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WATER, SANITATION, ENVIRONMENT and DEVELOPMENT

Rural school sanitation pilot project

Rob Burgess

Background

It was identified in Umgeni Water's Rural Areas Water and Sanitation Plan (RAWSP), that sanitation at almost all rural schools is inadequate or missing entirely. This situation has undoubtedly arisen to some extent because the schools do not receive any subsidy from the relevant authorities for sanitation facilities.

Statistics from 1991 revealed that a total of 417 schools existed in the RAWSP study area. This represented an enrolment in excess of 200 000 pupils and a capital investment in excess of $6 million will be required to provide adequate sanitation.

Introduction

The motivation for targeting schools is to ensure that the younger generation have the opportunity to learn about and experience healthy and safe sanitation. This information should then be carried home with them to the benefit of all. There is also the strong motivation that water and sanitation should be implemented simultaneously. The health benefits are self evident, but the administration and cost recovery procedures can then also be linked to complement each other.

To date the implementation of water schemes, as identified in RAWSP, are on programme, but progress on sanitation has been limited. This is caused by the fact that water is seen as a priority need amongst rural communities, whereas sanitation is not in such high demand. Umgeni Water is generally reactive in implementing water schemes, whereas sanitation will require a proactive approach.

Pilot project

In order to obtain more insight on how to overcome these problems it was decided to implement a pilot project in Sweetwaters, a peri-urban area 20km outside the city of Pietermaritzburg. Umgeni Water had recently completed construction of a water reticulation scheme in the area, which included water supply to seven schools. These schools ranged from Junior Primary to Senior High schools with enrolments ranging from 600 to 1300 pupils.

Initial contact with these schools revealed their keen interest in the project and also the urgent need for improved sanitation. There was no official school maintenance service in the area and this responsibility was carried out by the school staff and parents. The area was served by gravel roads in poor condition and no telephones, electricity supply or sewer reticulation was available. Local building contractors were available but had limited skills and would need assistance if employed on the projects.

Steering group

A steering group was set up by Umgeni Water to address various aspects of the project. These included community/school liaison, appropriate technology selection, pollution control, funding and administration. Represented on this group were the Institute of Natural Resources of the University of Natal and Umgeni Water. As progress was made the School Circuit Inspectorate and School Health Inspectorate were consulted for their input.

Appropriate technology selection

This group initially debated the basic criteria required for selection of the suitable technology. The facts taken into consideration were that the system should comply with the required health standards, have limited water consumption, minimal maintenance requirements and the construction method should be labour intensive and cost effective. The remoteness of the area and the limited availability of services also influenced these decisions.

After various considerations and extensive community liaison it was decided to implement a non-flush dry-septic system with various improvements, as recommended by the steering group. The septic tank was constructed using a "Riblock" system of precast concrete ribs, interlinked with concrete blocks. The inside of the tank was plastered and a suitable waterproofing compound applied. The toilet blocks situated adjacent to the central septic tank were built using "Lassak" precast concrete products. The wall panels hung vertically from a ring beam supported on uprights. The base of the panels were then tied in with the floor slab. Ventilation and natural lighting was provided by the opening between the sloping fibre-cement roofing and the ring beam.

The vertical toilet pedestal and horizontal pipe section connecting to the septic tank were manufactured as one solid unit out of fibre-glass. During the construction of the tank these were concreted in position as they accessed the tank through the side walls. Thus when construction of the toilet block took place, the pedestals were already in

position. To avoid blockages, the diameter of the vertical section of the chute below the seat was kept to a fairly wide dimension. The chute then turned through a ninety degree angle. The horizontal section was designed with an increasing diameter towards the tank to ensure it would be blockage free.

Percolation test/soak-away

Umgeni Water Scientific Services staff carried out soil percolation tests to assess on-site soil conditions and size the soak-away. Due to the relatively low inflow of a dry-septic system the siting of the soak-aways proved relatively simple and could be accommodated within the school property. To enhance the performance of the soak-away a lining of coarse gravel was used against the invert and sides of the trench and broken clay bricks were used as backfill material.

Community liaison

In parallel with selecting the appropriate technology, liaison was taking place with various parties. The School Staff, School Parents Committee, and School Inspectorate were involved at all stages of decision making. The proposed offer of a "soft loan" from Umgeni Water was accepted by the Parent's Committee and then the proposed project was presented to a full parent's meeting. A favourable vote indicated their approval of the project and signalled that construction could commence.

Labour resources

The school Parent's Committee recommended a list of names of unemployed parents available for employment on site. After interviews with these people, all positions other than site supervisor were filled and a standby list was prepared.

As was anticipated, an initial high degree of close supervision was required on site. The building method was unfamiliar to the labour but transfer of skills took place rapidly. Efficiency on site was motivated by the employees having a sense of ownership of the project.

As work progressed a core-group of labourers were selected and it was agreed that they remain with the project to carry their skills forward. It was also envisaged that a multiplier effect would be possible as this core-group gained experience and could then be divided up and allocated to various projects simultaneously.

Commissioning

Before commissioning of the toilets took place, the local Health Inspector informed the staff about the correct use and maintenance of the toilets. They in turn passed this information onto the pupils. At this stage the problem of toilet paper was raised. The staff did not feel the school could afford this item. It was initially of concern that the use of anything other than normal toilet paper would upset the functioning of the septic tank.

Various discussions and calculations regarding anticipated tank retention time followed. A retention time in excess of 21 days was agreed upon, therefore the septic tank performed as a digester and would be able to handle heavier types of paper. The pupils were in the habit of using old exercise books in their existing pit latrines and it was decided to let this habit continue.

Problems

Soon after commissioning of the toilets, alarm was expressed by the staff that the toilets were blocked. It then became apparent that their perception was that these toilets would be full flush. Observation also revealed that the contents of the chute did seem to float for an unexpectedly long duration.

This raised another problem. A type of blue bottle fly (chrysomyia putoria) was breeding in the contents of the toilet, the eggs were incubating and the larvae managed to wriggle up the side of the chute and onto the floor.

This caused great concern to all involved. Investigation followed where the larvae were identified but no immediate solution to the problem was forthcoming. Any form of insecticide used would possibly poison the tank. The larvae were extremely sticky and able to crawl over any type of surface. Introducing mechanical means of preventing the flies access to the chute would result in a possible increase in the maintenance requirements.

The breeding of larvae rose to alarming proportions almost causing the toilets to be abandoned. It was then observed that the contents of the toilets was sinking into the tank at an increased rate. In conjunction with this the appearance of the larvae started to diminish. It was then deduced that possibly with the tank becoming more activated the process of digestion had increased and the required egg incubation period had been removed from the breeding cycle.

Improvement in financing scheme

During this time separate negotiations had been underway, the result of which was that a 50% grant funding was now available to the schools for sanitation. Initially a piped water supply had been excluded from the project as funding and control of consumption were of concern. The schools now expressed their interest in a water supply in the toilets in order to assist cleaning purposes and hopefully enhance the digestion process in the chute. The staff were prepared a supervise cleaning operations in order to control consumption. It was then concluded that water would be supplied to the hand-basins in the staff toilets. For cleaning purposes a hose-pipe was supplied to wash down

the rest of the toilet block and break-up/saturate the contents of the chute.

Lessons learnt

Other than the unexpected appearance of the larvae the project presents a variable solution to rural school sanitation. With a few examples now in operation and available for site visits no false expectations should be raised by future interested parties.

The way forward

To simplify construction procedures and reduce costs changes to the design are under consideration. The recommendation is that the toilet blocks will move to directly above the tank, sharing a common back wall along the centre of the tank and a central rainwater gutter. The roof slab of the septic tank will form part of the floor slab of the toilet block. This will simplify the chute design and septic tank water proofing requirements as the chutes will now penetrate vertically through the roof slab and extend to below the water level in the tank. Observation of the commissioned toilets revealed the necessity for urinals to be provided for the boys. This could be achieved, quite simply, by redesigning the top of the chute in the form of a urinal.

Reference

The Institute of Natural Resources, University of Natal. Umgeni Water's Rural Areas Water and Sanitation Plan (RAWSP)