EVALUATION OF THE POUR FLUSH TOILETS IN SCHOOLS AND HOUSEHOLDS

Report to the

WATER RESEARCH COMMISSION

by

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Hlathi Development Services

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EXECUTIVE SUMMARY

The Water Research Commission (WRC) appointed Hlathi Development Services to conduct an independent evaluation of the demonstration programme of pour flush toilets implemented by the WRC in selected schools in the Eastern Cape and Limpopo provinces and selected households in Amathole District Municipality (DM) in the Eastern Cape province and Amajuba DM in KwaZulu-Natal (KZN) province. The initiatives were funded by the Department of Environmental Affairs and Department of Science and Technology.
The evaluation of the pour flush toilets was initiated to assess user acceptance and user perceptions of the pour flush sanitation technology in order to determine the best implementation approaches for making this sanitation technology sustainable in South African rural schools and communities.

The South African pour flush toilet design emanated from a WRC study, designed for human wastes to be flushed with small quantities of water which is poured into the pedestal pan by hand and the human waste is pushed to the leach pit which is connected to the toilet block. It requires a minimum of 1 litre of water for flushing. The leach pit is small and it does not require deep excavation, this makes it easy to access and empty sludge when the pit is full. The adapted toilet has a pedestal which is similar to that of a conventional waterborne toilet but it does not have a bowl, it is funnel shaped. This technology can meet the needs of households who aspire to have a flush toilet without the cost of full water reticulation, septic tanks or connection to an off-site sewerage system and wastewater treatment works.

The primary improvement of a pour flush latrine over dry sanitation systems is that it introduces a water seal between the toilet bowl and the sludge with the result that bad smells and flies can be eliminated from the user interface. The volume of water used for flushing is only 1 to 2 litres and as a result a simple leach pit is able to disperse the water content. The use of twin leach pits allows for alternate filling and emptying of the accumulated sludge. Because of this seal, one big advantage is that toilets can be built closer to the dwelling or even inside the dwelling. Greywater can be used as an alternative water source as well.

The evaluation focused on user acceptance, user perception, impacts of the pilot pour flush toilets on the quality of life for beneficiaries and assessment of the long-term sustainability of the pour flush sanitation technology in rural schools and households. The research methods used included primary and secondary data collection methods. The primary data collection

methods included survey questionnaires, interviews and on-site inspections of pilot pour flush toilets.

The key conclusions made from this evaluation are:

- The pilot pour flush toilets have been shown to work well in households and EC schools and some Limpopo primary schools.
- That this sanitation technology was accepted by all surveyed users in schools and households because the toilets were convenient, hygienic, free from bad smells and flies.
- The pour flush toilet had a positive impact on the quality of life of the users; it contributed to the improvement in health, hygienic practice and reduced absenteeism for adolescent girls because they had access to sanitary toilets that offered privacy.
- The pilot pour flush toilets were more likely to be sustainable in EC primary schools and households in the long-term because most of the sustainable indicators were in place.

More specifically, the following findings were highlighted from evaluation of the pilot pour flush toilets in rural schools and households:

What worked?

- There was a high user acceptance of the pour flush toilets by all surveyed users in schools and households because these toilets were convenient, clean, hygienic and free from bad odours and flies.
- The pour flush toilet was a huge improvement from the old pit toilet because it was safe for use by everyone including young children.
- The user education and hygiene awareness training provided by the implementing agent contributed to the improvement in the health of the beneficiaries in schools and households.
- The provision of pour flush toilets in Limpopo schools contributed to the reduction in absenteeism for adolescent girls because they had access to decent sanitation facilities that offered privacy.

- The Eastern Cape pilot schools had clean, hygienic and functional toilets because they allocated a dedicated budget for toilet paper, cleaning and proper operation and maintenance costs for the pour flush toilets.
- The pour flush toilet blocks implemented in Limpopo schools made provision for a toilet cubicle which was adapted to meet the special sanitation needs of physically disabled learners and teachers.
- The implementing agents took most of the indicators of sustainable sanitation services into consideration during the planning and construction of the pilot pour flush toilets, such as stakeholder engagement, user education, creation of employment for local labour and ensuring water availability for flushing the toilets.

What did not work?

- Unforeseen failure of the borehole at a Limpopo primary school led to the failure of the pour flush toilets in this school.
- Use of inappropriate anal cleansing materials and dumping of rubbish into toilets by learners led to blockages of toilets in 2 Limpopo high schools.
- Failure of school management to allocate a dedicated budget for toilet paper, soap, cleaning materials and other O&M costs led to blocked dysfunctional pour flush toilets in the two Limpopo high schools.
- Lack of access to local skilled plumbers and suppliers of spare parts for fixing broken toilets in Limpopo schools led to the abandonment of these broken and blocked pour flush toilets.
- The failure of the pour flush toilets in 2 Limpopo high schools could be attributed to poor governance because the school leadership did not show any commitment or appreciation of their responsibility for ensuring that learners were provided with safe and hygienic sanitation services that did not pose a threat to public health.

The following recommendations are based on the outcomes of the evaluation of the pilot pour flush toilets.

Schools

- Effective school governance is crucial for ensuring that the school management take responsibility for the providing learners and teachers with clean and safe sanitation

facilities. This requires allocation of a dedicated budget for water supply, toilet paper, cleaning materials and other O&M costs to prevent blockages of toilets from the use of inappropriate materials for anal cleansing. The relevant regulatory body must enforce good water and sanitation governance in all schools.

- The Provincial Education Department or District must provide technical support for rural schools to make sure that dysfunctional pour flush toilets are fixed so that learners can continue to have access to clean and hygienic toilets.
- Proper assessment of the reliability of water supply must be done and alternative sources of water such as rainwater harvesting tanks should considered in areas that are vulnerable to droughts to ensure that the pour flush toilets continue to function properly.
- On-going health and hygiene education must be provided to the learners so that they can learn to appreciate the importance of clean, hygienic toilets to the improvement of their health and protection of public health.
- The plans for emptying and disposal of sludge from full leach pits should be prepared by the schools with the support of the relevant authorities during the project planning phase to ensure long-term sustainability of the pour flush toilets.
- All school pour flush toilet blocks must make provision for the special sanitation needs of physically disabled learners and educators.
- More innovative dry sanitation technologies must be developed and piloted in rural schools located in very dry areas of South Africa.

Households

- Beneficiary households must be supported to have alternate sources of water supply such as rainwater harvesting tanks so that when the municipal water supply fails, they will always have access to water to keep their toilets functioning properly.
- The size of the pour flush toilet must be adjusted to meet the needs of larger and taller users.
- Municipalities must clarify household responsibilities for O&M of the pour flush toilets during the project phase and also make them aware of the cost implications.

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The author wishes to acknowledge Mr Dave Still (PID Consulting Engineers) and Mr Phillip Ravenscroft (Maluti GSM Consulting Engineers) for providing contact details for the relevant school principals in Limpopo and Eastern Cape provinces and sharing project reports with the project team. The following field researchers are acknowledged for conducting surveys and interviews in schools and households: Ms Vuyi Mlumbi (Eastern Cape schools &Amathole households), Itumeleng Modiba (Limpopo schools) and Thabani Zikalala (Amajuba households). My sincere gratitude goes to everyone who participated in surveys, i.e. the teachers, learners from EC and Limpopo schools, Amajuba households and Amathole households.

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ACRONYMS

DM	District Municipality
DST	Department of Science & Technology
EC	Eastern Cape
H&H	Health & Hygiene
HS	High School
JSS	Junior Secondary School
KZN	KwaZulu-Natal
O&M	Operation & Maintenance
PID	Partners in Development
SSS	Senior Secondary School
VIP	Ventilated Improved Pit toilet
WRC	Water Research Commission

1. INTRODUCTION

1.1 Background and context

The Water Research Commission (WRC) appointed Hlathi Development Services to conduct an independent evaluation of the pilot pour flush toilets implemented in selected schools in the Eastern Cape and Limpopo provinces and selected households in Amathole District Municipality (DM) in the Eastern Cape province and Amajuba DM in KwaZulu-Natal (KZN) province.

The implementation of the pilot pour flush toilets was funded by the Department of Science and Technology (DST) and the Department of Environment Affairs. Partners in Development Consulting Engineers were appointed by the WRC on behalf of the funders to assess the appropriateness of the pour flush toilets for sustainable use in rural households and rural schools.

The evaluation of the pour flush toilets was initiated to assess user acceptance and perceptions of this sanitation technology in order to determine the best implementation approaches for making this sanitation technology sustainable in South African rural schools and communities.

Brief description of the pour flush toilet

The pour flush toilet is designed to be flushed with water which is poured into the pedestal pan by hand and the human waste is pushed to the leach pit which is connected to the toilet block. It requires a minimum of 1 litre of water for flushing. The leach pit is small and it does not require deep excavation, this makes it easy to access and empty sludge when the pit is full. The WRC funded the adaptation of the pour flush sanitation technology which is widely used in Asia to meet the preferences of South African users. The adapted toilet has a pedestal which is similar to that of a conventional waterborne toilet but it does not have a bowl, it is funnel shaped. This technology can meet the needs of households who aspire to have a flush toilet without the cost of full water reticulation, septic tanks or connection to an off-site sewerage system and wastewater treatment works. The water seal blocks unpleasant odours and keep flies out of the toilets; it is safe for use by young children.

The primary improvement of a pour flush latrine over dry sanitation systems is that it introduces a water seal between the toilet bowl and the sludge with the result that smells and flies can be eliminated from the user interface (Fig 1). The volume of water used for flushing is only 1 to 2 litres and as a result a simple leach pit is able to disperse the water content. The use of twin leach pits allows for alternate filling and emptying of the accumulated sludge (PID Consulting Engineers and Maluti GSM Consulting Engineers, 2015).

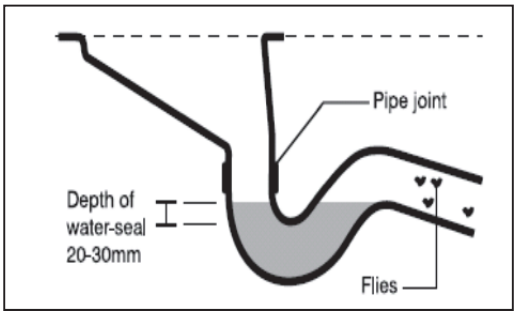

Fig 1: Pour Flush Pedestal water seal (PID and Maluti GSM, 2015)

Many South African rural schools still lack access to adequate sanitation services, consequently school children are at risk of contracting diseases associated with poor sanitation services. The provision of waterborne sanitation facilities to these schools is not an option because of scarce water resources and high operation and maintenance costs. Dry sanitation systems such as ventilated improved pit (VIP) toilets are not an ideal solution for large scale use in schools because they can fill up fast and the unpleasant smell can inhibit young children from using them. Poor sanitation in schools has also been shown to affect school attendance by adolescent girls negatively.

To address the sanitation challenge in South Africa, the Department of Science and Technology partnered with the Water Research Commission to identify, develop and evaluate new sanitation technologies for their appropriateness for the South African context. The pilot pour flush project targeted rural schools and households that still lacked access to basic sanitation facilities.

1.2 Objectives of the study

The study had the following objectives:

- To evaluate the pilot pour flush toilets with regards to user acceptance, user perceptions of the technology and long-term sustainability aspects
- To review the overall impact of the sanitation technology on the quality of life for the beneficiaries
- To make recommendations for addressing problems identified by the evaluation.

1.3 Scope of the evaluation report

The evaluation covered 5 schools in Cofimvaba, Eastern Cape (EC) province and 6 schools in Limpopo province. It also included pilot pour flush toilets implemented in households in KwaMdakane (Nellieville) near Newcastle in Amajuba District Municipality in KwaZulu-Natal and Ndakana and Jerseyvale villages near Stutterheim in Amathole District Municipality in the EC province.

1.4 Limitations

Due to timing of the project towards the end of the school year, it was not possible to conduct the survey of learners in the Eastern Cape schools. In all the five EC schools, learners were no longer attending schools because they had finished their final examinations. In Limpopo province, only 2 schools were surveyed where the learners were still coming to school because the feeding scheme was still operational, while in the other 3 schools the feeding scheme was suspended when final examinations were completed. Attempts to interview the municipal officials or councillors from Amajuba and Amathole DM were unsuccessful.

2. EVALUATION FRAMEWORK

The evaluation of the pilot pour flush toilets is an important part of the sanitation improvement in South Africa, it will provide decision-makers and sanitation programme planners with information on what works and what does not work and why. This information will provide decision-makers and policy makers with guidance on crucial factors that should be taken into consideration in the scaling up of the pour flush sanitation technology in rural schools and households.

2.1 Key aspects evaluated

The field research evaluation focused on user acceptance, user perception; impacts of the pilot pour flush toilets on beneficiaries and assessment of the long-term sustainability of the pour flush sanitation technology in rural schools and households. The evaluation focused on the following specific aspects:

User acceptance

- How well did the pour flush toilets meet the sanitation needs of the users?
- Level of user satisfaction with the pour flush toilets.
- How the users were experiencing the use of pilot pour flush toilets compared to their old toilets?
- Reliable access and availability of water for flushing the pour flush toilets.
- Willingness to recommend the toilet to family and friends.
- Affordability of the toilet paper for the users.

User perceptions of pour flush toilets

- Perception of the pour flush toilet compared to the old pit latrines.
- Perceptions of health benefits of the pour flush toilet compared to the pit latrine.
- Perceptions on suitability of the toilet for indoor use.
- Suitability and safety of the toilet for use by the children.
- Perceptions on the responsibility for maintenance and emptying of the full leach pits.

Impact of the pour flush toilet on the quality of life for beneficiaries

- Improvement in hygiene practice of the users
- Reduction in absenteeism of adolescent girls from schools.

- Job creation for the local people during the construction phase of the toilets and on-going operation & maintenance of the toilets.
- Problems experienced with the pour flush toilets.

2.2 Research questions

The evaluation addressed the following key questions that are critical to the long-term sustainability of the sanitation services:

- How has the implementation of the pilot pour flush toilets integrated the principles of sustainable sanitation services?
- To what extent did the implementing agents ensure that the beneficiary schools and households took ownership of the sanitation facilities?
- What plans were in place for emptying and disposal of sludge when leach pits become full?
- To what extent did the pilot sanitation project make provision for the integration of user and H&H education for the beneficiary households and schools?
- To what extent did the pilot pour flush project contribute to local economic development and job creation during the implementation and post-implementation phases?

2.3 Sampling strategy

It was not possible to conduct a survey of a sample of learners in all pilot project schools as originally planned because learners stopped going to school after they finished writing their final examinations. A total of 63 learners from Matsikinyane and Diphuti Primary schools in Limpopo participated in the survey.

A ten percent sample of households in Amathole and Amajuba District Municipalities was surveyed. A total of 28 households were surveyed (14 households per DM representing males and females).

3. METHODOLOGY

3.1 Data collection methods

The following primary and secondary data collection methods used for the study are presented in Table 1 below:

Table 1: Research instruments

Research instrument	Description	Pros	Cons
Document review	Review of project implementation reports and other relevant reports to understand the processes followed by the implementing agents during the planning and construction phases of the project	Provides comprehensive information on process and outputs of the programme	Often takes time and information may be incomplete
Surveys	Used to assess someone's experience or perceptions of the programme by users and key informants)	Gets in-depth information and builds a relationship with the stakeholders	Time consuming
On-site observations	Use of checklists to evaluate programme outputs such as the quality of the infrastructure, cleanliness of the toilets and availability of flushing water and hand-washing facilities etc.	Can observe operations of programme as they occur	Can be biased
Interviews with key informants	Qualitative in-depth interviews with stakeholders who have a first-hand knowledge of the programme	Can provide different perspectives of the programme	Can be biased

The survey questionnaires for school-children and households consisted of quantitative and qualitative questions to facilitate the collection of in-depth responses from the participants. The qualitative questions compensated for the lack of focus group discussions.

Data analysis and synthesis of the results

The data collected using the different research instruments was captured, classified and analysed according to the parameters set for this study and the key questions that guided the evaluation.

3.2 Brief description of the pilot pour flush sanitation project sites

3.2.1 Pilot schools in Limpopo province

The pilot pour flush toilets were implemented in six Limpopo schools, four of these schools were located in Mopani District Municipality near Tzaneen and Hoedspruit (Diphuti, Matsikinyane, Madie and Dipone), the other two schools were located in Vhembe District Municipality, one in Malamulele (Shitlhelani) and the other was near Thohoyandou (Lambani). Figure 2 below shows the location of the Limpopo schools provided with pour flush toilets.

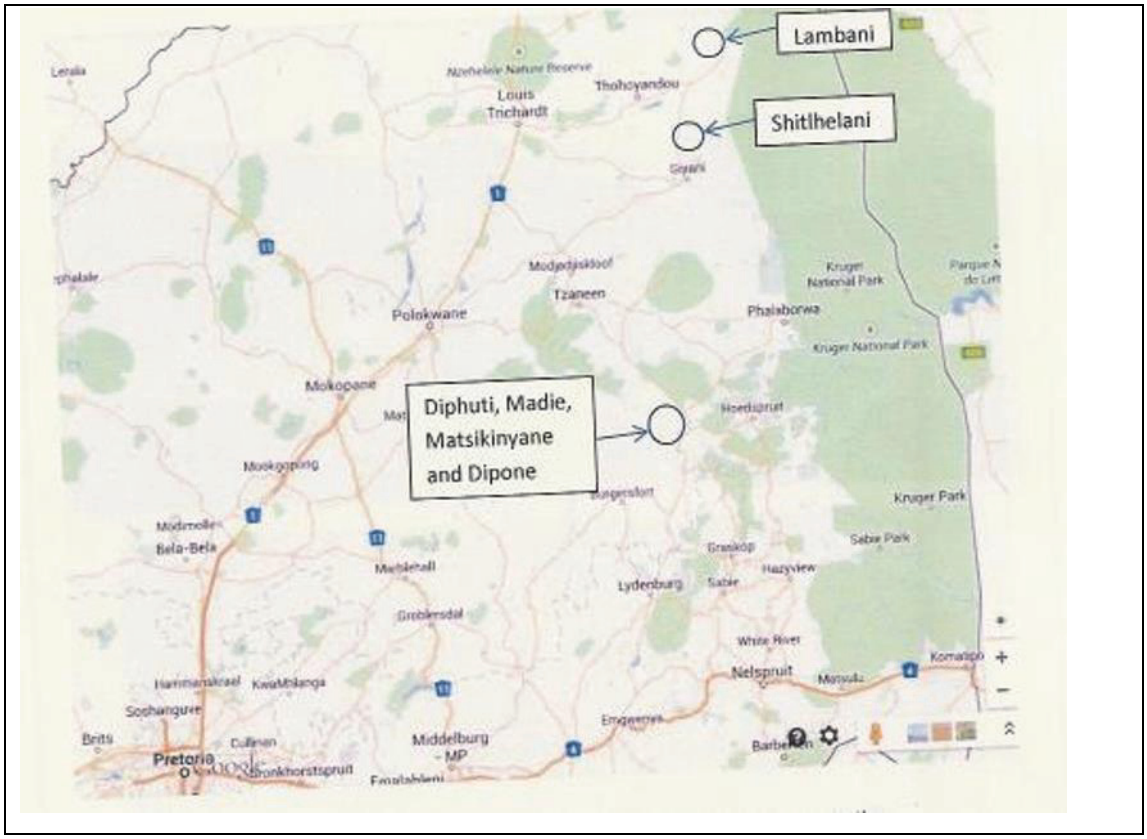

Figure 2: Map of 6 Limpopo schools provided with pour flush toilets (PID Consulting Engineers, 2014)

The following table summarizes details of the pour flush toilets built in these schools:

Table 2: Summary of pilot pour flush toilets in Limpopo schools

Name of school	Girls' toilets	Boys' toilets	Teachers' toilets
Diphuti Primary	1 block with 6 toilets	None	1 block with 2 toilets
Matsikinyane Primary	1 block with 4 toilets	1 block with 2 toilets & 4 urinals	1 block with 2 toilets
Madie High	1 block with 4 toilets	1 block with 2 toilets & 4 urinals	1 block with 2 toilets
Dipone High	1 block with 4 toilets	1 block with 2 toilets & 4 urinals	1 block with 2 toilets
Lambani Primary	1 block with 4 toilets	1 block with 2 toilets & 4 urinals	1 block with 2 toilets
Shitlhelani Primary	none	none	1 block with 3 toilets

3.2.2 Eastern Cape schools provided with pilot pour flush toilets

The pilot pour flush toilets were implemented in five EC schools and these were located in Cofimvaba close to R61. They were Arthur Mfebe Senior Secondary (SS) School, St Marks Junior Secondary School (JSS), Zamuxolo JSS, Mbudlu JSS and Mvuzo JSS. All these schools were participating in the Department of Science and Technology Cofimvaba Rural Schools Fuel Cell Education Initiative. Figure 3 shows the location of the Eastern Cape schools with pilot pour flush toilets.

Figure 3: Map of Eastern Cape schools provided with the pilot pour flush toilets

Table 3: List of EC schools provided with pilot pour flush toilets

Name of school	**Grades provided with pour flush toilets**
Arthur Mfebe SS	Grade 12 learners
St Marks JSS	Grade R-Grade 3
Zamuxolo JSS	Grade R-Grade 3
Mbudlu JSS	Grade 7 & Grade 8
Mvuzo JSS	Grade R-Grade 3

3.2.3 Household pilot pour flush toilets implemented in Amathole and Amajuba DMs

The pour flush sanitation technology was piloted in households in Amathole and Amajuba DMs to assess its appropriateness for use in households. A total of 250 demonstration toilets were constructed in the two DMs, this represented the first large scale pilot of the pour flush toilets in rural households.

Amathole DM

Amathole DM approved the piloting of the pour flush toilets in 2 villages (Ndakana also known as Amazibula and Jerseyvale) located about 10 km south east of Stutterheim after a consultative process with the implementing agents. These villages were close to R6 national road. The majority of Ndakana households obtained their water from communal standpipes, and it was estimated that 30-40% of the households had yard taps. Ndakana village had not been provided with subsidized basic sanitation facilities in the past. The households were relying on unimproved pit latrines built by the owners.

Jerseyvale households also obtain their water from communal standpipes and an estimated 20-30% of households had yard connections.

The village did not have basic sanitation facilities, most households were using owner built rudimentary pit latrines and some of them were dilapidated.

125 pour flush toilets were constructed in Jerseyvale households from April 2015 and completed in May 2015. The municipality took a decision to focus on meeting the demand for pour flush toilets in Jerseyvale before Ndakana. The Department of

Science and Technology allocated additional funding from the DST Innovation Programme to provide pour flush toilets to all households in Jerseyvale.

Amajuba DM

Amajuba DM approved the piloting of the pour flush sanitation technology in a rural village of KwaMdakane (also known as Nellieville); this village was located about 38km south east of Newcastle. This community had not benefitted from government subsidized basic sanitation facilities. Households were using owner-built rudimentary pit toilets. A total of 125 pilot pour flush toilets were constructed in this village.

4. FINDINGS

4.1 Process evaluation

A review of the project reports prepared by the pilot project implementing agents (PID and Maluti GSM) was conducted to evaluate the processes followed during the planning and construction phases to ensure sustainability of the pilot pour flush toilets. The following important considerations taken by the implementing agents to ensure long-term sustainable sanitation services were identified.

4.1.1 Stakeholder engagement

Schools

The five Eastern Cape pilot schools were selected in consultation with the Department of Science & Technology, Eastern Cape Provincial Education Department and the relevant Education District. In Limpopo Province, the six pilot schools were selected in consultation with the Department of Environment Affairs which funded the toilet superstructure through the provision of treated timber from its Invasive Alien Clearing Programme. The treated timber was used to build the superstructure of the school pour flush toilets.

Households

PID Consulting Engineers held several meetings with the councillors and officials of Amajuba DM and also made a presentation to the Amajuba DM Infrastructure Portfolio Committee to solicit their support for the project and approval of suitable sites for the pilot pour flush sanitation project. KwaMdakane village was selected as a suitable project site because households still lacked access to basic sanitation facilities. Amajuba DM requested PID to use cement block for superstructure to increase opportunities for employment of local labour in cement block-making. The implementing agent worked closely with a local project steering committee (PSC) and the ward councillor responsible for the pilot village in selecting beneficiary households and employment of the local labour.

Maluti GSM which was sub-contracted by PID held several meetings with senior Amathole DM officials responsible for water and sanitation to seek their approval for a suitable pilot village. Community engagement was done through the local project

steering committees established by Amathole DM for Jerseyvale and Ndakana villages. These PSC's assisted Maluti GSM with the selection of beneficiary households and employment of local labour. Amathole DM requested Maluti GSM to use the precast top structure because this superstructure had already been standardised within this District Municipality.

4.1.2 Availability of water supply in pilot schools and villages

All six Limpopo pilot project schools had existing boreholes which pumped water into JoJo tanks and they had several taps in the school yard. Additional sources of water included rainwater tanks and one school also had a connection to the municipal community water supply. All schools had sufficient water to meet the requirements of the pour flush toilets. The local municipality also provided an intermittent water supply and water tankers were used as a back-up water supply for schools; the reliability of this service was not known. The selected pilot villages in Amajuba and Amathole DMs had access to communal standpipes. It was estimated that 30-40% of households in Ndakana and Jerseyvale had yard taps.

4.1.3 Job creation and skills development for local people

The pilot project created jobs for the local unemployed people; in Amajuba, 16 people were trained as bricklayers. Local plumbing teams including women were trained to install the pedestals and pipework in the 2 district municipalities. In the Eastern Cape school pilot project, local people including women were trained by Maluti GSM in the pedestal and pipework installation for the pilot pour flush toilets and local community building contractors were appointed to build the leach pits.

4.1.4 User training and hygiene education

The implementing agent for Eastern Cape Province schools held training sessions for the learners and teachers on user education, health and hygiene education. The learners were made aware of the importance of not throwing any foreign materials, such as rubbish and sanitary towels into the pour flush toilets because these materials would block the pour flush toilets and render them dysfunctional. A game was used to train younger children on proper use of pour flush toilets. This game helped the children to differentiate between correct and incorrect use of the pour flush toilets.

The training of school children was conducted in both Xhosa and English with the local teacher helping with the translation.

PID Consulting Engineers provided all Limpopo pilot schools with a package of Health &Hygiene education materials. This included posters on the correct use of the pour flush toilet, a sticker to be placed on the toilet paper dispenser on proper use of toilet paper and information sheet on the importance of hand-washing. This information package was presented in English and Sepedi or other local languages depending on the school's preference. The implementing agent planned to train and hire a community member as a health and hygiene educator and monitor. The training sessions would take place at the hand-over time. The Health & Hygiene educator would be responsible for monitoring the toilets and report to the principal monthly for a period of 6 months.

PID also provided schools with a starter pack of toilet paper and cleaning materials (soap, brushes and buckets) which was enough to last them for two weeks. All pour flush toilet blocks implemented in Limpopo schools were provided with hand-washing basins to promote good hygiene practices.

4.1.5 Consideration of the sanitation needs of the disabled educators and learners

During the construction of pour flush toilets in Limpopo schools, provision was made for one toilet cubicle specially adapted for use by physically disabled learners and educators. The cubicle had rails installed to support the physically disabled people to use the toilet. This toilet was located in the toilet block for educators to protect it from abuse by learners. Wheel-chair access ramps were built in the entrance to the toilet block in all the six schools to ensure easy access for wheel-chair users without any assistance.

4.2 Quantitative surveys of schools and households

The major findings on the main aspects of the pilot pour flush toilets evaluated are presented below. These include the user acceptance, user perceptions, impacts of the pour flush toilets on the quality of life of users and the long-term sustainability aspects of the sanitation technology identified by the study.

4.2.1 User acceptance – Limpopo school children

The findings on the user acceptance for the pour flush toilets by 63 surveyed learners from two Limpopo primary schools based on 5 survey questions (Please refer to Annexure A for detailed survey questions and results). The majority of surveyed learners from the two schools (Matsikinyane and Diphuti) were satisfied with their toilets. They liked the pour flush toilets because they were clean, hygienic, had no bad smells, no flies and they were far much better than the old pit toilets. The respondents indicated that they would recommend the pour flush toilets to their friends and families.

4.2.2 User perceptions – Limpopo school children

All the surveyed learners from the two schools believed that the pour flush toilets were more hygienic than the old pit latrines because they were clean, had no smells and were free from flies which were responsible for spreading sanitation-related diseases from the old pit toilets. They also believed that the pour flush offered the same level of convenience as a full waterborne sanitation toilet. Most of the surveyed learners believed that the pour flush toilet was suitable for installation inside the house. (Please refer to Annexure A for details of survey results).

4.2.3 User acceptance of the pour flush toilets by households from Amajuba and Amathole DMs

The user acceptance of the pour flush toilets for 28 surveyed households from Amajuba and Amathole District municipalities are highlighted below: (Please refer to Annexure A for details of survey results)

- The majority of surveyed households were satisfied or very satisfied with their pour flush toilets
- Almost all surveyed households indicated that the pour flush toilets were much better than the old pit latrines.
- All surveyed households were likely to recommend the pour flush toilet to their friends and families.
- Almost all surveyed households had not experienced any blockage of their pour flush toilets.
- The majority of surveyed households had reliable access to water for flushing

- The majority of surveyed households indicated that they always used toilet paper.

4.2.4 User perceptions of the pour flush toilets by households from Amajuba and Amathole DMs

The survey results on the user perceptions of the pour flush toilets by households from Amajuba and Amathole DMs are presented below:

- All surveyed households believed that the pour flush toilet was more hygienic than the pit latrine because it had no bad smells and no flies.
- The majority of households believed that the pour flush toilet offered the same level of convenience as a full waterborne sanitation toilet.
- All surveyed households believed that the pour flush toilet was safe for use by small children.
- Almost all surveyed households believed that the pour flush toilet was suitable for installation inside the house.
- All the surveyed households believed that the municipality should be responsible for fixing the blocked toilets and also for emptying the leach pits when they become full.

4.3 Impacts of the pour flush toilets on the quality of life for the users

4.3.1 Impact of the pour flush toilets on the quality of life for 63 learners

The surveyed learners from 2 Limpopo primary schools highlighted the following impacts of the pour flush toilets on their lives:

Convenience – The pour flush toilet was convenient, clean, hygienic and pleasant to use because there were no bad smells and flies.

Health improvement for learners – The availability of hand-washing facility, soap and water enabled learners to wash their hands thus reducing the incidence of sanitation-related diseases. The learners were taught good hygienic practices by the implementing agent.

Contribution of the pour flush toilets to the reduction in absenteeism for adolescent girls – School attendance by adolescent girls had improved because the toilets had bins for disposal of sanitary pads and they also offered privacy.

4.3.2 Impact of the pour flush toilets on the quality of life for beneficiary households of Amathole and Amajuba District Municipalities

The following impacts of the pour flush toilets on the quality of life for the 28 surveyed households were identified by the survey respondents:

- The pour flush toilet was convenient, clean, safe and dignified for use by everyone.
- The pour flush toilet was hygienic and free from bad smells and owners were very proud to show-off their toilets to the visitors.
- The pour flush toilet was easy to keep clean when compared to the old pit toilets.
- Health and hygienic practices of the family had improved because they were taught how to wash their hands with soap and water after using the toilet.
- The pour flush toilet contributed to improved health for the family because there were no flies which used to spread diseases when households were using the old pit latrines.
- The pilot project created jobs for the local unemployed people during the construction phase in both Amajuba and Amathole DM.

4.4 Sustainability aspects of the pour flush toilets

4.4.1 Sustainability indicators identified by the interviewed teachers from Limpopo and Eastern Cape Schools

The following factors which are crucial to the sustainability of the pour flush toilets were identified by the interviewed teachers from pilot project schools:

Access to a reliable water supply for flushing the toilets: All five Eastern Cape schools had a reliable water supply. 5 out of 6 Limpopo schools had a reliable water supply. Lambani Primary from Limpopo used to have a reliable water supply until its borehole dried-up in August 2015; this led to the blockage of all pour flush toilets used by learners. The teacher's pour flush toilet block was still functional because it had access to water from a rainwater harvesting tank.

Availability of a dedicated budget for toilet paper, soap, cleaning materials and O&M costs: All four primary schools in Limpopo had a dedicated budget for toilet paper, soap, cleaning materials and O&M costs and the two high schools (Dipone and Madie

did not have any budget for these items. The pour flush toilets in Dipone and Madie High schools were blocked and no longer usable due to the use of inappropriate anal cleansing materials by the learners. Four EC primary schools had a dedicated budget for the above-mentioned items and Arthur Mfebe High School did not have a dedicated budget for toilet paper.

Access to local technically skilled plumbers: The two Limpopo high schools did not have any budget for plumbers; the three primary schools had access to local plumbers but their rates were too high. There were also no local suppliers of spare parts required to repair the broken pour flush toilets. Shitlhelani Primary relied on the Department of Public Works to solve any technical problems they encountered with their pour flush toilets. None of the five EC had experienced any technical problems with their pour flush toilets; therefore, the need for a local plumber had not yet arisen. However, they believed that the local municipality should be responsible for providing the technical support when the need arises in future.

School's plan for emptying and disposal of sludge when the leach pits become full: Most of the Limpopo schools had no plans for emptying full leach pits; two schools were planning to seek assistance from PID Consulting Engineers (pilot project implementing agent) when the need arises. The responding teachers from the EC schools indicated that they were not aware that the leach pits would get full one day. They believed that they needed training on options available for emptying the full pits and they also believed that the Local municipality should provide the necessary technical support.

User education: All learners and teachers who benefitted from the pilot pour flush toilets were trained by the implementation agents on how to use these toilets properly including promotion of good hygienic practices. All school toilets were provided with hand-washing basins.

4.4.2 Current state of pour flush toilets in EC and Limpopo pilot schools

3 out of 6 Limpopo schools had no toilet paper inside the toilets, these toilets were very dirty, blocked, and unusable, the hand-washing basins were dirty, there was no water, no soap and the toilets had a very bad odour (Madie High School, Dipone HS and Lambani Primary School). The other 3 schools had functional clean toilets which were not blocked. All Limpopo schools had a special toilet cubicle for physically disabled people with a ramp for the wheel-chair bound users in the teacher's toilet

block. It had a chain installed to support the movement of the wheel-chair bound users; this chain had already been removed from Madie High schools.

Fig 12: Examples of dysfunctional toilet, unused blocked urinal and dirty sink from the 2 Limpopo High schools

The on-site inspection of five EC school pour flush toilets showed that all toilets were clean and in perfect working condition. There was toilet paper inside the toilets of the four primary schools. None of the five school pour flush toilet blocks had specially adapted toilet cubicles for use by physically disabled educators and learners.

Fig13: Examples of EC school toilet blocks – all in good condition and well-looked after

4.4.3 State of pour flush toilets in households of Amajuba and Amathole DM

All the 14 surveyed households in Amathole DM had toilet paper, including those of pensioners, the unemployed and those dependent on child grant, because they wanted to keep their toilets clean, functional and hygienic. Most households had toilet paper, a bucket with water and a jug in the toilets. Almost all the inspected toilets were clean, functional and not blocked.

50% of Amajuba households had toilet paper inside the toilet, there were no hand-washing facilities inside the toilet, no bucket with water inside the toilet, most of the households had yard taps, only one toilet was blocked and the majority of toilets were clean and had no unpleasant smell.

Fig14: Examples of Amajuba household toilets inspected

Fig 15: Examples of Amathole household toilets inspected

4.4.4 Problems experienced by users of pour flush toilets

The surveyed learners and interviewed teachers highlighted the following problems with pilot pour flush toilets:

- The pour flush toilets of three Limpopo schools were no longer usable due to the shortage of water, lack of dedicated budgets for toilet paper and O&M costs, use of inappropriate anal cleansing materials and dumping of rubbish into these toilets by learners.
- The lack of funds to employ a cleaner was cited as the reason for the filthy condition of the toilets in the 2 Limpopo high schools.
- The timber used for the superstructure of Limpopo school toilets had shrunk thus leading to cracks and opening of gaps in the wall structure; this compromised the privacy of the users of these toilets.

The majority of households had not experienced any problems with their pour flush toilets. However a few respondents were not happy with the size of the household toilet because it was too small for larger and taller users.

4.5 Key issues emerging from the evaluation of the pilot pour flush toilets

The following key issues have been identified from the survey results, interviews with teachers and on-site inspection of the current state of the pour flush toilets:

- All users in both schools and households were satisfied with the pilot pour flush toilets because they were convenient, hygienic, had no bad odours, no flies and germs.
- The pour flush toilets were working very well in primary schools in Eastern Cape and Limpopo because the schools had allocated dedicated budgets for toilet paper, soap, cleaning materials and O&M costs. The pour flush toilets in Lambani Primary school in Limpopo stopped working when the borehole dried up in August 2015.
- The pour flush toilets had failed completely in two Limpopo high schools (Madie and Dipone) because the school management did not budget for toilet paper, soap and O&M costs for the toilets. The learners abused the toilets by using inappropriate anal cleansing materials and throwing rubbish into the

toilets. All these toilets were no longer suitable for human use. The pour flush toilets in Arthur Mfebe High school were functional but not as well-looked after by the learners as those used by primary school children.

- Almost all household toilets in Amajuba and Amathole DM were working very well and owners were keeping them clean and they were very satisfied with their convenient, clean, hygienic and safe toilets.
- The majority of problems identified were due to the lack of commitment by school management, user behaviour and unreliable access to water for flushing the toilets.

5. LONG-TERM SUSTAINABILITY OF THE POUR FLUSH SANITATION TECHNOLOGY IN SOUTH AFRICA

5.1 Dimensions of sustainable sanitation services

Sustainability refers to sanitation services that continue to work and deliver lasting benefits for the users over a long time (WaterAid, 2010). Sustainable sanitation services must demonstrate the following five sustainability dimensions:

***Social sustainability**:* Sanitation services must be acceptable to the end-users; therefore the representatives of the beneficiaries must be involved in the selection of the sanitation technology options in order to ensure that users take ownership of the sanitation facilities provided. The implementation of the sanitation technology must contribute to community empowerment and local economic development. User education and ongoing health and hygiene education for the beneficiaries is crucial for sustained health improvement.

***Institutional sustainability**:* The selection of the sanitation technology and service levels must be based on availability of the management capacity and budgets for operation and maintenance at the institutional level and support from local municipality and district municipality.

***Technical sustainability**:* The choice of the sanitation technology must be based on availability of local technical skills with the capacity to provide O&M support to the users when necessary. Where water is required for flushing, reliable water supply sources must be in place.

***Financial sustainability**:* Sanitation services must be affordable to the beneficiary institutions and households. Where certain categories of households require sanitation subsidy, it must be established how much subsidy can be sustainably provided before decisions are taken to select sanitation technologies and service levels.

***Environmental sustainability**:* Sanitation services should not have negative impacts on the environment such as pollution of water sources from unsafe disposal of untreated human waste. Sanitation technologies that rely on on-site storage of human waste must put in place plans for emptying and disposal of sludge during the project planning phase.

Mjoli (2012) in her report on the evaluation of the bucket eradication programme demonstrated the importance of these dimensions in the long-term sustainability of sanitation services in poor communities of South Africa.

5.2 Assessment of the pilot pour flush toilets against the dimensions of sustainable sanitation services

Social sustainability

The project implementing agents engaged the relevant stakeholders in the planning and selection of pilot schools (Provincial and District Education Officials and school principals). For the household pilot pour flush toilets the relevant officials and councillors of Amajuba and Amathole District Municipalities were consulted by the implementing agents (PID and Maluti GSM respectively). The local project steering committees (PSCs) were established in both villages selected for the piloting the pour flush toilets. These PSCs played a central role in selecting beneficiary households and also selection of local people for employment in the construction of the toilets.

The implementing agents ensured the integration of user education and hygiene awareness in the pilot pour flush project. The teachers, learners and beneficiary households were trained in proper use of the pour flush toilets and hygienic practices such as hand-washing. All pilot schools and households were provided with posters with information on the correct use of the pour flush toilets and information sheet on importance of hand-washing after using the toilet. This information was translated into local languages (Xhosa or Sepedi or other relevant local languages). The implementing agent for Limpopo provide all the pilot schools with a starter pack of toilet paper and cleaning materials (soap, brushes and buckets) sufficient to last for a period of two weeks.

The construction of the pilot pour flush toilets in schools and households created job opportunities for local labour and contractors. The employed people were trained in brick-laying and installation of pedestal and pipework for the pour flush toilets.

Institutional sustainability

The Eastern Cape schools where the pilot pour flush toilets were working successfully were characterized by having committed school management that had allocated a

dedicated budget for toilet paper, cleaning materials and other O&M costs necessary for ensuring proper operation and maintenance of the pour flush toilets. The failure of the pilot pour flush toilets in two Limpopo high schools was due to a lack of commitment by the school management to the allocation of dedicated budgets for toilet paper and proper operation and maintenance costs of the pour flush school toilets.

Technical sustainability

The implementing agent ensured that all the pilot schools and households had access to a reliable water supply because water availability is crucial to the sustainability of the pour flush toilets. A borehole in one Limpopo school dried -up in August 2015 due to the prevailing drought and this led to the failure of the pour flush toilets because the school did not have alternative source of water supply to the toilets for the learners. Most schools did not have access to local plumbers and suppliers of parts for repairing broken toilets. Pilot households had not yet experienced any technical problems with their toilets and they were expecting their District Municipalities to provide the technical support when the need arises in future.

Financial sustainability

The Eastern Cape pilot schools allocated a dedicated budget for toilet paper and operation & maintenance costs to ensure the sustainability of the pour flush toilets. Household toilets were functioning properly because all users were aware of the importance of using toilet paper to maintain their toilets in good condition. Two Limpopo schools failed to allocate dedicated budgets for proper operation & maintenance of the pour flush toilets and this led to the failure of these toilets which were no longer usable.

Environmental sustainability

The pilot schools and households had no plans for emptying and disposal of the sludge when the leach pits become full. Some of them were not aware that the leach pits would become full in future. The schools and households assumed that the local municipalities would take responsibility for emptying and disposal of sludge when the need arises in future.

5.3 Issues to be taken into consideration when planning the scaling-up of the pour flush toilets for schools and households

An assessment of the pilot pour flush toilets against indicators of sustainable sanitation services highlighted several aspects. The assessment showed that the implementation of the pilot pour flush toilets had adhered to several indicators of sustainable sanitation services. These included the following:

Social sustainability

- All the relevant stakeholders were consulted and they played a major role in the selections of the pilot schools and demonstration households.
- The pilot pour flush toilets were implemented in schools that had inadequate access to sanitation facilities for all their learners
- The villages selected for the pilot were prioritized because they still lacked access to adequate basic sanitation facilities.
- Local project steering committees were established in selected villages; these PSCs represented the interests of the beneficiary households and played a major role in the selection of beneficiary households and employment of the local labour.
- The implementing agent provided user education to the teachers, learners and households and they were also taught how to use the pour flush toilets properly and the importance of washing their hands properly after using the toilet.
- Local people were employed and trained in construction, installation of pedestals and associated pipework for the toilets.

Institutional sustainability

Accountable school leadership that appreciated its responsibility for the provision of safe and hygienic sanitation facilities to the learners was crucial to the success of pilot pour flush toilets in Eastern Cape schools. The failure of the pour flush in the 2 Limpopo high schools could be attributed to weak institutional capacity which was characterized by weak leadership and lack of accountability for providing learners with safe sanitation facilities that were not harmful to their health.

Technical sustainability

- The implementing agent assessed water availability before taking decision to pilot the pour flush toilets in rural schools and households.
- Availability of local plumbers with the skills to fix technical problems with the toilets was not taken into consideration, consequently blocked and broken pour flush toilets in the 2 Limpopo schools were abandoned.

Financial sustainability

The affordability of the toilet paper and O&M costs should be addressed before decisions are made to build more pour flush toilets in schools. The failure of the pour flush toilets in 2 Limpopo high schools showed that school leadership did not appreciate their responsibility for allocating adequate budgets for providing learners with safe sanitation services and basic water supply.

Environmental sustainability

The pilot schools in Limpopo and Eastern Cape provinces had no plans for emptying and disposal of the sludge when the leach pits become full. The interviewed EC teachers were not aware that these toilets would need emptying in future. Their assumption was that the local municipalities should be responsible for pit emptying and disposal of sludge when the need arises. There was a need for the clarification of the institutional and household roles for emptying and safe disposal of sludge from the pour flush sanitation facilities when the leach pits become full.

6. CONCLUSIONS, CHALLENGES AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions were highlighted from the evaluation of the pilot pour flush toilets in rural schools and households:

What worked?

- There was a high user acceptance of the pour flush toilets by all surveyed users in schools and households because these toilets were convenient, clean, hygienic and free from bad odours and flies.
- The pour flush toilet was a huge improvement from the old pit toilet because it was safe for use by everyone including young children.
- The user education and hygiene awareness training provided by the implementing agents contributed to the improvement in the health of the beneficiaries in schools and households.
- The provision of pour flush toilets in Limpopo schools contributed to the reduction in absenteeism for adolescent girls because they had access to decent sanitation facilities that offered privacy.
- The Eastern Cape pilot schools had clean, hygienic and functional toilets because they allocated a dedicated budget for toilet paper, cleaning and proper operation and maintenance costs for the pour flush toilets.
- The pour flush toilet blocks implemented in Limpopo schools made provision for a toilet cubicle which was adapted to meet the special sanitation needs of physically disabled learners and teachers.
- The implementing agents took most of the indicators of sustainable sanitation services into consideration during the planning and construction of the pilot pour flush toilets, such as stakeholder engagement, user education, creation of employment for local labour and ensuring water availability for flushing the toilets.

What did not work?

- Unforeseen failure of the borehole at a Limpopo primary school led to the failure of the pour flush toilets in this school.

- Use of inappropriate anal cleansing materials and dumping of rubbish into toilets by learners led to blockages of toilets in 2 Limpopo high schools.
- Failure of school management to allocate a dedicated budget for toilet paper, soap, cleaning materials and other O&M costs led to blocked dysfunctional pour flush toilets in the two Limpopo high schools.
- Lack of access to local skilled plumbers and suppliers of spare parts for fixing broken toilets in Limpopo schools led to the abandonment of these broken and blocked pour flush toilets.
- The failure of the pour flush toilets in 2 Limpopo high schools could be attributed to poor governance because the school leadership did not show any commitment or appreciation of their responsibility for ensuring that learners were provided with safe and hygienic sanitation services that did not pose a threat to public health.

6.2 Challenges

The following challenges were identified from the evaluation of the pilot pour flush toilets in rural schools and households:

- South African rural areas were more susceptible to frequent droughts because they lacked access to water storage infrastructure such as dams. Therefore, any sanitation technology that relied heavily on water availability was likely to be more vulnerable to failure when droughts occurred as shown in Lambani Primary School in Limpopo where the bore-hole dried up in August 2015 due to the prevailing drought in this province.
- The majority of poor households in South Africa lived in rural provinces such as Limpopo, Eastern Cape and KwaZulu-Natal provinces; therefore, affordability of toilet paper and O&M costs for the pour flush toilets could be a problem as demonstrated by the failure of the pour flush toilets in 2 Limpopo high schools.
- The one-size-fits-all pour flush toilets provided to the households were too small for larger and taller users.

- The lack of local plumbers who were trained to fix and repair blocked or broken pour flush toilets led to the abandonment of the dysfunctional toilets in the two Limpopo high schools.

6.3 Recommendations

The following recommendations are based on the outcomes of the evaluation of the pilot pour flush toilets.

Schools

- Effective school governance is crucial for ensuring that the school management take responsibility for the providing learners and teachers with clean and safe sanitation facilities. This requires allocation of a dedicated budget for water supply, toilet paper, cleaning materials and other O&M costs to prevent blockages of toilets from the use of inappropriate materials for anal cleansing. The relevant regulatory body must enforce good water and sanitation governance in all schools.
- The Provincial Education Department or District must provide technical support for rural schools to make sure that dysfunctional pour flush toilets are fixed so that learners can continue to have access to clean and hygienic toilets.
- Proper assessment of the reliability of water supply must be done and alternative sources of water such as rainwater harvesting tanks should considered in areas that are vulnerable to droughts to ensure that the pour flush toilets continue to function properly.
- On-going health and hygiene education must be provided to the learners so that they can learn to appreciate the importance of clean, hygienic toilets to the improvement of their health and protection of public health.
- The plans for emptying and disposal of sludge from full leach pits should be prepared by the schools with the support of the relevant authorities during the project planning phase to ensure long-term sustainability of the pour flush toilets.
- All school pour flush toilet blocks must make provision for the special sanitation needs of physically disabled learners and educators.
- More innovative dry sanitation technologies must be developed and piloted in rural schools located in very dry areas of South Africa.

Households

- Beneficiary households must be supported to have alternate sources of water supply such as rainwater harvesting tanks so that when the municipal water supply fails, they will always have access to water to keep their toilets functioning properly.
- The size of the pour flush toilet must be adjusted to meet the needs of larger and taller users.
- Municipalities must clarify household responsibilities for O&M of the pour flush toilets during the project phase and also make them aware of the cost implications.

6.4 Concluding statements

- The evaluation of the pilot pour flush toilets in Eastern Cape and Limpopo schools demonstrated that good governance was crucial to the sustainability of this sanitation technology. Good governance was characterized by strong leadership and accountable school management that allocated dedicated budgets for operation and maintenance of the pour flush toilets in order to ensure that learners continued to have clean, safe, hygienic toilets (Mjoli, 2015).
- The Department of Education must allocate adequate funding for ensuring access to sustainable sanitation services for all rural schools and this must be coupled with the implementation of good governance in all these schools.
- The evaluation of the pilot pour flush toilets concluded that this sanitation technology was accepted by all surveyed users in schools and households because the toilets were convenient, hygienic, free from bad smells and flies.
- The pour flush toilet had a positive impact on the quality of life of the users; it contributed to the improvement in health, hygienic practice and reduced absenteeism for adolescent girls because they had access to sanitary toilets that offered privacy.
- The pilot pour flush toilets were more likely to be sustainable in EC primary schools and households in the long-term because most of the sustainable indicators were in place.

7. REFERENCES

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ANNEXURES

Annexure A: Results of user surveys

Schools: Matsikinyane and Diphuti Primary Schools

The quantitative survey results for the 2 Limpopo schools (Matsikinyane and Diphuti Primary Schools) are presented below:

User acceptance of the 31 surveyed learners from Matsikinyane Primary

A1. Level of satisfaction with your new pour flush toilet (Tick appropriate box)

Response& ranking	Not satisfied: 1	Satisfied: 2	Very satisfied: 3
# of respondents	**1**	**10**	**20**

A2. Is the pour flush toilet an improvement from your old toilet? Tick the appropriate box below

Response & ranking	Similar: 1	Better: 2	Much Better: 3
# of respondents	**0**	**12**	**19**

A3. Are you likely to recommend the pour flush toilets to your friends and family who are still using a pit latrine?

Response & ranking	Highly unlikely: 1	Likely: 2	Most likely: 3
# of respondents	**0**	**22**	**9**

A4.How often do you experience problems with the blockage of your pour flush toilets?

Response & ranking	Very often: 1	Sometimes: 2	Hardly ever: 3
# of respondents	**3**	**20**	**8**

A5. Do you always have reliable access to water for flushing the toilet?

Response & ranking	Not reliable: 1	Sometimes: 2	Very reliable: 3
# of respondents	**4**	**15**	**12**

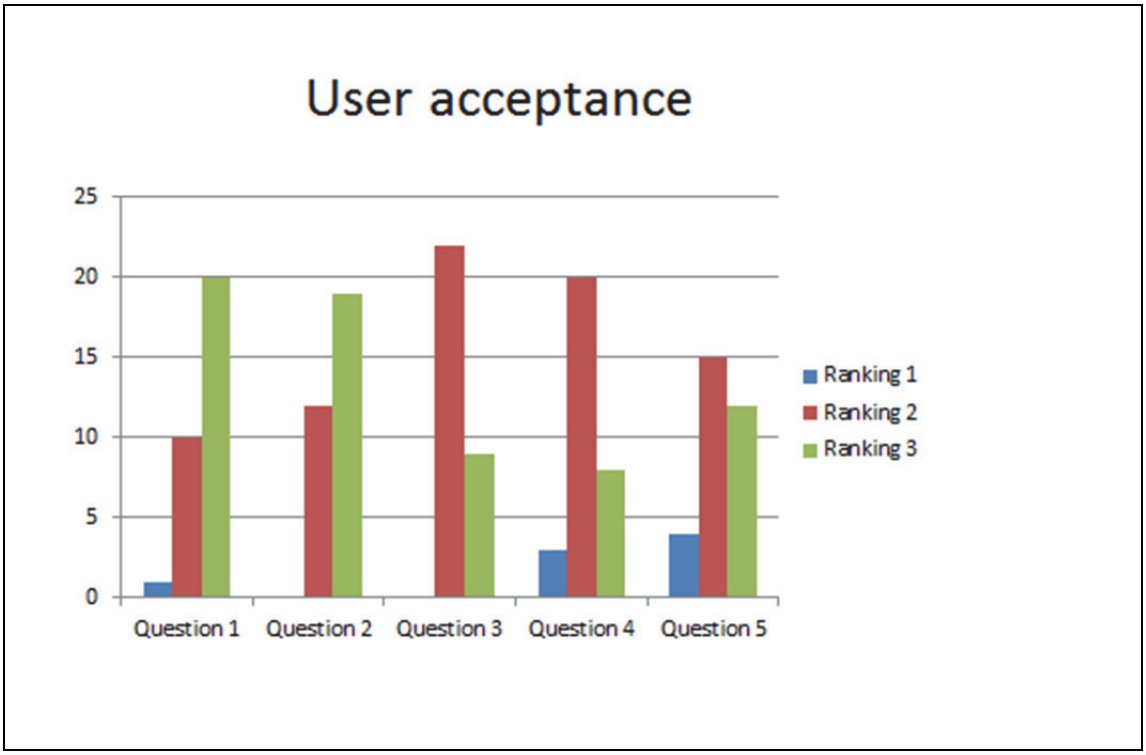

Fig A1: Chart of user acceptance for 31 surveyed Matsikinyane learners (Ranking 1 = low acceptance and ranking 3 = high levels of acceptance)

User acceptance – 32 learners from Diphuti Primary: survey results

A1. Tick the appropriate box to indicate your level of satisfaction with your new pour flush toilet.

Response & ranking	Not satisfied: 1	Satisfied: 2	Very satisfied: 3
# of respondents	**0**	**14**	**18**

A2. Is the pour flush toilet an improvement from your old toilet? Tick the appropriate box below

Response & ranking	Similar: 1	Better: 2	Much Better: 3
# of respondents	**0**	**11**	**21**

A3. Are you likely to recommend the pour flush toilets to your friends and family who are still using a pit latrine?

Response & ranking	Highly unlikely: 1	Likely: 2	Most likely: 3
# of respondents	**0**	**16**	**16**

A4.How often do you experience problems with the blockage of your pour flush toilets?

Response & ranking	Very often: 1	Sometimes: 2	Hardly ever: 3
# of respondents	**0**	**11**	**21**

A5. Do you always have reliable access to water for flushing the toilet?

Response & ranking	Not reliable: 1	Sometimes: 2	Very reliable: 3
# of respondents	**3**	**13**	**16**

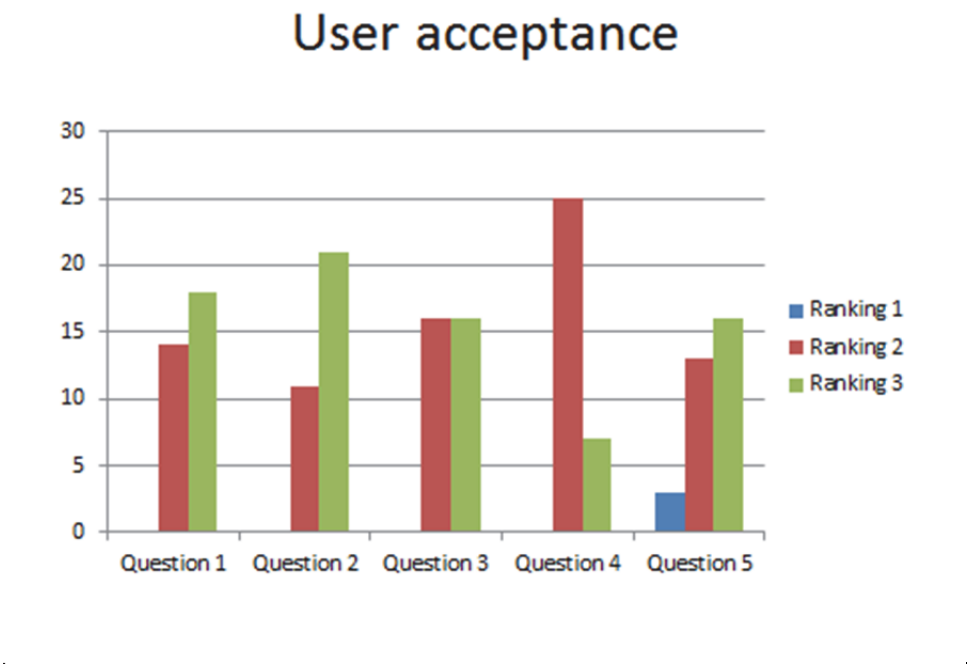

Fig A2: Chart of user acceptance for 32 surveyed learners from Diphuti Primary

User perceptions of 31 surveyed learners from Matsikinyane Primary

B1. Do you believe that the pour flush toilet is more hygienic than the pit toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**14**	**17**

B2. Do you believe that the pour flush toilet provides the same level of convenience as a full waterborne sanitation toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**4**	**21**	**6**

B3. Do you believe that your family would consider installing a pour flush toilet inside the house?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**1**	**21**	**9**

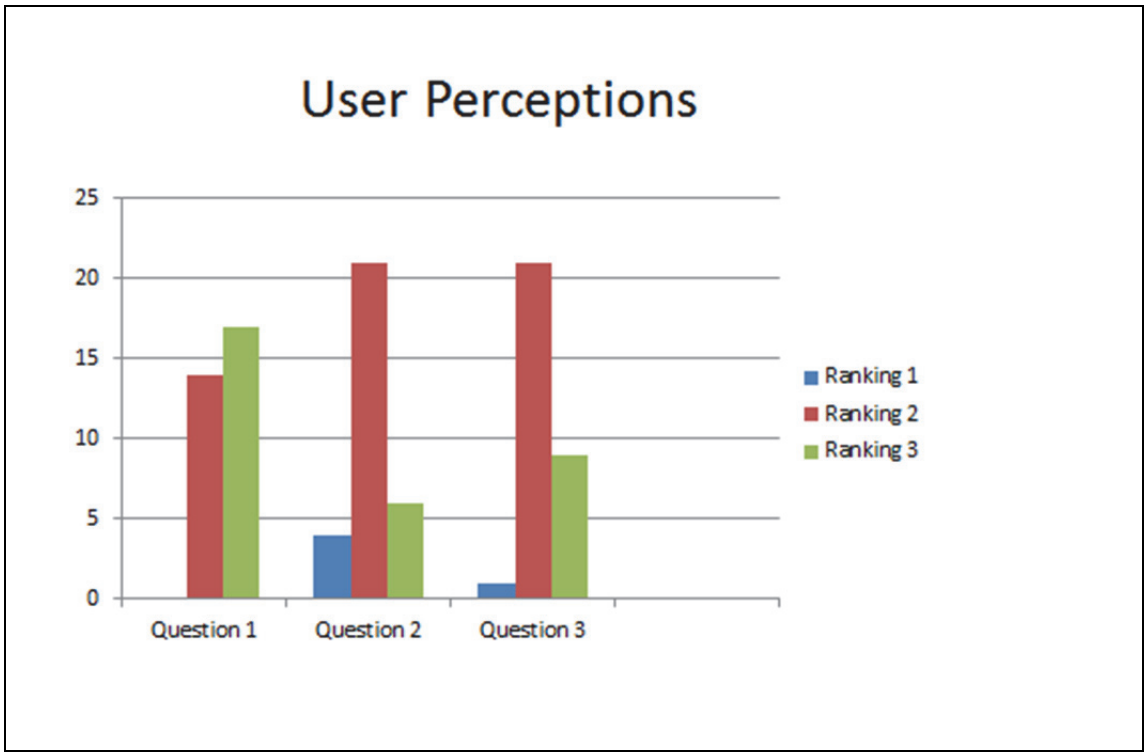

Fig B1: Chart of user perceptions survey results for 31learners from Matsikinyane Primary School (ranking 1=negative perception and ranking 3= very positive perception)

User perceptions: 32 Diphuti learners survey results

B1. Do you believe that the pour flush toilet is more hygienic than the pit toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**11**	**21**

B2. Do you believe that the pour flush toilet provides the same level of convenience as a full waterborne sanitation toilet?

Response &ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**10**	**6**	**16**

B3. Do you believe that your family would consider installing a pour flush toilet inside the house?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**9**	**23**

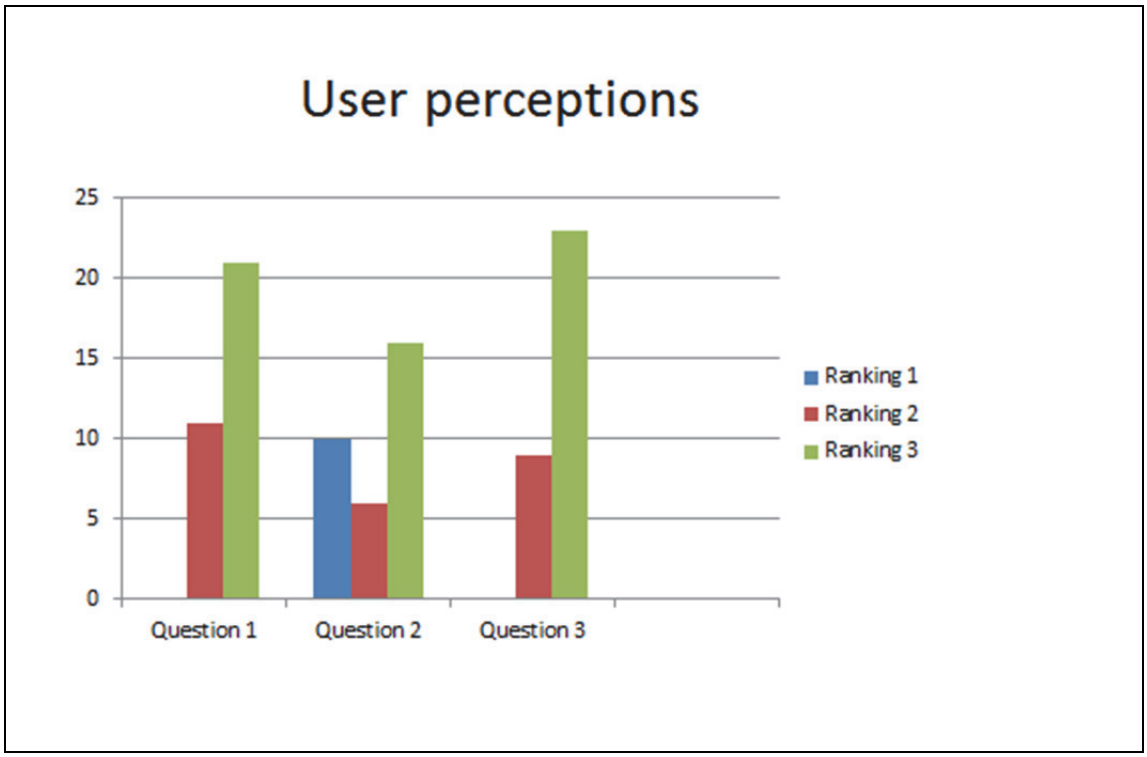

Fig B2: Chart of user perceptions survey results for 32 learners from Diphuti Primary (Ranking 1 =negative and ranking 3: very positive)

Households: User acceptance and perceptions

Amajuba DM – Nellieville households

The following survey results are based on a survey of 14 Nellieville households of Amajuba DM which included male and female respondents:

User acceptance

Q1: Level of satisfaction with your new pour flush toilet.

Response & ranking	Not satisfied: 1	Satisfied: 2	Very satisfied: 3
# of respondents	0	6	8

Q2: Is the pour flush toilet an improvement from your old pit latrine?

Response & ranking	Similar: 1	Better: 2	much better: 3
# of respondents	**1**	**3**	**10**

Q3: Are you likely to recommend the pour flush toilet to your friends and family?

Response & ranking	Unlikely: 1	Likely: 2	Most likely: 3
# of respondents	**0**	**5**	**9**

Q4: Have you experienced regular blockages in your pour flush toilet?

Response & ranking	Very often: 1	Sometimes: 2	Hardly ever: 3
# of respondents	**1**	**1**	**12**

Q5: Do you have reliable access to water for flushing your toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**3**	**9**	**2**

Q6: Affordability of toilet paper

Response & ranking	Never: 1	Sometimes: 2	Always: 3
# of respondents	**0**	**4**	**10**

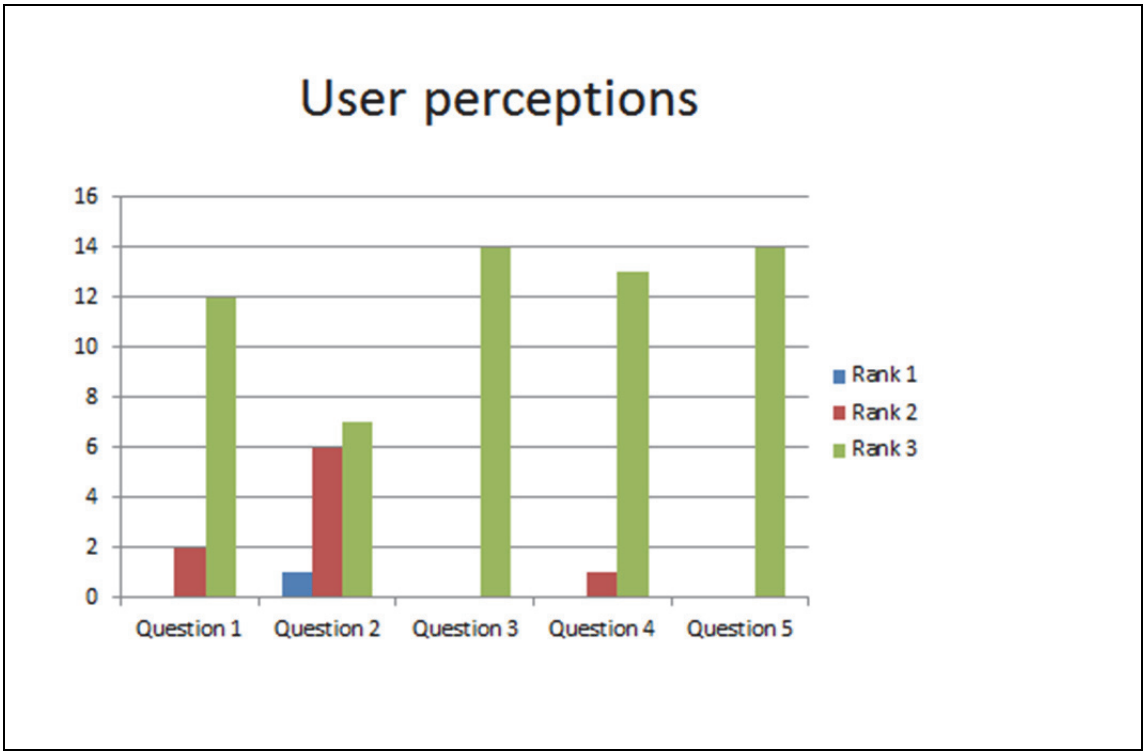

Fig H1: Chart of user perceptions survey results for Amajuba households (rank1=negative and rank3=very positive)

User acceptance: Responses of 14 Amathole households (Ndakane/Jerseyvale)

Q1: Level of satisfaction with your new pour flush toilet.

Response & ranking	Not satisfied: 1	Satisfied: 2	Very satisfied: 3
# of Respondents	0	5	9

Q2: Is the pour flush toilet an improvement from your old pit latrine?

Response & ranking	Similar: 1	Better: 2	much better: 3
# of respondents	**0**	**3**	**11**

Q3: Are you likely to recommend the pour flush toilet to your friends and family who are still using a pit toilet?

Response & ranking	Unlikely: 1	Likely: 2	Most likely: 3
# of respondents	**0**	**3**	**11**

Q4: Have you experienced regular blockages in your pour flush toilet?

Response & ranking	Very often: 1	Sometimes: 2	Hardly ever: 3
# of respondents	**0**	**0**	**14**

Q5: Do you have reliable access to water for flushing your toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**3**	**2**	**9**

Q6: Affordability of toilet paper

Response & ranking	Never: 1	Sometimes: 2	Always: 3
# of respondents	**0**	**4**	**10**

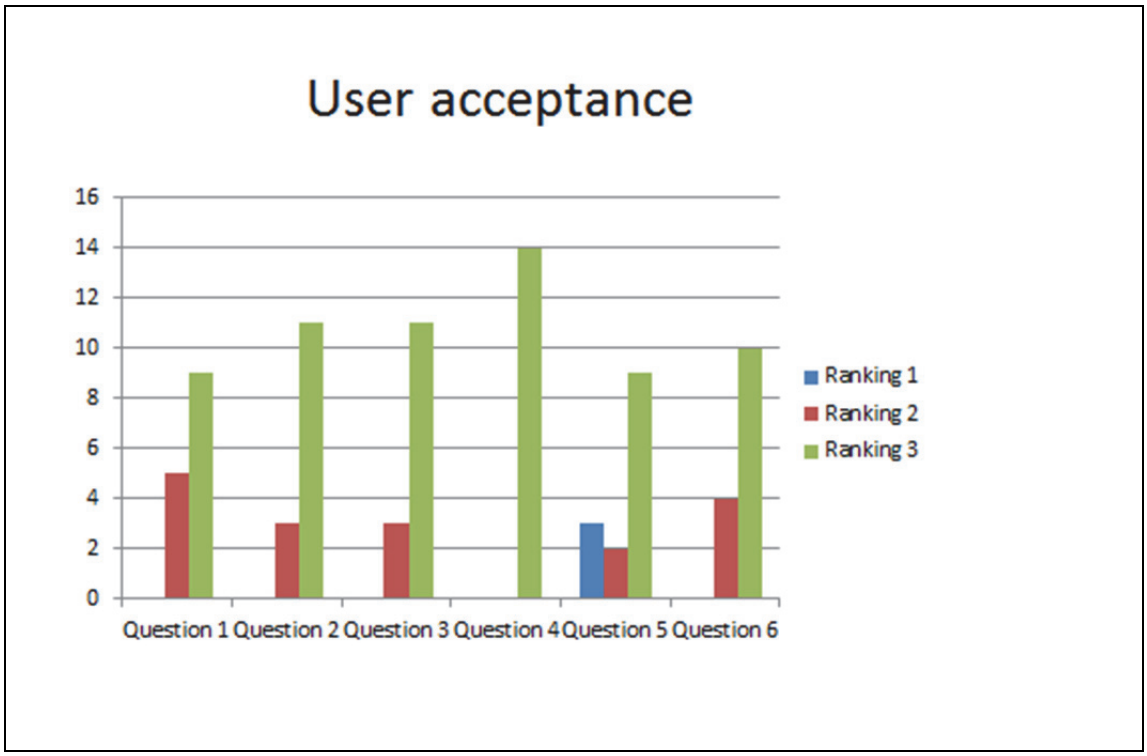

Fig H2: Chart of user acceptance survey results for 14 Amathole households (ranking 1=negative and ranking 3= very positive)

User perceptions – Responses of 14 Nellieville households (Amajuba DM)

Q1: Do you believe that the pour flush toilet is more hygienic than your old pit toilet?

Response & ranking	No difference: 1	Better: 2	Much better: 3
# of respondents	**0**	**2**	**12**

Q2: Do you believe that the pour flush toilets provide the same level of convenience as the full waterborne sanitation toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**1**	**6**	**7**

Q3: Do you believe that the pour flush toilet is safe for use by small children?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**0**	**14**

Q4: Do you believe that the pour flush toilet is suitable for installation inside the house?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**1**	**13**

Q5: Do you believe that the municipality should be responsible for fixing toilet blockages and also empty the leach pits when they are full?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**0**	**14**

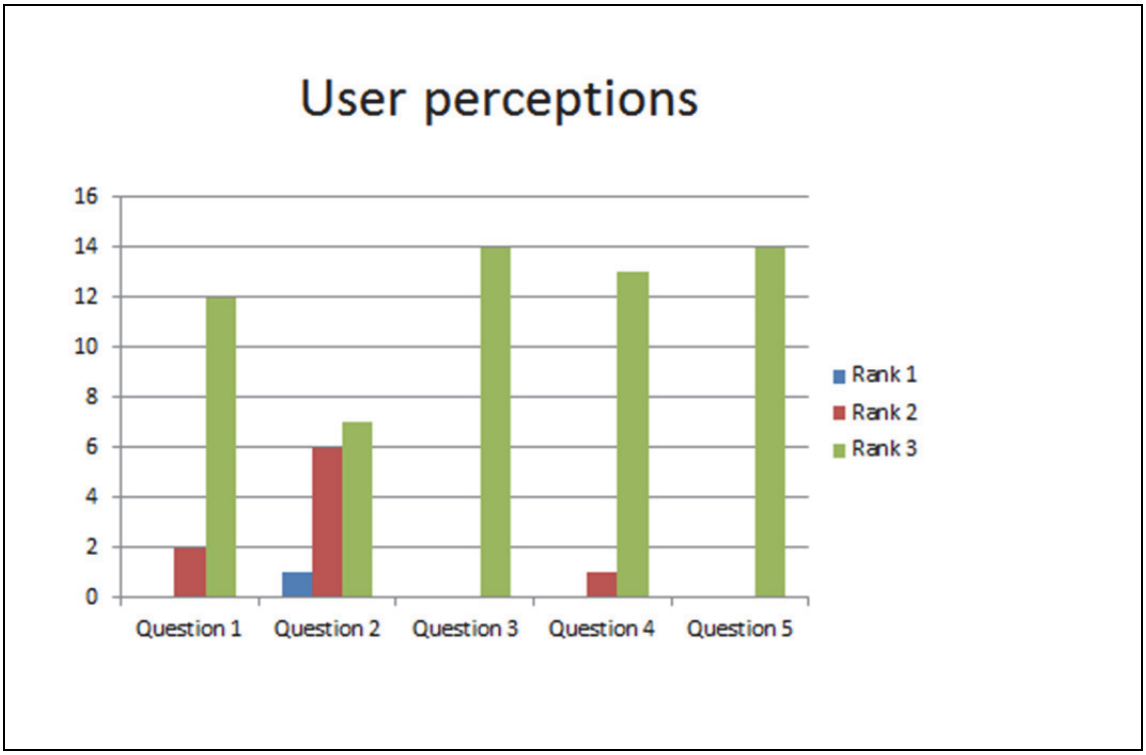

Fig H3: Chart of user perceptions survey results for Amajuba households (rank1=negative and rank3=very positive)

User perceptions of 14 surveyed Ndakane/Jerseyvale households (Amathole DM)

Q1: Do you believe that the pour flush toilet is more hygienic than your old pit toilet? Tick appropriate box

Response & ranking	No difference: 1	Better: 2	Much better: 3
# of respondents	**0**	**2**	**12**

Q2: Do you believe that the pour flush toilets provide the same level of convenience as the full waterborne sanitation toilet?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**2**	**12**

Q3: Do you believe that the pour flush toilet is safe for use by small children?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of Respondents	**0**	**3**	**11**

Q4: Do you believe that the pour flush toilet is suitable for installation inside the house?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**1**	**3**	**10**

Q5: Do you believe that the municipality should be responsible for fixing toilet blockages and also empty the leach pits when they are full?

Response & ranking	Strongly disagree: 1	Agree: 2	Strongly agree: 3
# of respondents	**0**	**2**	**12**

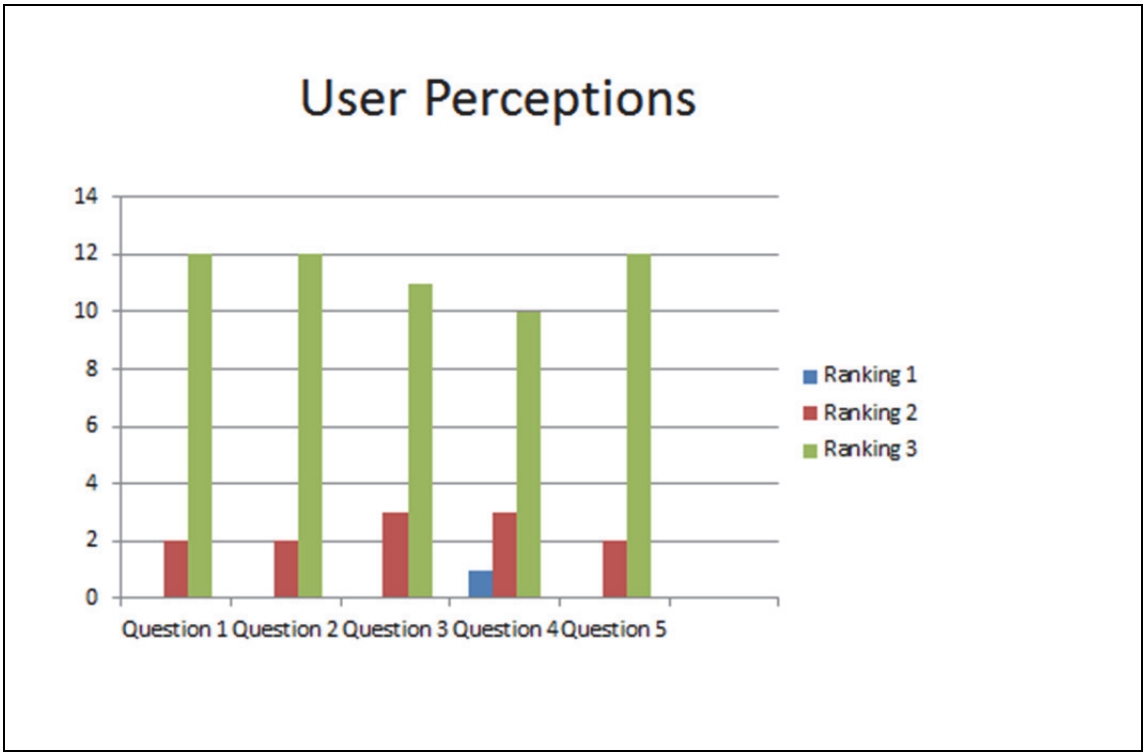

Figure H4: Chart of user perceptions survey results for Amathole households (Ranking 1=negative and ranking 3 = very positive)

Annexure B: State of pour flush toilets in Limpopo and Eastern Cape schools

Table1: State of the pour flush toilets in six Limpopo schools

Checklist	Matsiki-nyane PS	Diphuti PS	Shitlhelani PS (teachers toilets only)	Madie HS	Dipone HS	Lambani PS
Toilet paper available in all toilets	Yes	Yes	Yes	No toilet paper in learners' toilet	No toilet paper in learners' toilets	No toilet paper in learners' toilets
Clean toilets	Yes	Toilets not very clean	Yes, very clean and well looked after	Toilets very dirty	Toilets filthy inside and outside	Filthy toilets including inside walls. Educators' toilet clean
Toilets functional	Yes	Yes, no blocked toilets	Yes, no blocked toilets	All toilets were blocked except the educators' toilets. Urinals also blocked and dirty	The learners' toilets were blocked and unusable	Learners' toilets blocked and not usable, worms visible inside the pedestal
Water available on-site	Yes	Yes, borehole and JoJo tanks full of water	Yes , borehole and JoJo tanks	Yes, borehole , JoJo tank filled with water & taps in school yard	Good water supply with JoJo tanks full of water and taps in the school yard	No water, borehole dried up in August 2015. Educators are using rainwater harvested from the school roof
Hand washing facility + soap+ water	Yes	Water available but no soap	Water and soap available including clean hand towels	Dirty hand-washing basin, no water and no soap	Washing basin dirty, no water and no soap	Water and soap for hand-washing only present in the

						teachers' toilets
Bad odours present	No	No	No, toilets smell fresh and hygienic	Yes , very bad smell and not usable	Yes, very bad smell, toilets not usable	Yes, very bad odour, learners' toilets not usable
Access for disabled people	Yes, ramp and supporting chain in teacher's toilet	Yes, ramp and supporting chain in teacher's toilet	Yes, ramp and chain for supporting the disabled inside the teachers' toilet	Yes, ramp , but chain for supporting the disabled people removed from the teachers' toilet	Ramp present but the chain for supporting the disable people inside the toilet removed	Ramp and support chain present inside the teacher's toilet
Wall poster with user information inside the toilet	Yes	Yes	Yes	Yes	Poster missing from inside walls of the toilets	Poster present inside the walls of the toilets

State of pour flush toilets in 5 EC schools

All the EC schools inspected had properly functioning pour flush toilets and the following aspects were highlights on the state of the pour flush toilets in schools based on the checklist used to guide the field researchers:

- All the five EC schools evaluated had toilet paper inside the toilets.
- All schools had a hand-washing facility with water and soap inside the toilet block.
- All the toilets were kept clean and well-looked after.
- All toilets were in good functional state and none were blocked.
- All schools had water available in tanks (Mbudlu and Zamuxolo JSS) and taps close to the toilets.
- All schools had a container with water and jug inside the toilets to enable users to flush their toilets after use.

- There were no unpleasant smells in any of the toilets except a slightly unpleasant odour in toilets of Arthur Mfebe SS.
- The pour flush toilets in four primary schools were specially designed for young children in Foundation Phase (Grade R- Grade 3)
- There were no pour flush toilets with special adaptations for use by the physically disabled learners or teachers in all 5 schools evaluated.
- Only three schools had a wall poster inside the toilets with information on how to use the pour flush toilet correctly which was provided by the implementing agent.