Report on Visit to eThekwini Sanitation Programme
8 April 2004

1. Purpose of Visit

On 8 April 2004 the Ehlanzini and Embo projects were visited to try and ascertain what the problems were with the projects and to propose solutions. From discussions with Ethekwini Municipality officials the problems are not unique to the Mvula projects and are replicated various degrees across the programme.

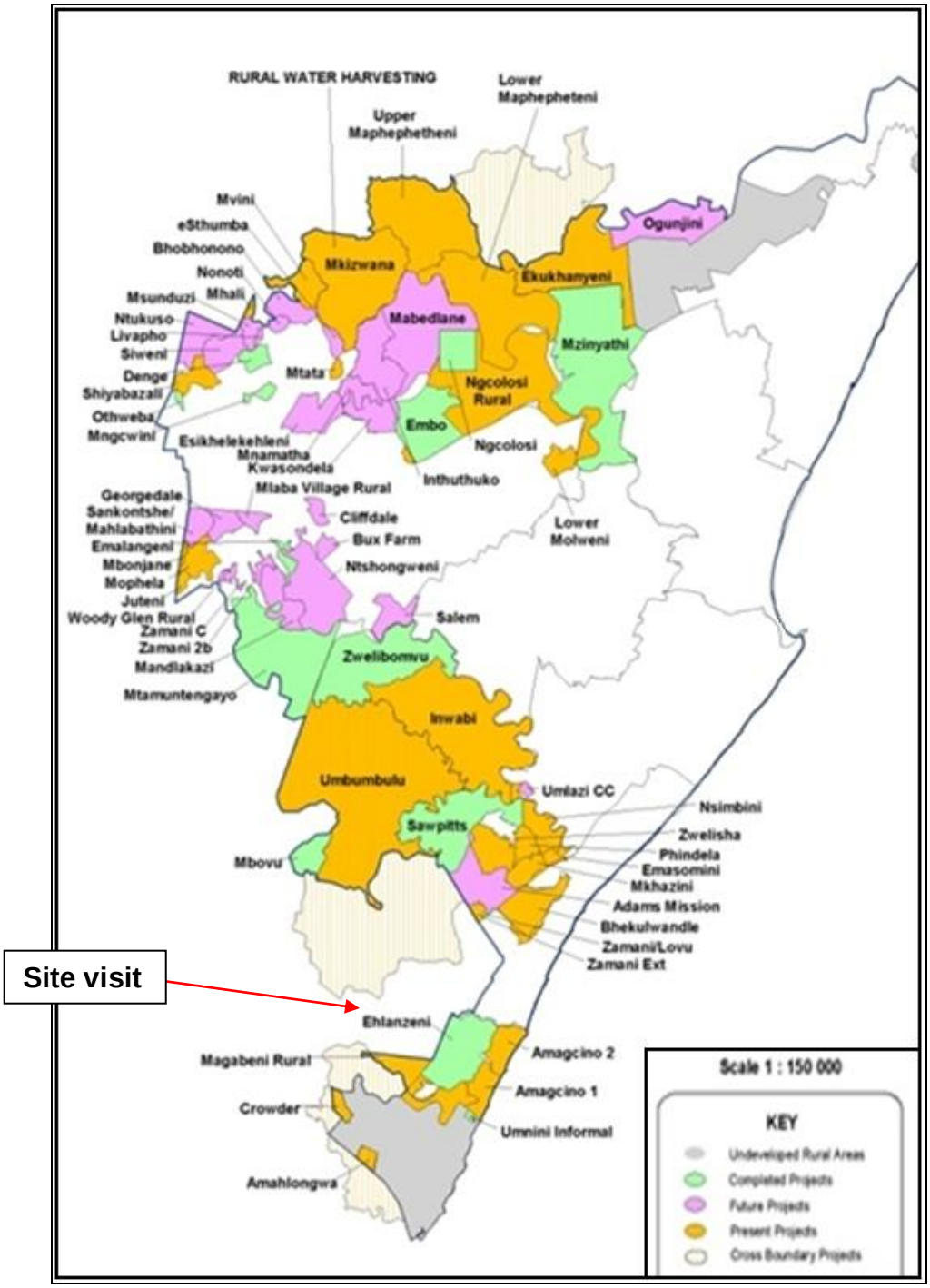

Figure 1: eThekwini Municipality with site visit to UDDT project location marked (source: EWS)

2. Visit to Ehlanzeni

Ehlanzini is a rural area on the southern boundary of the metropolitan area. The houses are widely spread with very little continuity between yards. This is contrast to the houses closer to the urban centres and main roads where they are closer together and often continuous. On the drive to the project it was noted that the urine diversion toilets were invariably positioned as far from the house as possible and were often adjacent to the existing pit toilets. Most of the doors had not been treated by the households and there were many instances of warped and broken doors.

The first house that was visited was a modern brick home with the urine diversion toilet approximately 30m from the house. It was explained to the householder, a woman in her fifties, that we wished to open up and empty the toilet. She happily opened toilet only for us to find that it had never been used since its installation one year ago. We asked her why she did not use it and she stated that she prefers to dig a hole in the veld and cover it up after use. She also stated that most of her neighbours do the same. She did, however, state that she had a place in the house for the flush toilet.

We than visited a 2nd house. This house was constructed from wattle and daub and in a lot poorer condition than the 1st, yet the household was using the toilet. The toilet was not in a good condition there being:

- Paper in the urinal;
- Fouling of the top and insides of the pedestal;
- The chamber appear to be full; and
- The floor of the toilet had not been kept clean.

Figure 2: Poorly maintained UD Toilet (source: Holden, 2004)

The toilet was then opened and in 20 minutes the contents emptied and buried alongside the toilet. During this process the following was discovered:

1. The back slab had been broken during construction and when breaking the mortar to remove it further breakage occurred;
2. The ventpipe extends 200mm into the chamber. This causes two problems, it reduces the effectiveness of the venting action as any gasses will rise to the top of

the chamber and the highest vent point is the opening for the pedestal rather than the ventpipe and the ventpipe obstructs the opening when emptying the chamber.

3. Although the chamber appeared full it was in fact quite empty. What had happened was that a pile of toilet paper (newspaper in this case) and faeces had built up directly under the pedestal, whilst the remainder of the chamber was relatively empty.
4. There was no evidence that dry soil had been used in the chamber. The officials with us reported that this is common although buckets and scoops are given to the households they are not found in any of the projects.
5. The top of the pile was very dry and it was possible to set fire to it. However the bottom was very wet meaning that within the chamber 2 different processes were happening. Desiccation at the top and anaerobic digestion at the bottom. There was, however, very little smell so the water causing the digestion was probably not from urine but from rainwater entering through the ventpipe.
6. It was difficult to empty the chamber. The back ramp was too steep, the ventpipe got in the way and one had to be careful to avoid raking the contents onto your shoes. It was also very difficult to reach the front of the chamber.
7. The chamber contained plastic bags, bottles and disposable nappies. These, however caused no problems in emptying in contrast to the problems they cause in VIPs.

Figure 3: Chamber opened for emptying, ventpipe can be seen clearly (source: Holden, 2004)

The contrast between the 2 houses could not have been greater. The first was a modern house with a clean external environment where the faeces is buried immediately and the intermediate step of a toilet is not used, in the second the faeces is buried after the intermediate step of a toilet is used (1 year and ascaris will still be viable) yet the environment is not clean.

A discussion was held with the 2nd householder and worker on payment for cleaning the chambers. The householder was quite happy to pay R20 for someone to clean the chamber. The worker was not that happy about this until it was pointed out that he could empty 10 a day thus earning R200 per day.

3. Visit to Embo

In Embo only a short meeting was held with Ethekwini Project Manger, Neville Slee and households were not visited. He reported that his biggest problems were relating to:

- Water entering the chambers;
- Poor construction so that when the pedestal is shifted the urine is discharged directly into the chambers.; and
- Lack of feedback from the ISD on these problems. However, he then when on to say that the timing of the visits was wrong only occurring during toilet handover and at the end of the project.

He had other problems but these related to how Mvula was managing the project (incorrect invoices) rather than the outcomes.

On the drive back to Durban the official accompanying us, related to us how the Councillor in Umzinyathi was an enthusiastic participant physically demonstrating to households how to empty the chambers and as a result there were far less problems.

4. Discussion

4.1 Technology & Design

The first issue is what process Ethekwini is trying to achieve in the chamber. John Harrison on the promotional video tape states quite clearly that that objective is desiccation. From the chamber that was opened up and the comments of Neville Slee this is not being achieved due to water entering through the walls and base, through the back slab, down the ventpipe (we understand Ethekwini is discussing with TCEcc to manufacture a cowl to go over the ventpipe), next to the pedestal when cleaning the toilet floor and probably some urine entering the chamber (through use of potties at night, colonic irrigation, misuse and accidental spillage). Desiccation provides no assurance that pathogens will be destroyed (Austin & Wickers) and therefore a composting process will have to take place outside the toilet to ensure this.

The question then arises as to what is the point of the second chamber. As soon as the first chamber is opened up the contents might as well be removed, as was done in Ehlanzini, and the composting process started.

When only a single chamber is used it then removes the problem of moving the pedestal and the pipe being misaligned with the receiving pipe underneath. The joint between the slab and the pedestal can then be sealed thus preventing cleaning water entering the chamber.

If desiccation is the desired result then there is no need for the ventpipe. The ventpipe is required when decomposition occurs in the toilet and smell is generated. If desiccation is occurring then no smell will be generated thus removing the need for the ventpipe and a potential entry point for water. However if the ventpipe is removed it must be ensured that the contents stay dry.

By moving to a single chamber, with a permanently fixed pedestal and no ventpipe, 3 possible sources of moisture entering the chamber are eliminated. To eliminate the next point of water entry, the back slab, requires a total redesign. Neville Slee was reporting that water still enters in the new design and it is still a concrete slab, which is difficult to move. This must be a lightweight lid, which anyone can lift on their own, with a raised lip to prevent water entering. Once the lid can be removed and replaced with minimum effort, and without water entering the chamber, householders will become far more willing to open and empty the toilet.

Figure 4: (left) Removing lightweight pit cover, (right) emptying the container into a composter, Johannesburg (source: Holden, 2004)

This leaves one area, which is extremely difficult to solve, water entering trough the base and floors of the chamber. Either a lot of money is put into ensuring that there is a watertight chamber (a reinforced concrete structure) or a simple plastic membrane is used, which cannot be damaged when emptying the chamber (i.e. a container). If a container option is used care must be taken that it is not too large. In Kimberley 110 litre dustbins were used. Apart from the size of chamber that was required to place such a container it became so heavy that the householder could not move it. If a smaller container is used, say 45 litres then, the contents will require emptying once a month but it only takes a minute and nothing requires cleaning afterwards.

Simple design changes can ensure that the water does not enter the chamber and that desiccation takes place. However, it then places a greater responsibility on the household to ensure that the toilet is used correctly, that liquid is not disposed of down the chamber and that, if a container is used, it is emptied on a regular basis.

4.2 Promotion, Health and Hygiene and User Education

The choice of position of the toilet, by the householder, as far away from the house as possible and often next to the existing pit toilet is revealing, in that on all the projects the urine diversion toilet is still equated with a pit toilet. Its position means that the household gains none of the benefits that urine diversion can offer, whilst having the disadvantage of frequent maintenance compared to a pit toilet. If the outside toilet is not used at night then the probability of getting urine in the chamber increases if potties are used. At Ehlanzini, when officials were questioned as to why they had not offered the 1st householder an inside urine diversion toilet, they stated that it was too difficult as the household must indemnify them for any damage that they might cause to the house (This was said whilst at the 2nd house one of the back slabs had been broken during the construction process. There is no excuse for poor workmanship). Since it is common practice to alter existing buildings if Ethekwini is not prepared to do this then contracts need to be let to contractors who are.

At the 2nd house dry soil had not been used and plastic bottles, bags and disposable nappies were being thrown down the chamber. Without the chamber being opened it is not possible to show the householder what is happening and the effect this has. In Umzinyathi it was

reported that the Councillor was an active participant in the project and as a result there was a far higher degree of acceptance.

Also the household, which was not using the toilet, had a higher level on environmental cleanliness than the household that was (the households being 200 m apart), suggesting that the programme needs to think how health and hygiene education is targeted.

The above suggests a fairly radical rethink of the promotion, health and hygiene and user education programme and the options offered. The 1st is that urine diversion should be promoted firstly as an inside toilet so that there is a clear differentiation in peoples perceptions between it and a pit toilet. On all the projects we saw, the perception is that it is a different pit toilet (albeit one with a ventpipe). To gain people's acceptance of this the toilet needs to be installed inside prominent people's houses, such as the Councillor from Umzinyathi. It can already be seen in the Umzinyathi project how his active involvement is beneficial to the project.

From the different percentage usage of toilets in Embo and Ehlanzini, and discussions with householders and officials, the main reason for using a toilet is privacy. In Ehlanzini it was easy to find a private spot in the veld whilst the section of Embo, adjacent to Waterfall, it was not. The ultimate in privacy and comfort is a toilet inside the house, which is what the 1st householder in Ehlanzini wanted (she had a room in the house ready for a flush toilet) and was not offered.

On user education opening up a toilet only a year after installation is too late. If the toilet had been opened up during the 1st year the mistakes that people were making could have been rectified as part of the user education programme (using dry soil, not throwing plastic bags etc down the toilet). Although it remains the household responsibility to empty the toilet, unless a free basic sanitation policy undermines this, the emergence of small entrepreneurs willing to do this for the householder for a small fee should not be discouraged.

With health and hygiene education it needs to be very carefully targeted to ensure the right messages are sent. In Ehlanzini the simple message of using a toilet for health purposes would have been wrong since in both cases burying was the method of disposal for the faeces. The problem was that the one household kept the environment clean whilst the other did not. It is for this reason that the Trust developed the Health & Hygiene monitoring form "Barriers to the Transmission of disease" (attached), which allows individual targeting of households.

5. Conclusions & Recommendations

Despite the problems encountered the Ethekwini Sanitation Programme does demonstrate the inherent advantages of urine diversion over VIP toilets. Whilst it took the author 20 minutes to empty the chamber using only a shovel and rake, the previous week a similar exercise at Bakerville, North West Province on a VIP took 1 day, due to all the foreign objects blocking the pump. The original logic behind the decision to go for urine diversion, therefore, remains sound.

Since the decision is that the toilet should be a desiccating toilet then it is recommended that a number of design changes are made to ensure that these happen. These are:

1. Use only a single chamber with desiccation in the chamber, removing the contents on a regular basis for them to be composted. The savings on the second chamber can be used to construct a above ground composter;
2. Remove the ventpipe (as this is no longer required), permanently fix the pedestal to the floor and seal to prevent water entering and affecting the desiccating process;
3. Totally redesign the back opening so that it prevents water entering and the lid is light enough to handle;
4. Redesign the chamber so that it is watertight or use a container so that moisture from the surrounding soil cannot reach the faeces; and
5. Allow for and inside toilet.

For the toilet to work effectively as a desiccating toilet it will require major changes in the promotion, health & hygiene and user education. These are:

1. People's perceptions around the toilet must be changed so that they recognise the advantages of the toilet over a traditional pit type toilet. The urine diversion toilet needs to be installed inside houses, preferably of prominent people, so that people aspire to it, rather than the unattainable aspiration of an inside flush toilet. Once this becomes widely known, in Kgalagadi District Municipality it took 3 months to increase use from 20 to 63% following this approach, then decision making, by the householder becomes easier;
2. Urine diversion must be promoted on a wide scale using pamphlets and local people. The councillor from Umzinyathi is an excellent, example of this. When this is achieved, consultants will only be required to facilitate the process, not do the promotion where often they do not have the credibility (living in towns and using flush toilets).
3. During the first year, people must be supported far more with user education. The chambers must be opened far more regularly, with the householder and mistakes pointed out. In particular the householder needs to understand the importance of using dry soil to aid the desiccation process. They also need to be supported with the composting process as this is virtually unknown in South Africa and it shown to them how the natural processes render the faeces harmless;
4. Health and hygiene needs to be carefully targeted to avoid sending the wrong messages to households and thus undermining existing good behaviour; and
5. Emptying of the chambers by small entrepreneurs, working directly for the household needs to be encouraged not discouraged. There is then an alternative if the households do not want to empty the chambers themselves.

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