised wastewater treatment. Bremen Overseas Research and Development Association (BORDA) has been partnering with eThekweni Municipality to pilot and implement DEWATS wherever a wastewater processing solution is needed.

A standard DEWATS system consists of a screen, settler and anaerobic baffled reactor. One can also add a constructed wetland. The system is independent of electricity and chemicals but can be modified to use both if a more compact footprint is required and these utilities are available. DEWATS are easy to install and tolerant towards inflow fluctuations. They can treat between 1 m<sup>3</sup>/day and 1 500 m<sup>3</sup>/day of wastewater. Biogas digesters can be added for additional energy.

DEWATS are an approach rather than a technical hardware package. With DEWATS,

the system must always be adapted to suit a specific context. It is impossible to use a generic design. DEWATS for schools differ to DEWATS in residential areas. And different school DEWATS may vary from each other.

## Design considerations for school DEWATS

Before designing a system, it is crucial to visit the site, retrieve information like the amount of water used (there needs to be enough water to carry everything through to the system), the temperature of the site, and the best possible location on the school grounds for the DEWATS. One size does not fit all. Some schools have separate toilets for boys and girls that may be placed at opposite ends of the school grounds, and two different DEWATS may have to be installed.

“There can be some challenges when designing DEWATS for school sanitation. They need to be robust. Children must know what DEWATS are, and understand

## BORDA – BREMEN OVERSEAS RESEARCH AND DEVELOPMENT ASSOCIATION

- An expert NGO specialising in full-cycle decentralised sanitation
- Together with governments, local enterprises and partner organisations, BORDA works on-site to improve communal planning processes, sanitation supply structures and basic needs services – they tackle unsolved sanitation challenges and bring tried and tested solutions to challenging places
- Headquartered in Bremen, Germany, with regional offices in Tanzania, India, Jordan, Thailand and Mexico
- With a network of local partner organisations, BORDA is active in more than 20 countries
- Working in South Africa since 2006 to extend the wastewater infrastructure for inhabitants of peri-urban areas
- Focused on projects in new and existing low-income housing developments, informal settlements and schools
- Has partnered with eThekweni Municipality to exchange knowledge and build capacity in the water and sanitation sector, and to advise on innovative technologies and local implementation of DEWATS

## PROPOSED PROJECT FOR SIKHULULIWE SECONDARY SCHOOL

- The project will benefit 500 Sikhululiwe Secondary School learners and the surrounding community. The current sanitation facilities in the school are not safe to use for schoolchildren. This innovation will provide a safe and hygienic sanitation facility that improves the quality of education for learners. In addition, the innovation will present an opportunity to create jobs and generate income for the community through nutrient recovery from the sanitation facilities. The project aims to produce nursery plants and ornamental plants on a 360 m<sup>2</sup> land parcel using the resources recovered from the sanitation facilities.
- It will be a partnership between BORDA, UKZN, Umgeni Water, the Department of Education, PID and RUNRES ETH.
- It is located in the uMgungundlovu District Municipality, Edendale, KwaZulu-Natal, South Africa.
- This system would collect human waste (urine and faeces) and flush water, and treat it to produce water for ornamental plants and fertilisers.
- The DEWATS system will: collect 284 m<sup>3</sup> of urine, faeces and flush water per year; process 264 m<sup>3</sup> of water containing urine, faeces and flush water per year; and produce 616 kg of fertiliser and 50 kg of urea fertiliser per year.

their value, so continuous education programmes are important. Due to school holidays, children are only present at the school for roughly 180 days a year, causing intermittent loading, making effective and logical design very important,” says Lloyd Govender, project engineer, BORDA SA.

He adds that one needs to either ‘over-design’ school DEWATS so that they can be easily rebooted after a period of inactivity, or partner with some residences to always ensure that wastewater flushes through the DEWATS during weekends and school holidays. “The bacteria that stabilise or

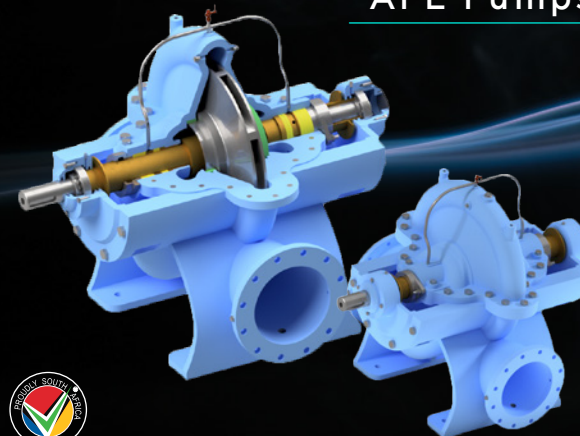
settle in the anaerobic baffled reactor must be considered. Will the bacteria become inactive over the school holidays? Will the bacteria have to be re-seeded?”

School DEWATS have high nitrogen levels (greater amount of urine) and will need to use filters with anoxic zones. There must be facilities available for the disposal of sanitary pads and tampons, as they should not be added to the DEWATS. A screen should also be fitted at the wastewater source to catch any sanitary pads and tampons that are flushed. At times, toilet paper is not available and children may use newspaper, so either DEWATS must be designed to take this into consideration or the school must budget for toilet paper.

Govender believes that simplicity is the answer when installing school DEWATS. “Simple DEWATS can work for schools. Sensors and electronics should be avoided. Instead of using pumps, try to use a gravitational design. If one must use pumps, then there needs to be a calculation on the elevation levels of the pipes, the flow and then match the flow to the pump curve. All construction materials



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