

**SOCIAL FACTORS THAT AFFECT THE ACCEPTABILITY OF THE
ENVIRO LOO SANITATION TECHNOLOGY: A CASE OF SCHOOLS
IN LIMPOPO PROVINCE**

by

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DECLARATION BY THE RESEARCHER

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Master of Development, Social factors that affect the acceptability of the Enviro Loo sanitation technology: the case of schools in Limpopo province has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

Tshivhase N.J. (Mr.)

Date

DEDICATION

This study is dedicated to Takalani Tshivhase and my children: Tshifhiwa, Ndiene and Iphi.

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First I would like to thank God the mighty, the Creator of wisdom, for giving me the power, strength and endurance to write this thesis.

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ABSTRACT

The purpose of this study was to investigate the social factors that affect the acceptability of the Enviro Loo sanitation technology in schools. The study adopted the anti-positivism theory. Phenomenology school of thought was used as one of the three schools of thoughts as marked under Anti-positivism.

The qualitative research method had its foothold in the fact that social factors, as a human activity, occurs in a particular natural and social environment. Utilising the qualitative research design, the researcher focused on describing and understanding the social factors that influence the acceptability of the Enviro Loo sanitation technology at schools.

The study utilised an interview guide to collect data. The advantage of this is that it allowed the researcher to probe and ask for clarification of some answers as given by the respondents

The population of this study comprised 35 secondary schools in Limpopo Province that benefited from the implementation of the Enviro Loo sanitation technology system during the 2010/11 financial years. Non-probability sampling was used. The method used to select the schools was convenience sampling as a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher. This is because the researcher was bound by time, money and workforce and because of these limitations, it was almost impossible to randomly sample the entire population.

Three sets of focus groups were used as sample, namely; the Provincial Sanitation Task Team (PSTT), School Governing Body (SGB) and Learner's Representative Council (LRC). All groups were gender balanced and members participated voluntarily.

Nvivo was utilised to analyse data. The audio recordings from the digital voice recorder were transcribed, translated into English, typed into word and thematic analysis was used.

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CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1. Introduction

Approximately 18 million South Africans did not have access to adequate sanitation. This problem is not unique to South Africa, but is a challenge to many developing countries (Department of Water Affairs and Forestry 2009). The White Papers on Water Supply and Sanitation and Basic Household Sanitation 1994, indicate that during the apartheid era, sanitation lacked the priority that it should have enjoyed in relation to health, economic and environmental issues (Department of Water Affairs and Forestry 1994). (Belcher & Vazquez-Calcerrada 2007; Elmendorf & Buckles 1980) maintain that sanitation was not viewed as a popular topic at any level of society. They also observed that it was not viewed as an attractive career, or a political campaign issue. This is supported by the South African report which indicates that in 1996, approximately 21 million South Africans did not have access to adequate sanitation namely, safe, hygienic, easily accessible, acceptable and affordable systems of disposing human excreta, wastewater and household refuse (Department of Water Affairs and Forestry 2009).

(Alcock 1999) maintains that the sanitation problem is one of the major challenges in all developing countries, as most of them do not have adequate sanitation facilities. In addressing this legacy, the national and provincial governments in South Africa, have taken a number of initiatives to reduce the sanitation backlog and to ensure that people adopt safe hygienic practices. Nationally, the initiatives include the establishment of the National Sanitation Programme Unit (NSPU).

The Department of Basic Education (DoE) was also affected by sanitation challenges. In the quest to fulfil constitutional mandate of providing basic educational infrastructure that creates conducive environment for effective teaching and learning, the Department of Education embarked on a massive roll out of the provisioning of water and sanitation programme nationwide in 2001. The programme seeks to address the need for sanitation facilities and the improvement of sanitary conditions in schools, particularly

those in rural areas (Department of Water Affairs and Forestry 2001). A hygienic sanitation system, the Enviro Loo (an onsite, water free sanitation system), was selected by the Department of Basic Education amongst other sanitation technology options such as Ventilated Improved Pit latrine (VIP), Waterborne system, Pour flush etc as provided by the then Department of Water and Forestry (now known as the Department of Water and Sanitation). The Enviro Loo sanitation technology option is recommended to be environmentally friendly and does not require water to function (AGES 2007). In water scarce areas, the Enviro Loo is to be supplied by The Mvula Trust and Council for Scientific and Industrial Research (CSIR) as implementing agents to those schools without adequate sanitation facilities nationwide (Department of Water Affairs and Forestry 2001).

Regardless of extensive training provided by the implementing agents (The Mvula Trust and CSIR) on operation and maintenance of the Enviro Loo sanitation technology, which according to (AGES 2007) was said to be the most effective for mass population, it was observable that the sanitation technology implemented appears to have limitations when used in schools. The system functions in a way that does not allow anything other than human waste and toilet paper to be thrown into the pits as these cannot be processed into compost, and can make the pit fill up quickly. However, during inspections by the then Department of Water and Forestry officials and implementing agents' officials (The Mvula Trust and CSIR), it was discovered that objects like sanitary pads (which the school had to provide alternate disposal means), hard papers and other objects were thrown into the pit. This created a serious operational problem as the system could not operate effectively under those conditions as they fill up the toilet pit quickly and could not be easily turned into compost. That also had impact on the lifespan of the facility.

1.2. Problem Statement

The Enviro Loo sanitation system appeared not to be socially acceptable to the schools because of reluctance and non-adherence to daily operation and maintenance as required. The toilets are not taken care of and there appeared to be lack of ownership. Consequently the facilities are not used as prescribed. Irrespective of extensive training and user-education on operation and maintenance of the facilities, foreign objects such as sanitary pads, condoms (as they are accessible to learners), hard papers and plastics were thrown into the toilet pit. Facilities such as doors, toilet seats pedestals, the manholes, vent pipes and windows were also vandalised. (Department of Basic Education 2013) asserts that a range of other hazard can also lead to the failure of infrastructure, including sabotage, terrorism and vandalism. The present study was developed out of concern for achieving effective diffusion and adoption of appropriate technologies for improving environmental sanitation in rural schools.

Although the supplier claimed that the system is the most appropriate, universal, and yields no problems (AGES 2007), there seemed to be some social aspects that might be contributing to the inappropriate use and disuse of the Enviro Loo. (Wolfaardt 2015:124) contended that 'while it won't be a problem everywhere, it will be a problem somewhere, and we have to figure out how we can locate the high-risk areas.'

(Belcher & Vazquez 2007) maintain that along with the designs that are not user-friendly to poor communities due to some sanitary belief systems, there are other major constraints which prevent the benefits of improved sanitation services in a manner that they understand and relate to their day-to-day life styles. (Deakin, Huovila, Rao, Sunikka & Vreeker 2002; Tayler & Colin 2003) point out the following as other constraints: poor access and use of sanitation facilities, lack of policy framework and institutionalisation of school sanitation, lack of budget allocation for operation and maintenance, inappropriate designs for children, especially girls, small children and children with disabilities, social and cultural norms against dealing with human excreta and lack of stakeholder involvement. Often the result is vandalism, non-use, misuse, and poor operation and maintenance of such facilities (Parr & Shaw 1999).

(Elmendorf & Buckles 1980) assert that no matter how much we have learned about the engineering details of alternative sanitation systems and the related health aspects,

unless these findings can be translated to the target population in a way that they can understand and accept, that would be a waste of time as the technology system would be useless to the beneficiaries if they do not understand it. This study attempts to address this issue in relation to the acceptability of the Enviro Loo in rural schools in Limpopo Province.

1.3. Aims of the Research

The aims of the study were:

- I. To investigate the social factors that affects the acceptability of the Enviro Loo sanitation technology in rural schools.
- II. Make recommendations that may enhance the acceptability of the Enviro Loo sanitation system in schools.

1.4. Objectives of the Study

The objective of the study was to investigate the socio-cultural factors that affect the acceptability of the Enviro Loo in schools and to find out whether it was possible to increase the acceptability of the Enviro Loo sanitation system.

1.5. Research Questions

The study was guided by the following questions;

- I. What are the social factors that reduce the acceptability of the Enviro Loo system in schools?
- II. What recommendations could be made to enhance acceptability of the Enviro Loo sanitation technology system in schools?

1.6. Definitions of Concepts

1.6.1 Basic sanitation facility: This is an infrastructure necessary to provide a sanitation service which is safe, reliable, private, protected from the weather, ventilated,

keeps odour to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation-related diseases by facilitating the appropriate control of disease carrying flies and pests, and enables safe and appropriate treatment or removal of human waste and wastewater in an environmentally sound manner (Department of Water Affairs and Forestry 2009).

1.6.2 Enviro Loo Sanitation Technology: The Enviro Loo is a "dry or waterless sanitation system" rather than a composting toilet. Enviro Loo is more of a dehydrating process over a lengthy retention period, with an ancillary, lesser composting process (AGES 2007).

1.6.3 Faecophilic Societies: Persons/cultures with no taboos against handling or talking about human faeces (Schelwald & Reijerkerk 2009; Warner, Heeb, Jenssen, Gnanakan & Conradin 2008).

1.6.4 Faecophobic Societies: Persons/cultures with strong taboos against handling and talking about human faeces (Schelwald et al. 2009; Warner et al. 2008).

2. Outline of the Research Report

This study investigates the social factors that affect the acceptability of Enviro Loo sanitation technology at schools. Emphasis was placed on finding the possibility of increasing the acceptability of the Enviro Loo sanitation technology at schools.

Chapter one: Introduction and Background

In this chapter, the researcher gave a general introduction to the study. The focus was on the background to the problem, aims and objectives of the study, as well as definitions of relevant concepts. The researcher further outlined the reasons that led to the choice of this research topic.

Chapter two: Literature Review

The views of different scholars and policy makers on the research topic were highlighted and discussed in this chapter. This was important as it laid a foundation in understanding the nature and extent of what affects the acceptability of Enviro Loo sanitation technology at schools.

Chapter three: Research Methodology

This chapter outlined the research methodology utilised in conducting the research. The method used was relevant to the objectives and aim of the study and the phenomenon being investigated received proper and relevant attention.

Chapter four: Interpretation of Findings

This chapter presented the analysis, interpretation and discussions of the findings about the data collected for the study on the social factors that affect the acceptability of the Enviro Loo sanitation technology.

Chapter five: Summary, Recommendations, Conclusion

Chapter concluded and summarised the findings of the study and provided some recommendations and prospects for future research.

3. Conclusion

Chapter One introduced the research study and gave a brief background of the study. The problem statement, aims and objectives of the study were also outlined. The research questions which guided the research process were also stated. Definitions of some concepts that are pertinent to the study were given.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

According to (Maree 2010), a literature review is a critical analysis of a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, reviews of literature, and theoretical articles. (Neuman 2001) identifies two main goals of literature review among others as:

I. To integrate and summarise what is known in an area.

A good review points out areas where prior studies agree, where they disagree, and where major questions remain.

The literature review also helps to:

- identify gaps in current knowledge
- avoid reinventing the wheel
- identify other people working in the same and related fields
- increase one's own breadth of knowledge of subject area
- identify the seminal works on the topic

II. To show how the current project links to past research.

A review outlines the direction of research and places a research project in a context, demonstrating its relevance by making connections to a body of knowledge. Thus, it helps to:

- build on existing knowledge and ideas
- provide the intellectual context for new research
- identify methods that could be relevant to your project

2.2. LEGISLATIVE FRAMEWORK

For this study, various legislations, regulations and statutory framework provide for the provisioning of sanitation services. The legislative frameworks assist in the development of policies, guidelines and strategies to ensure effective, efficient and sustainable delivery of sanitation services at all levels. Scholars such as (Deakin, Huovila, Rao, Sunikka & Vreeker 2002; Tayler, Parkinson & Colin 2003) only to mention a few, conducted studies on the importance of social factors that affect sanitation technologies. The views of different scholars and legislative frameworks on the research topic are of utmost importance as they will lay a foundation in understanding the nature and extent of sanitation implementation at schools, thus expanding the knowledge base of the topic.

2.2.1. *Water Services Act*

According to (Department of Water Affairs and Forestry 2001), implementation of sanitation is the responsibility of many different agencies both from government and the private sector. The objectives for providing sanitation by different agencies are not necessarily the same (Department of Water Affairs and Forestry 2009).

Because of these varying objectives, the achievement of the goals of sanitation may then be viewed differently by different agencies (Department of Water Affairs and Forestry 2009). It is therefore necessary to regulate sanitation in order to ensure that the recipients of sanitation get the same benefits and that the objectives of the various agencies are met by all service providers. (Department of Water Affairs and Forestry 2001) indicates that the consequences of improper sanitation are also a national issue going beyond the confines of the specific agency delivering the service. In order to protect communities from likely adverse situations it is important to regulate the delivery and provision of sanitation.

2.2.2. The Bill of Rights

The founding provisions of the Republic of South African Constitution open with the values on which the state is founded and list the first of these as “human dignity, the achievement of equality and the advancement of human rights and freedom” (Constitution of the Republic of South Africa 1996: 6). Human dignity is also emphasised on the Department of Water and Sanitation that has its motto: “Water is life, Sanitation is dignity” (Department of Water Affairs and Forestry 2001: 13). The founding provisions further establish the supremacy of the Constitution over all other South African legislations and require that “the state must respect, protect, promote and fulfil the rights in the Bill of Rights” (Constitution of the Republic of South African 1996: 5).

Sections 24 and 27 of the Bill of Rights in the Constitution grant specific rights to access to sufficient water, an environment not harmful to health and well-being and the protection of the environment from degradation (Constitution of the Republic of South Africa 1996). Although the right to basic sanitation is not an explicit constitutional right, the right to sanitation could be derived from the right to a clean environment read together with the right of access to clean water.

Many other constitutional rights in the Bill of Rights overlap with and support rights to water and sanitation. These include the right to equality, the right to dignity and rights of access to information and just administrative action.

The right to sanitation has been affirmed internationally. In July 2010, the United Nations (UN) General Assembly passed a resolution declaring “the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights” (Atkinson 2009: 46). (Atkinson 2009) further maintains that in September 2010, the UN Human Rights Council (HRC) reaffirmed this with a resolution confirming the right to water and sanitation as legally binding in international law.

2.2.3. The National Sanitation Strategy

According to (Department of Water Affairs and Forestry 2004), the overall vision of the National Sanitation Strategy is to achieve the goals of improved health, safety and dignity of communities through the provision of adequate sanitation for all South Africans. This vision is to be achieved through the development of a coherent approach that incorporates the strategies produced by other stakeholders such as Provincial Sanitation Task Teams, South African Local Government Association etc. (Department of Water Affairs and Forestry 2004) further indicates that in line with the vision, the strategy has the objective of mobilising resources at all government and community levels to eliminate the backlog by 2010 (although the backlog is not yet eradicated). Though an extensive consultative process has been undertaken since the publication of the Strategy Framework, there has been little documented commitment from stakeholders on resource allocations, delivery approaches and technical options. In essence, the strategy seeks to table the agreed delivery approaches, technical options and resource allocations and to seek full support from all stakeholders.

2.2.4. Principles That Guides the Provision of Schools Sanitation: the (Social context of sanitation)

According to (Department of Water Affairs and Forestry 2001), helping people to help themselves requires knowledge of and sensitivity to the social context of a sanitation improvement programme. Government programmes must adopt people-oriented strategies in which community members play an active role in planning and organisation so that local values are incorporated. This will ensure that the resulting programme is: relevant, appropriate, acceptable, accessible, affordable, equitable, empowering, and based on indigenous knowledge and local skills.

2.2.5 The South African Schools Act (Act NO. 84 OF 1996)

According to the Act, the following basic standards are the guideline provisions on school sanitation.

As guided by the (South African Schools Act, Act No. 84 of 1996), this means that in order to protect the health of learners:

- All schools should have sufficient toilets and hand washing facilities to meet learners' needs.
- The toilets and washbasins must be in working order (and regular maintenance is needed to prevent flooding, blockages and breakages).
- The toilets, taps and all surfaces should be clean and hygienic.
- Learners need access to toilet paper so that they do not have to use newspaper, stones or plastic bags or wipe their hands on the walls.
- Female toilets need bins and a sanitary towel disposal service.
- Every effort should be made to ensure the personal safety and privacy of learners using the toilet facilities.
- All schools must make provision for learners with special needs.

2.3 SANITATION TECHNOLOGY OPTIONS

According to (Department of Water Affairs and Forestry 2012), the full range of technical options for providing adequate basic sanitation is still not widely known nor are the characteristics of the different options well understood. In particular, there is little appreciation of the long-term financial, environmental and institutional implications of operating and maintaining the various sanitation systems. As a result, in many cases communities and local governments are choosing technical options that, in the long term, are unaffordable or unsustainable (Department of Water Affairs and Forestry 2012).

According to (Department of Water Affairs and Forestry 2012), challenges arise from the wide range of options available and the differing environments and conditions to which each is suited. Experience shows that it is important to allow local involvement in the choice of solutions, but with a full grasp of the requirements of each option. (Department of Water Affairs and Forestry 2012), further indicates that the options include the ventilated improved pit toilet in all its variations, dry on-plot system Composting or desiccating (e.g. urine diversion system - UDS) toilets: similar to Enviro

Loo, separation toilets, dehydration type toilets, on-site wet systems such as aquaprivies and septic tanks, and a range of full water borne systems (Annexure B depicts and describes the most common types of sanitation technology options in South Africa).

2.4 APPROACHES FOR SELECTING THE MOST APPROPRIATE SANITATION TECHNOLOGY SYSTEM

(Nozibelenmjoli, Gillian & Jooste 2009) take the view that there is widespread recognition that there is no best sanitation technology option. Successful sanitation technologies are those which are appropriate i.e. they meet the privacy, safety, convenience and other needs of users and are (Department of Water Affairs and Forestry 2009). (Nozibelenmjoli et al. 2009) further maintain that under supply-driven sanitation schemes, it is far easier for project implementers and sanitation professionals to select one standardised technology. However, the move towards demand responsive approaches implies a more central role for the end-users in selecting technology options, to ensure that the facilities are both used and maintained in the long-term. They further point out that the starting point is to identify and address particular sanitation and hygiene-related problems and to define appropriate actions within that context, rather than impose a preferred, standardised technical solution in the form of a particular design of latrine as cure-all for sanitation.

2.4.1 Key issue and lesson for South Africa on approaches for selecting the most appropriate sanitation technology system

New approaches are needed to make a substantial and sustainable impact on public health. This study suggests that the focus of large-scale sanitation programmes should be on stopping open defecation and on improving hygiene behaviour on community-by-community basis, with success measured not by the number of toilets built, but by long-term improvements in public health and well-being (Robinson & James 2005: 14).

2.4.2 The importance of accounting for specifications of sanitation technology system

While the reviews on sanitation technology options contained a host of illustrative examples of successes and weaknesses of sanitation technology systems, there is no blanket recommendation for increasing sanitation coverage. Significantly, be it the institutional arrangements, public perception or socio-economic status. This highlights the need to account for features and demands of the local context in particular.

(Robinson & James 2005) maintain that demand-driven sanitation approaches being implemented need to respond to the specific project context in order to be successful. While supply side factors may determine what is physically and financially feasible, achieving sustainability requires that the programme responds to local demands, rather than the parameters of what can be supplied. They contend that this factor appears to be of specific relevance to the South African context, where the emphasis on meeting service coverage targets has resulted in the adoption of supply-driven approach.

(Robinson & James 2005) found in a review of several sanitation programmes that the successful programmes tended to be supply-driven, concentrating on building standard toilet designs (or sewage systems) rather than focusing on programme outcomes such as stopping open defecation or improving hygiene behaviour. In order to ensure that these weaknesses are addressed (Robinson & James 2005) asserts that a demand-driven approach to sanitation delivery is crucial. Understanding what the consumer wants and can afford as well as knowing their willingness to pay is clearly important. When the needs of people are ignored and the local context is not taken into account, sanitation schemes will fail (Robinson & James 2005) According to (Robinson & James 2005) supply-driven programmes focused on (usually subsidised) delivery of hardware alone do not work; at best they provide thousands of expensive, unwanted and unused toilets.

2.4.3 Community and stakeholder participation

Related to the above issues, is the need for inclusion of local communities and potential beneficiaries of the initiative being implemented. (Robinson & James 2005) argue that - the buy-in and support of the community is essential, especially after the government or funding agency has made the initial start-up capital investment. Working with a wide network of stakeholders such as local business, local government and NGO structures has also proven to be a key element of success. Robinson and James further argue that it is important to realise that good hygiene practice goes beyond hand-washing and includes cleaning and maintenance of the sanitation facility being used, to ensure that it remains functional. They further point out that it is thus imperative that beneficiaries who have access to sanitation for the first time not only be taught the importance of hygiene, but that they take ownership of the future upkeep of the facility.

2.4.4 Setting realistic targets and being flexible

It has been observed through the review of international literature that targets need to be realistic, both in terms of the number of beneficiaries and the scale of the programme. (Robinson & James 2005) state that it is evident there are many pockets of success across the world, with many of these being located in villages, towns and cities rather than the entire country. According to (Nozibelenmjoli, Gillian et al. 2009), these suggest that sanitation expansion programmes work best incrementally or on a smaller scale and may be challenging to implement on a national scale. They further contemplate that indeed, with countries there are contextual factors which need to be accommodated and a flexible policy approach may need to be adopted for broader sanitation delivery to the poor to be achieved. They conclude that this also implies that the setting of national targets may also be unrealistic, as they fail to take into account specific regional context.

2.5 THE ENVIRO LOO SANITATION TECHNOLOGY

2.5.1 The Enviro Loo Sanitation Technology System

According to (AGES 2007), the Enviro Loo is an applicable solution for both developed and developing nations, hence they regard it as a universal solution. As a fully environmental certified solution, that has both urban and rural applications, it has been installed in a number of countries and for a number of uses from private residential homes to hotels, from schools and clinics to larger township and community installations. (Kyle 2015) maintains that to date, there are more than 100,000 Enviro Loo successfully installed in 52 countries worldwide. He further asserts that over 45,500 installations are in South African schools. Moreover, the Enviro Loo is installed in many developed countries such as Australia, France, U.S., Canada, Germany, Greece and developing countries like India, Nigeria, Ghana, Kenya, and South Africa (Kyle 2015).

According to (Kyle 2015), the widespread experience globally has demonstrated that the Enviro Loo is a cost-effective, respectable, hygienic and environmentally friendly sanitation system that satisfies the dignity of all users. Kyle points out further that it is the perfect solution for all developing countries that are struggling with the sanitation crisis as it is cost effective, easily installed and places no stress on the environments in which it is installed.

(AGES 2007) further maintains that the world made a promise in 2000 with the Millennium Development Goals. The Enviro Loo is an ideal solution to tackle these goals and make inroads in addressing the sanitation crisis, which will deliver quantifiable health, mortality, gender equity, education and economic benefits. The sanitation crisis is predominantly a developing world issue; however, water scarcity, increasing urbanisation, growing population and resultant demand for food is a global issue – the Enviro Loo is a global solution (AGES 2007).

2.5.2 Enviro Loo Features

The Enviro Loo is recommended for environmental sustainability, economic viability, longevity, safety and convenience, (AGES 2007). According to (AGES 2007), the following are the advantageous features of the Enviro Loo:

- It is a "dry or waterless sanitation system";
- It does not need water to operate;
- It is a permanent installation;
- It is designed to be a self-contained, all in one unit;
- It does not use chemicals and has little environmental impact;
- It has a sealed unit that captures and treats waste through the natural processes of dehydration and evaporation with no contact or contamination of the waste to either the immediate or surrounding environment;
- It requires no electricity or power source to function, it utilises wind and sun to dry up the sludge content inside the toilet and expels bad smell from the inside of the toilet, and
- It requires minimum maintenance and servicing, with minimal associated cleaning costs which are necessary for more conventional and traditional systems.

2.5.3 The functioning of the Enviro Loo

According to (AGES 2007), the system separates liquid and solid waste as it enters the container via the custom designed ceramic toilet bowl. Liquid waste drains to the bottom of the container while solid waste remains on the drying plate. Both the liquid and the solid waste are exposed to a continuous flow of air that's driven through the unit by the forced aeration ventilation system. The movement of air is assisted by the ventilation extraction unit positioned on top of the outlet vent pipe with air being drawn into the container via the inlet vent pipes and toilet bowl. As the air moves through the system, it dehydrates the solid waste as it migrates down the sloped, ridged, perforated drying plate. This causes the liquid that has drained to the bottom of the container to

evaporate. At the same time, sunlight absorbed by the black inspection cover increases the ambient temperature within the container. The intense heat, prolonged retention periods and oxygen-rich air drawn in via the toilet bowl and side air inlets, dehydrate and decompose the waste. At the end of this process the human waste is converted via the stimulated bacterial and biological activity into an inoffensive dry stabilised material. At this point it is reduced to roughly 5% of its original volume. The negative pressure within the container prevents the escape of any odour through the toilet bowl or through the air inlet pipes. The odour is vented into the atmosphere via the wind driven extractor.

(AGES 2007) asserts that distributors of the Enviro Loo provide a maintenance service on a contractual basis to ensure the sustainable operation of the system. This includes: regular-on site preventative maintenance, followed by a detailed service report. The maintenance procedures are performed by its owners. The maintenance schedule depends largely on the volume of usage and climatic conditions. While high usage units may need to be serviced and waste removed more often, for example learners' toilets, the lower usage unit such as that for teachers may only need attention less frequently.



Figure 1 Depict the back side of the Enviro Loo sanitation structure

2.5.4 General Monitoring and Maintenance of Enviro Loo Sanitation.

According to the (AGES 2007), the school management, with the aid of their maintenance staff are only be allowed to monitor and perform basic and emergency maintenance procedures on the Enviro Loo system. (AGES 2007) maintains that services of a contractor, with the necessary resources to execute the work safely and in accordance with legal requirements, must be summoned when the liquid holding area and drying area need to be emptied.

The school management or their maintenance staff may not remove sewage or any objects from the drying area or liquid holding area (AGES 2007) Annexure C: Enviro Loo Procedures Manual on Operations, Monitoring and Basic Maintenance of Enviro Loo Facility).

2.6 SOCIAL FACTORS THAT AFFECT ACCEPTABILITY OF SANITATION TECHNOLOGY SYSTEM

Choices and behaviours related to sanitation are usually deeply rooted in a cultural understanding. Sanitation and related topics are often taboos (Gunnerson, Kalbermatten, DeAnne, & Mara 1982). These fundamental aspects have to be considered when planning a sanitation system.

Cultural beliefs vary so widely in different parts of the world that it is not possible to assume that any of the practices that have evolved in relation to excreta and wastewater use can be readily transferred elsewhere. A thorough assessment of the local socio-cultural context is always necessary.

(Gunnerson et al. 1982) maintain that a fundamental difference can be found between faecophilic and faecophobic societies. While the former have few if any taboos against handling and talking about human faeces, the latter is a term associated with taboos against handling and talking about human faeces. An in-depth understanding of the

social fabric concerning people's views towards sanitation technology will enlighten authorities about motivational factors behind people's acceptance.

(Simpson & Mayling 1983) assert that the introduction of sanitation systems is much more than the application of simple engineering techniques. He states that it is an intervention that entails considerable social change. Simpson further recommends that it is therefore necessary to understand how a society functions, including the communities and households within it, and what factors promote change. Saunders, (Robert & Warford 2000) emphasises that if sanitation improvements in rural and urban areas are to be widely accepted, the relevant social and cultural factors have to be taken into consideration during planning and implementation. During implementation of the programme, the Department of Water and Forestry learnt that the relevant social and cultural factors have to be taken into consideration during planning and implementation.

Early social-psychologists pointed sanitation technology system acceptability to the link between individual perceptions of excreta and social structure (Douglas 1966). The socio-cultural environment where an individual grows up influences the acceptance of a new sanitation system. Planners before the international water and sanitation decade (1980-1989) considered human behaviour as a potential barrier to project implementation (Wagner & Lanoix 1998; Cross 1985). They gradually tried adapting the project to the human behaviour (Elmendorf & Buckles 1980). (Kalbermatten, Julius & Gunnerson 1982) recognised early the difficulty to integrate socio-cultural aspects into water and sanitation projects as the use of proper social science tools will be expensive as they will need to be used on a "site by site approach". Misunderstanding of some social or cultural aspects led to the failure of sanitation projects (Chowdhury, Schroeder & Williams 1981; Cairncross & Feachem, 1993).

While there are frustrations on the appropriateness of the technology, it is believed that during the last decade, relationships between the success of a sanitation project and good understanding of the individual and community sanitation approaches are clearly drawn (Jenkins & Curtis 2005; Avvannavar & Mani 2008). Researchers look at social

aspects to discover if new technologies can match existing social needs and social taboos (Dellström 2005). It is also now stated that socio-cultural aspects are a more powerful drivers for sanitation than health (Saywell & Cotton 1998) or the environment (Kvarström, Bracken, Ysunza, Kärrman, Finnson, & Saywell 2004).

Studying the feasibility of a sanitation system in Thailand, (Schouw & Tjell 2003) define acceptability through two subjective ideas:

- The socio-cultural acceptance focusing on the perceptions of the user.
- The practical acceptance which is the perception of the user and their behaviour in terms of the facility.

A similar interpretation is proposed by (Kvarström et al. 2004:138) who point out that socio-cultural sustainability has to be seen through "...cultural acceptance, institutional requirements and perceptions on sanitation". A dimension of time (Cross 1985; Kvarström et al., 2004) is also emphasised, as the acceptability evolved based on both external and internal factors and opportunities (Jenkins & Cairncross 2010).

According to (Still & Foxon 2012), the study of sanitation programmes needs to include a large range of stakeholders from different sectors, using different methods and having different immediate objectives. They further maintain that developing methodologies which include data collection and data analysis methods from social, technical and economic domains is a first step in getting a more complex but also a more realistic view of the sanitation's problems and solutions. As a result, all stakeholders shall then put the user of the sanitation facility at the centre of this multi-dimensional picture (Still & Foxon 2012). Although there is substantial research and literature on sanitation technology acceptance, there is no literature related to the acceptability study on Enviro Loo sanitation technology system in Limpopo Province.

(Momba, Mwabi, Brouckaert, Swartz, Ofanga, & Rugimbana 2013) maintain that to identify a demand for improved sanitation is more positive than to initiate a supply of technology that is deemed to be good for communities. They note further that the former depends upon cooperation between providers and beneficiaries which comes through

dialogue and the exchange of information. They add that those individual users are the ultimate decision-makers in the acceptance or rejection of new technology. It is the beneficiaries who determine the success of a project, since the value of the investment depends not only upon their support but, more particularly, on the consent of beneficiaries. They furthermore allude that they (schools as beneficiaries) need to be convinced that the benefits of improved sanitation, and the new technology with which it is associated, outweigh the costs. Equally, it is for providers to appreciate the social context and the constraints within which individual decisions are made. In conclusion, (Momba et al 2013) emphasises that new sanitation technology implementers must learn from communities about why improved sanitation may elicit negative responses and also the positive features of community values, beliefs and practices which can be harnessed to promote change.

2.7 Maximising Effective and Responsible Use of Sanitation

To ensure effective and responsible use of sanitation infrastructure in South Africa, good governance is required. Good governance, according to (De la Harpe n.d.), involves constructive co-operation between the different sectors where the result is responsible use of resources, responsible use of power, and effective and sustainable service provision. Such good governance would only be achieved where all stakeholders are engaged and participate in the sanitation sector in an inclusive, transparent and accountable manner to accomplish better services free of corruption and abuse, and within the rule of law.

(Wilkinson & Duncker 2014) state that the sanitation sector is a complex and weakly understood sector, and thus often demonstrates poor governance. However, this does not mean that the sanitation sector should not continue to strive towards 'good enough' governance, in order to achieve sustainable services (De la Harpe n.d.). The basic characteristics of good governance to which the sector should strive, according to (Wilkinson & Duncker 2014) include:

- There is participation of all stakeholders;

- Decisions are taken in terms of rules and regulations in a transparent manner, with all information freely available and accessible to those who are affected by decisions;
- Broad consensus is achieved about what is in the best interest of the community, and how to achieve sustainable services;
- There is equity and inclusiveness of all members of society in development, particularly the most marginalised, with an emphasis on ensuring that the interest of women and men are included, and
- Services are responsive so that the needs of consumers are addressed within a reasonable time period.

2.7.1 Sanitation Policy Positions and Legislation that is Unambiguous

According to (Wilkinson & Duncker 2014) the main obstacle to the effective delivery of acceptance of sanitation services in developing countries have been the lack of political buy-in, the lack of clarity on the roles and responsibilities of the various role players; and specifically, a lack of consistency of policy, funding and implementation between the different sphere of government and between different national government departments responsible in various ways for addressing the sanitation problem. These obstacles have specific consequences to the sanitation services environment of South Africa.

(Wilkinson & Duncker 2014) recommends that the sanitation functions related to infrastructure, software, education, policy, regulation, etc. be consolidated under a single authority, either national or provincial. According to (Wilkinson & Duncker 2014), the requisite knowledge and skills to understand and address the complexities of sanitation services delivery, beyond the scope of simply providing a facility, should be developed.

2.7.2 Monitoring for Effectiveness and Responsible Use of Sanitation Infrastructures

Large scale sanitation programmes require regular monitoring and periodic evaluation. These monitoring and evaluation activities need to be outcome-based where the results of the monitoring process are used to make adjustments in the programme (WSP 2010). According to the (WSP 2010), monitoring the effective and responsible use of sanitation subsidy funds will identify strengths and weakness in the programme methodology, implementation arrangements, and cost-effectiveness.

The sanitation backlog in the country is growing every year as many sanitation facilities are provided under pressure with a focus on delivery instead of sustainability. For example, a number of beneficiaries of sanitation programmes in South Africa over the past 15 years received VIP toilets and Enviro Loo, which currently have pits that are almost or completely full (Department of Water Affairs and Forestry 2009). (Water Research Commission 2012) indicates that during the period of installation of the Enviro Loo sanitation technology system, no consideration was given to the emptying of these pits, resulting in these toilets either being abandoned when the pit is full, or the pit being emptied off manually by ‘scooping’ the excreta out of the pit (this practise is discouraged by the Department of Water and Sanitation as it poses health risks and environmental pollution). According (Wilkinson & Duncker 2014), the focus on delivery also led to the construction of toilets using a subsidy to be of poor quality and to become un-usable within a year or two. Toilets that are abandoned result in beneficiaries returning to historically poor sanitation technologies in areas that are considered ‘served’, in effect joining the backlog again (Department of Water Affairs and Forestry 2009). (Water Research Commission 2012) allude that this amongst others indicates that present sanitation interventions are flawed and unsustainable, mainly due to a lack of the delivery process and evaluation the impact. (Water Research Commission 2012) concludes by pointing out that an incentive and reporting system should be developed, implemented and practised at the local level, feeding into the government-wide monitoring and evaluation system at the national level to ensure that sanitation infrastructures are used effectively and competently.

(Momba et al. 2013) suggest that there is a need for regular monitoring of sanitation, not just monitoring of inputs-outputs (i.e. funds utilised and toilets built), but monitoring of outcomes such as latrine usage, prevalence of open defecation, handwashing, and depositing of unacceptable foreign materials.

3 CONCLUSION

The introduction of on-site sanitation systems is much more than the application of simple engineering techniques. It is an intervention that entails considerable social change. If sanitation improvements at schools are to be widely accepted, the relevant social and cultural factors have to be taken into consideration during planning and implementation. It is therefore necessary to understand how a society functions, including the communities and households within it, and what factors promote change.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter discusses the research design and data gathering techniques used in the study. It further outlines in detail the procedures followed and describes how data relevant to the research questions were collected and analysed.

3.2. Research design

(Polit & Hungler 2001) describe the research as a blueprint, or outline, for conducting the study in such a way that maximum control will be exercised over factors that could interfere with the validity of the research results. The research design is the researcher's overall plan for obtaining answers to the research questions guiding the study. (Burns & Grove 2009) states that designing a study help researchers to plan and implement the study in a way that will help them obtain the intended results, thus increasing the chances of obtaining information that could be associated with the real situation. This study employed a qualitative research method and a descriptive research design to identify, analyse and describe social factors that affect the acceptability of Enviro Loo sanitation technology at schools.

3.2.1. Research paradigm

(Cohen et al. 2000) identifies three paradigms that have taken birth due to remarkable growth in social science research, namely; positivism, anti-positivism and critical theory. The study adopted the anti-positivism theory as it emphasizes that social reality is viewed and interpreted by the individual him/herself according to the ideological positions he/she possesses. Phenomenology school of thought was used as one of the three schools of thoughts as marked under Anti-positivism (phenomenology, ethnomethodology and symbolicinteractionism). All the three schools of thought emphasise human interaction with phenomena in their daily lives, and suggest qualitative rather than quantitative approach to social inquiry. Thus, the choice of the research methodology to be qualitative is not by accident. The study investigated the social reality views and interpretations in relation to the Enviro Loo system acceptability.

3.2.2. Qualitative research method

(Creswell 2003: 228) views the qualitative research method as “an enquiry process of understanding a social human problem, based on building a complex, holistic picture, formed with words, reporting views of information, and conducted in a natural setting”. Qualitative research is concerned with understanding the processes and the social and cultural contexts which underlie various behavioural patterns and is mostly concerned with exploring the “why” questions of research. It further studies people or systems by interacting with and observing the participants in their natural environment and focussing on their meanings and interpretations (Maree 2010).

Pertinent to this study, the qualitative research method had its foothold in the fact that social factors, as a human activity, occurs in a particular natural and social environment. Utilising the qualitative research design, the researcher focused on describing and understanding the social factors that influence the acceptability of the Enviro Loo sanitation technology at schools. This view is supported by (Mouton 2001) who asserts that both the formal and informal interviews should include questions related to any of the following; facts, people’s beliefs about facts, feelings, motives and present and past behaviours.

The study utilised an interview guide to collect data. The advantage of the above-mentioned data collection is that it allowed the researcher to probe and ask for clarification of some answers as given by the respondents (See attached Annexure D for the interview guide).

3.3 Study area

The study was conducted in Makhado Local Municipality, which falls under the jurisdiction of Vhembe District Municipality. Makhado municipality is situated North side of Limpopo Province. It borders Musina Local Municipality in the North, Capricorn District Municipality in the South and Thulamela Local Municipality in the East. It is located about 100 km North of Polokwane.

3.4 Research population and sample

(Polit & Hungler 1999) define a population as the totality of all subjects that conform to a set of specifications, comprising the entire group of persons that is of interest to the researcher and to whom the research result can be generalised. (Marshall & Rossman 1995) describe a sample as a portion or a subject of the research population selected to participate in a study, representing the research population.

3.4.1 Target population

The population of this study comprised 35 secondary schools in Limpopo Province that benefited from the implementation of the Enviro Loo sanitation technology system during the 2010 financial years.

3.4.2. Sample

3.4.2. 1 Demographic Profile of the Focus Groups

Three sets of focus groups were used, namely; the PSTT, SGB and Learner's representatives. The PSTT comprised 12 members; the SGBs comprised 7 members while the learners' representative comprised 15 member. All groups were gender balanced and members participated voluntarily.

3.5. Data collection Method

3.5.1. Data collection instrument

Data collection instrument refers to the device used to collect data such as questionnaires, tests, structured interview schedules, and checklists (Seaman, 1991). For the purposes of this study, an interview guide (Annexure D) was utilised. The interviews were done in focus groups as follows:

3. 5.2. Overview of the Focus Groups

3.5.2.1 Overview of the PSTT focus group

The PSTT was selected to be part of participants because the forum has broad knowledge and understanding of sanitation activities in the province. Most of the members are professionals in the area of water and sanitation and have extensive professional understanding and experiences on sanitation. Members of the forum are from the eleven (11) Water Services Authorities (WSAs) that represent the 5 district municipalities in Limpopo. The forum also comprised various stakeholders from multi-spectral departments and institutions that play vital roles on sanitation related matters. Hence, their input on this study is vital. Non-probability sampling was used. The forum is mostly attended by approximately 35 representatives. Those who were interested in participating in the study remained after the meeting and others left.

3.5.2.2 Overview of the SGB focus group

The SGB was selected because it comprises adults from local community members and the staff members. The SGB provides governance activities to the school environment and is made up of individuals who understand the local socio-cultural practices within the community and have a broader understanding of the local behaviours. Their participation in this study is of great importance since the SGB is the important local structure. As part of the school management it has firsthand information on what is happening around sanitation practices at the school.

Elected members of the SGB comprise the following:

- Parents or guardians of learners enrolled at the school;
- Educators at the school;
- Members of staff at the school who are not educators;
- Learners in Grade 8 or higher who are elected members of the Representative Council of Learners (RCL) who serve on the SGB. Learners with special

educational needs. Learners who are in Grade 8 or higher can also be elected if this is reasonably practicable;

- Representatives of:
 - Organisations of parents of learners with special education needs, if applicable;
 - Sponsoring bodies, if applicable, and
 - Organisations of disabled persons, if applicable;
- Disabled persons, if applicable;
- Experts in relevant fields of special needs education, and
- The principal by virtue of his or her official capacity.

For participation in the study, the researcher made appointments with the selected schools. The method used to select the schools was convenience sampling as a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher. This is because the researcher was bound by time, money and workforce and because of these limitations, it was almost impossible to randomly sample the entire schools' SGB population. Most SGBs have approximately 16 members. The first SGB group had 8 members; the second had 13 while the third group had 11 members. Their participation was based on their availability as others were either not at school or were committed at the time.

3.5.2.3. Overview of the learners' representative council focus group

The Learners Representative Council (LRC) is a mandatory body, according to departmental requirements, and consists of fifteen learners – three from each grade. These learners have to be nominated formally for the position and deliver a manifesto speech to their grades, before being voted into their positions. The LRC forms a vital link between the staff and learners, and ensures effective all-round communication as all members act as direct spokespeople for their grades.

Objectives of the student council are to:

1. Provide a democratic form in which students can address school related issues, which affect their lives.
2. Maintain open communication between students and school staff.

Learners were important for the study since they are the end users of the facilities; naturally their point of view is important. Although they might not understand why they practise some of their behaviours towards sanitation, the SGB and the PSTT have some deeper understanding of the social context around sanitation that may explain why the learners may behave in a certain way. All 15 representatives were present in all Learner Representative Council groups.

3.5.3. Data analysis methods

Nvivo was utilised to analyse data. Texts, views, expressions and opinions were analysed using thematic analysis as it is one of the methods used for the analysis of qualitative data. According to (Richard 1998), thematic analysis is used in qualitative research and focuses on examining themes within the data. This method emphasizes organisation and rich description of the data set. Richard further maintains that thematic analysis goes beyond simply counting phrases or words in a text, it moves on to identifying implicit and explicit ideas within the data.

The results are presented as themes that emerged from the coding of the data using Nvivo. Each theme emerged from transcripts of the focus groups. The findings are presented within three sets of data gathered and consolidated from the three focus groups, namely; the PSTT group, learners' group and SGB group.

3.6. Ethical considerations

Anyone involved in a research study needs to be aware of the general agreement about what is proper and improper in scientific research (Babbie 2001). According to (Strydom, Fouche & Delport 2005), too often ethical lapses takes place in research studies, such as the faking of interview data, inaccurate reporting results or bias shown in favour of the researcher's hypothesis. (Welman, Kruger & Mitchell 2006) indicate that

there are four important ethical considerations that a researcher should pay attention to, namely: informed consent, right of privacy, protection from harm, and involvement of the researcher. These ethical elements were duly complied with in this study.

In the present study the researcher applied for the permission (Annexure E) to conduct the research study in writing from the PSTT chair person and the school governing bodies concerned. There was no harm to the respondents, whether psychological or emotional. In line with the above view, (Dane 1990) as cited in (Strydom, Fouche & Delport 2005) state that an ethical obligation rests with the researcher to protect subjects, within reasonable limits, from any form of physical discomfort that may emerge from the research project. The names of the respondents do not appear in the report for anonymity purposes; to avoid the likelihood of any views expressed in the report linked to the participants. With regard to anonymity of the respondents (Babbie 2007) maintains that anonymity is guaranteed in a research project when neither the researcher nor the readers of the findings can identify a person with a given response.

Respondents participated voluntarily in the study as they were allowed to participate or withdraw at any given point during the research process. Regarding voluntary participation in a social research, (Strydom et al 2005) asserts that emphasis must be placed on accurate and complete information, so that subjects will fully comprehend the investigation and consequently be able to make a voluntary, thoroughly reasoned decision about their possible participation. Lastly, the Code of Ethics of the Department of Basic Education was adhered to.

3.7. Conclusion

This chapter dealt with the research design and research methodology. The study area, target population, sampling method, data collection method and ethical considerations were also discussed. Data analysis will be dealt with in detail in the next chapter.

CHAPTER FOUR: INTERPRETATION OF FINDINGS

4.1. Introduction

This chapter presents the analysis, interpretation and discussion of the findings of the study. The audio recordings from the digital voice recorder were transcribed, translated into English, typed into word and thematic analysis was used. A codebook of themes was applied to all the transcripts using Nvivo 9 software.

4. 2 Findings of the Study

4.2.1 Themes related to PSTT only

Theme 1: The general perspective on sanitation in Limpopo

This theme refers to the way the respondents perceived sanitation related matters in the province. It also covers the general observations on school sanitation in the province. The respondents stated their points of view on the way they perceived sanitation practices in the province.

The PSTT group stated that the province still has a huge backlog on household and school sanitation. They maintained that the government is trying to curb the backlog, but the funds are limited. Sanitation status is said to be relatively good because they are able to provide basic sanitation services to the poor and those who have not yet benefitted rely on old pit latrine sanitation systems. This can be observed as one travels through the villages in the province. There are identifiable sanitation (VIP) facilities that are constructed by the government funds, both at household level and schools (Enviro Loo) premises. The challenge on those who have benefitted is that health and hygiene and user education awareness are not done or are ineffective because some of beneficiaries are not observing good sanitation practices. As a result, their toilets get full within a very short space of time and not well cared for. This was one of the researcher's encounters while inspecting some of the implemented projects and has contributed into the choice of the research topic.

The group maintains that some sanitation projects (both in communities and schools) are constructed without proper consultations, materials are not appropriate and there is poor workmanship in some of the constructed sanitation facilities. This is supported by (Robinson & James 2005) who maintains that community and stakeholder participation is important. They further reiterate that related to the above issues, is the need for inclusion of local communities and potential beneficiaries (School Governing Body) of the initiative being implemented. The buy-in and support of the SGB is essential, especially after the government or funding agency has made the initial start-up capital investment. The researcher's encounter while working with communities is that they were not consulted on the technology choice as they would have not opted for the Enviro Loo should they have been made aware of the technology.

The study found that municipalities lack capacity to inspect every facility. The PSTT emphasises further exploration of sanitation technology systems in terms of facilities, disposal and effective health and hygiene and user education approaches (for example, ring-in fencing, health and hygiene funds). The group maintains that municipalities and the Department of Basic Education do not have dedicated sanitation personnel and projects implemented are massive and complicated. The complexity of sanitation implementation is well visible though not well documented as most contraction needs thorough inspections for compliance to specifications while on the other hand the, municipalities forfeit lot of sanitation funds due to projects that were not completed or could not be constructed due to capacity challenges. The contractors that are hired to deliver do not have the ownership of the work as they are interested in profit taking, thus compromising quality. Benefited schools also do not take care of the provided sanitation facilities. It was evident during inspections and audit verifications that quality is compromised as contractors care much about profit making than quality work. Some of the challenge the researcher has noticed is that while inspections are minimal, the builders sell the materials to the community. For an example, builders sell cement and instead of using two to three bags of cement, they can use one bag so that they can sell the remaining bags for quick cash or use incorrect concrete mixtures.

Theme 2: Sanitation practices in the province.

This theme refers to the respondents' views on sanitary practices by the communities, including schools in Limpopo. The general observation is that most communities and schools are sensitised about good sanitation practices, thus there are many community uprisings demanding proper sanitation services while schools request proper sanitation facilities as well. Sanitation advocacy programmes appear to be contributing positively towards awareness of good sanitary practice.

The researcher's observation is that while communities are sensitised about good sanitation practice, the municipalities does not take initiatives on fostering the ongoing of good sanitary practices. This is evident as the municipalities do not put plans on ongoing health and hygiene and user-education in their Integrated Development Plan (IDP). The same goes on observing national or international sanitation events and activities such as World Toilet Day, National Sanitation Week and Global Handwashing Day to mention a few. The municipalities are Water Services Authorities and are expected to be active on observing these days or events as they are mandated to provide services to the communities.

The study found that most people and schools that have not yet benefitted from the government sanitation programmes use pit latrines and toilets instead of going to the bush. The government is implementing the Ventilated Improved Pit latrines at the household level and Enviro Loo at schools. According to (Department of Basic Education 2013), 80% of schools in Limpopo are still using basic pit toilets which are unhygienic and unsafe. The un-safety of the schools own built pit latrines hardly hit the Limpopo Department of Education as one of the learner fell into the pit toilet. This attracted critiques from most of the concerned groups such as the Section 27 Institution and opposition political parties that are interested on community safety and human rights. Most commercial areas such as Malls and shopping complexes use waterborne sanitation systems, while government or public and private entities as well use waterborne systems depending on the availability of water. Generally, people can be said to observe good sanitary practices. The challenge arises due to lack of refuse

collection. This results in people disposing most of the unwanted materials such as sanitary pads, disposable nappies and condoms into toilets. This practice is highly discouraged as it makes sanitation facilities to be dysfunctional. For example, pit toilets get full quickly while waterborne systems are blocked. In some instances disposable nappies, condoms, dead pets and garbage are disposed in nearby streams and rivers. This causes environmental pollution and contamination of water sources, resulting in waterborne diseases.

4.2.2: Themes related to SGB only

Theme 1: Duration of the schools' use of the Enviroloo toilets.

This theme seeks to establish the length the schools have been using the Enviro Loo toilets. The theme is relevant as the length of use has more importance to the experiences they have encountered while using the toilets and bears high possibilities of sharing lessons learnt from using the toilets. The study found that all SGB groups indicated that they started using the toilets in 2010 immediately after they were handed over. This means that all the schools have been using the facilities for a period of five years. This period has afforded the SGB enough time to learn on how to use the toilets and to respond to the challenges.

Theme 2: Proper working conditions of the facilities.

This theme tries to establish if any of the toilets have not worked properly or have become dysfunctional since the hand-over date. This theme is important because it gives an indication if everything is going on well or not. All of the three SGB groups reported that there had been a number of times when the facilities were dysfunctional. The knowledge from training (user education, on operation and maintenance) provided during the hand-over of the facilities could not be implemented. The SGB maintains that this is because the management said the means proposed were not easy to administer, especially the issue of controlling the behaviour of learners. It should be noted, however, that the former school system (during the apartheid era), applied corporal punishment to enforce compliance and learners could behave because of fear of punitive consequences. In contrast, the present system forbids corporal punishment and

takes a view of corrective manner and positive reinforcement. The challenge on this aspect is that the management does not have the necessary skills to implement positive reinforcement. The latter is the best system as opposed to punitive that evokes hatred between the learners and the school management.

On this note, it is important that schools should improve on learners' rules during registrations that it is as well their responsibility to make sure that the facilities are functioning properly and that if they notice any defects, they should report to the management immediately. Failure to report any defect should be regarded as insubordinate and one could face disciplinary measures.

Theme 3: Frequency when the facilities were not working properly.

This theme explored on the frequency when the facilities were not working. This exploration seeks to investigate how often the facilities were dysfunctional. The prevalence of dysfunctional facilities may be linked to the negligence of role players on facilities management. The SGB members indicated that most often, there were facilities which were dysfunctional. It is the researcher's observations that in some of the schools, the wind masters and vent pipes as observable from a distant in most cases are broke and not spinning as required and it takes forever to be fixed. One may elude this to lack of interest by concerned groups. This is similar to (De la Harpe's u.n.d.) views that the main obstacle to the effective delivery of acceptance sanitation services in developing countries has been the lack of political buy-in, the lack of clarity on the roles and responsibilities of the various role players. Other factors include a lack of consistency of policy, funding and implementation between the spheres of government and between the different national government departments responsible in various ways for addressing the sanitation problem. He further maintains that these obstacles have specific consequences to the sanitation subsidy environment of South Africa.

Theme 4: Factors that might have led to facilities to be dysfunctional.

This theme is relevant to the study because the facilities were handed over with user education that the school management agreed to adhere to. On this theme, each SGB group had its input to give. The SGB at one school blamed vandalism and improper use by learners, while the second school claimed that the facilities were not correctly constructed. They said that the manhole plate was not slopping enough as it made waste to pile upwards instead of it sliding backwards. Vandalised facilities were alluded to children's behaviour. The latter school based their arguments on lack of water, high number of learners using the toilets, negative mentality towards sanitation facilities, vandalism, lack of operation and maintenance, lack of cleaning equipment, lack of a sense of ownership towards the facilities, moral degeneration, and use of foreign objects as the factors that led to the dysfunctional of the facilities.

The SGB groups had valid points that need to be taken into consideration. Although they are able to identify the contributory factors to the dysfunctional of the facilities, it appears that they made less or no effort to take corrective measures. During interviews, only one school indicated to have called a service provider to desludge the toilets while others had nothing to report.

Theme 5: The incidence, contributory factors and the extent of vandalism

This theme seeks to explore if there were facilities that are vandalised. Two of the schools indicated that most of the toilet structures were vandalised by learners while the other school indicated that only some were vandalised. The study further investigated on the contributory factors on vandalised facilities: this undertaking seeks to establish the contributory factors that lead to the vandalising of the sanitation facilities. The first school pointed out moral degeneration while the second school blamed it on the design. Similar to the first school that mentioned moral degeneration was the second school that said children who lacked manners vandalised the facilities. The same went with the third school that blamed vandalism on learners' unruly behaviours and poor workmanship.

The above findings show that while moral degeneration, poor workmanship and designs are a problem, there is a need for multi-sector collaboration to tackle the sanitation issues. This calls for engineers as designers, construction entities such as the Department of Public Works, community organisations such as churches and non profit organisations are needed to tackle these challenges. The school setting does not address such challenges as its main focus is on academic development of learners.

Furthermore, the study also explored the extent of the vandalism of the sanitation facilities: This is so because once sanitation facility is damaged, it affects the maximum operation of the whole component; this makes it to be dysfunctional. Two schools reported that some of the toilet blocks were moderately vandalised while the other school reported severe vandalism. Schools that had moderately vandalised facilities were still using them as the damage was not affecting the toilet systems. Moderate vandalised features include among others: windows, doors, pedestal seat covers and hand wash basins (see the pictures of vandalised facilities below). The school that reported severe vandalism (figure 3) has two blocks of toilets that are no longer functional completely. The severely vandalised toilets as depicted below show the outer and the inside view of the toilet block. Doors are missing, windows are broken while the hand washing basin is dismantled. The long arrow on the severely vandalised toilet picture shows a bypass that goes to the nearby fields that is used as a toilet. Figure 4 shows the vandalised toilet sit pedestal. Figure 5 depicts back side of one of toilet blocks with wind masters that are vandalised and not working. Shattered glass windows are part of the vandalised facilities.



Figure 2 vandalised door



Figure 3 severely vandalised toilet blocks



Figure 4 toilet sit pedestal is vandalised



Figure 5 the back of severely damaged block

The extent of facilities vandalism leaves one with questions on the competences of schools management on sanitation facilities and their broad understanding of underlying consequences of not having proper sanitation services at the school. If they could have broad understanding of sanitation importance, they would have been taking care of the facilities. While other schools are crying and in dire need for proper sanitation facilities, one can raise questions on the sustainability of the required facilities and what measures are in place to foster that. The above sanitation conditions are undesirable and are uncalled-for. Serious integrated action needs to be taken into account. Although

the researcher suggested to the school management (and this had the buy-in from students as well) to take action for an example, raise donation and seek community involvement from interested stakeholders such as the Independent Development Trust (IDT) and the Mvula Trust to refurbish the facilities during Mandela day, he did not have time to go back and monitor if it was implemented due to time constraints and the resources required to undertake such.

Theme 6: SGB perspectives on the appropriateness of the toilets designs

This theme deliberates on the perspectives of the SGB members on how they feel about the facilities' designs. It seeks to find out if the design features are appropriate for learners in respect of their needs, for example, needs for girls (e.g. disposal of sanitary pads as the old pit toilets used to accommodate them), boys (urinals) and learners with special physical needs (special accessories for people with disabilities).

The entire SGB group maintained that the physical designs were technically good, but socially and economically not fit for rural and poor communities. One SGB group asserted that the outer part design of the structure was structurally fit for the learners, but sited that the pit dimensions were a problem. The group pointed out the problem was that it was shallow and not deep enough not to see the waste content inside. The recommended depth of pit according to the Department of Water and Sanitation is that the pit depth should be a maximum of 2 meters and not less than a cubic meter (m³) (Department of Water Affairs and Forestry 2012). The group members argue that the wall plates inside that are meant to capture waste and make it to slide backwards does not have slope enough and should have been constructed correctly. The slope of the pit does not allow waste to automatically slide backwards as expected. As a result, the waste piles upwards and emits odour.

The SGB members of the second and third school stressed that the assumptions that the Enviro Loo toilets were odourless was not correct. In respect of the learners' needs, the SGB groups advocated the notion that the boys' toilets needed urinals (to avoid messing on the toilet sit) and girls needed a separate place for disposal of sanitary pads. All the toilets were not equipped with basic amenities used by disabled people.

The entire SGB group was forward-looking to be able to accommodate people with disabilities since there is a call for inclusion and integrating learning system that is not discriminating towards learners with disability.

The above findings call for further investigations on the facilities designs. Although much of design works are done by engineers, social, environmental, economic and health factors needs to be augmented into the designs. Although this study was not focusing on the design issues, they are still of great importance as they have a bearing to the community to be served. Thus social appropriateness and acceptability comes in. The environmental, economic and health factors are as well of great importance and should not be ignored or undermined.

Theme 7: involvement of other institutions with interest on sanitation matters.

This theme tries to find out if there are other institutions with interest on sanitation matters from outside the school environment that come and assist in matters relating to sanitation. The SGB groups reported that there had not been stakeholder involvement. One SGB group responded that the involvement of other stakeholders was when they were hired to empty, clean and fix/repair, and this was done with charges. There had never been another Health and Hygiene and user education since the toilets were commissioned. Even the Department of Basic Education did not monitor the facilities.

Involvement of related sanitation stakeholders is important on sanitation services. This is because sanitation on itself is a multifaceted phenomenon that requires involvement of various multidiscipline sectors collaboration. Thus it is mostly said that sanitation is a complex concept. Among other complexities of sanitation (to mention a few) are biochemical reaction of sanitation waste, the pathogens involved, the agricultural use of sanitation waste as compost or manure, the environmental impacts, the use of sanitation waste for energy purposes, the health impacts related to proper sanitation, not forgetting the biological need for excretion that if not taking place on time can affect the health of a person, the social and economic factors. All these components require specialised fields to come together and work towards the best sanitation practice as

desired. Hence, the need for involvement of other institutions with interest on sanitation matters.

4.2.3 Themes related to Learners only.

Theme 1: User-friendliness of the toilets.

This theme tries to find out if the toilets are user-friendly to the learners. All learners' groups claim that the toilets are not user-friendly. The reasons provided range from the fact that the pits are shallow and intensive emptying requirements. Operational and maintenance of the toilets are said to be demanding and not affordable (it was cited that it is because the schools are not able to buy cleaning equipment). The groups complained that they did not have toilet paper to supply to learners and stated further that foreign objects (items not supposed to be thrown into the toilets) and materials were thrown into the toilets because it was the local practice to do so. All the groups mentioned further that there were no urinals for boys.

Besides complaining, one Learners' group commended the toilets in terms of containing smell. The toilets are said to be smell free and this makes the toilets to be desirable on this aspect. The group further noted that the materials are of high quality and usable. All groups maintained that the fact that the toilets have to be raked and emptied from the back is considered to be the worst job one can do. All learner groups recommended the use of old pit toilet system as they were not such restrictive on using only toilet papers that they cannot afford, hence they raised the concern that the Enviroloo toilets are less desirable because they have strict rules that only human waste and toilet paper may be disposed into the toilet. They reckon that it is commonly exceptional in rural areas to use materials like hard papers and sanitary pads that are not wanted into Enviroloo pits.

Although the above findings reiterate the issue of multifaceted of sanitation services, it commend the engineering designs on the quality of the materials used for construction, the ability of the toilet to contain smell as opposed to the former traditional pit latrines. As mentioned before, one cannot say with surety that the facility is one hundred percent

user-friendly as mentioned by the learners. Most of what the learners said is true and the researcher has personally observed with interest the social concerns of the learners. In most of the rural communities and schools, it is common to find toilets without toilet papers and what they said is important as they are the end-user of the facilities and it has to be user-friendly for their need.

Theme 2: Learners' perceptions on who should be accountable on taking care of the facilities.

This theme seeks to find out the learners' perspective on accountability when it comes to taking care of the facilities. The focus was mainly on the cleanliness and physical structure.

Theme 2.1: Cleanliness: Learners from the first school contemplated that they were the ones who should clean the toilets after use. Other learners from the same group mentioned workers but it was overruled as the toilets cannot wait for the cleaners who would clean randomly and the toilets are used frequently. According to the original health and hygiene and user education, learners were educated that it is their responsibility to leave the toilet clean after use and demonstrations were done on how to clean the toilets. Cleaning equipment was provided for each school.

Learners from the second school recommended that the school should hire people to clean the toilets. When asked what should happen if one messed up the toilets, should they wait for the end of the day to come and clean? Some said workers should do that, while others said someone had to guard the toilet and check after use, but the question on who will pay that person was a challenge. They expect the toilet to be clean. They indicated that they expected the user to clean immediate mess just like they do at home. They conceded that a cleaner must be hired. This is in line with the SGB view that they could hire someone to focus specifically on cleaning the toilets and work as a supervisor for learners. But learners have to pay a minimum of 50 cents to use the toilets in order to compensate the worker. This proposition had challenges as some could not afford 50 cents to use the toilet every day. One group of learners indicated

that for them, they pay annual fee of R50. 00 and those whose parents cannot afford are given piece job at school such as for cleaning the classes for a day and their children gets credited.

Restroom cleanliness is very important for learners. An unsanitary toilet can lead to germs that can affect allergies or bacteria which can cause diseases and is one reason why restrooms need to be cleaned daily. A properly cleaned toilet is cleaned daily and starts from top to bottom. My observations from other institutions such as offices, malls and some tertiary institutions are that there are check list that shows that the toilets are cleaned regularly and cleaners are always nearby which indicate that they are dedicated for their duties.

It is surprising that at schools where there are massive number of learners, is hard to locate a dedicated cleaner for ablution facilities. The learners are correct that they should be responsible and leave the toilet ready for the next use, but the school management should take prior responsibility towards fostering that the learners' toilets are always clean. Although one may not prescribe for schools on how they should make it, but they should take it upon their shoulders to maintain and monitor facilities' cleanliness. This should be doctrine as one of the school's requirements by the Department of education.

Theme 2.2: Physical structure: on this aspect, the first group of learners said they should take care of the physical structures and stop graffiti and vandalising. If anything got broken, it should be fixed immediately or within a reasonable period. The second group as well agreed that learners must take care of the facilities. This is in congruence with the third group which conceded as well that the learners should be responsible. But management must monitor and inspect the facilities on a regular basis.

While learners need to be responsible for physical care of the facilities, there is a rigorous need to social change towards ablution perspective especially among communities in rural areas. The researcher's observations are that toilet is place mostly

at the far end of the premises. This is as well applicable to household sanitation facilities. The fact that the toilets are located at the farthest position and away from other buildings indicates that it is not desirable. As a result, one may interpret this as a form of the facilities not considered to be of utmost importance like other buildings. With no intention for racism, the researcher's observations are that the so called Model C schools (previously White only schools and Multiracial schools) and recently Presidential schools, the ablution facilities are always within the main premises or reach un like it being positioned farthest where learners have the chance and time to do as they wish.

4.2.4. Themes related to PSTT and Learners

Theme 1: The most used sanitation technology system in the province.

This theme refers to the respondents' opinions based on their observations of highly used sanitation technology system in the province. The research found that there is a general agreement that VIP is the most used sanitation technology system in the province, especially at the household level. As stated earlier, according to (Department of Basic Education 2013), 80% of schools in Limpopo are still using basic pit toilets which are unhygienic and unsafe.

The PSTT group maintains that those who have not yet benefited from the government system (most in rural areas) rely on pit latrines and open defecation while those who benefited from the state system are either provided with waterborne (in urban areas) or VIP (in rural areas). Most of urban areas use the waterborne system. The Department of Education is implementing Enviro Loo at schools while those that have not yet benefitted rely on pit latrine system as confirmed by the Department of Basic Education. The highly used sanitation system in the province is the VIP. This is because the province is dominated by rural settlements and there is scarce water supply to implement waterborne system seriously.

Most of learners did not know the type of sanitation technology system (Enviro Loo) used at their schools. This theme tries to find out if learners knew the type of sanitation

technology system they are using. The theme is important because it may lead to useful information and one may assess if they understand the basics around it. Knowing the type of sanitation and how it operates is important as this may foster its appropriate use.

Theme 2: General observations on school sanitation.

This question seeks to obtain the participants' opinions based on what they have observed on schools sanitation practice in relations to Enviro Loo. This theme is related to the study because through observations, one may acquire the understanding on people's behaviour, which is socially influenced. On this theme, the PSTT group claims that sanitation in schools is very poor. Standards are not the same. The facilities are structurally satisfactory, but are affected by learners' behaviour in terms of using the system. The study also found that in most schools, there is visible difference between the teachers', girls' and boys' toilets. The teachers' Enviro Loo toilets are lockable, always clean, provided with toilet paper and structurally in good condition. The learners' toilets, on the other hand, are generally not lockable, dirty, not provided with toilet paper, and are structurally vandalised.

The PSTT group also mentioned that in most schools, the toilets are dilapidated and overcrowded during breaks. There are bushes around most of the toilets as well as open caves of old full toilets. Toilets are very far from the classes or are mostly at the outskirts of the school premises. Hand washing basins are often not on the sanitation facilities. This is supported by (Department of Basic Education 2013) that pointed out the following findings;

- The toilets at many schools are old and the buildings dilapidated. Some of these buildings are under threat of collapse. Some toilets have collapsed in the recent rains in Limpopo and have left the learners with no functional toilets to use.
- There are insufficient toilets for the number of learners. In many cases, learners line up for extended periods to relieve themselves, or miss class time to avoid having to line up. In addition, the toilets are not designed for use by such high numbers of learners and this contributes to their unhygienic state.

- The state of the toilets is unhygienic. Waste is not disposed of efficiently. The floors and surrounding areas are soiled.
- At some schools, the pits are full and therefore learners cannot use the toilets. The only alternative for learners is to relieve themselves in the bushes or to walk home during the school day to relieve themselves.
- Most toilets do not have toilet seats. This facilitates the spread of diseases. In addition, many toilets do not have doors and learners are not afforded the privacy they are entitled to when relieving themselves.
- Most toilets do not have any hand-washing facilities.

The Department of Basic Education acknowledges that these toilets are in breach of the rights to privacy, dignity, health and basic education.

Observations by the PSTT and (Department of Basic Education 2013) have reference to learners' observations towards sanitation facilities. The learners' observations were based on the following: user-friendliness and good sanitation hygiene practices. Their observations were similar to those of the PSTT group and confirmations by (Department of Basic Education 2013). The research found that the sanitation facilities are not user-friendly and good sanitary practice is not observed.

Learners on the other hand based their argument on good sanitation hygiene practices. In this aspect, one school reported that even if they know of hygiene practices, they do not practice them because there is always no water at school. This is the school where the boys' sanitation facilities are severely vandalised. Although the learners indicated that there was no water for cleaning, the researcher's observations on girls' toilets are that they are clean and not filthy as compared to the boys' toilets. The other two schools reported that they did practice good hygiene practice as they wash their hands every time after using the toilets even though they do not have soap. They asserted that

hygiene is part of the education curriculum (Life skills orientation subject) hence, they practice it.

The researcher's findings and take on this theme is similar to his real life experiences and observations on school sanitation. The pictures below may be used to sum up and provide evidence of the findings of the study under this theme. These observations on schools sanitation are dishearten and not admirable.



Figure 6 toilet facility at the outskirts and dumping site of school premise



Figure 7 facility that does not afford learner's' privacy



Figure 8 dilapidated ablution facility



Figure 9 the state of unhygienic toilet

Theme 3: The use of sanitation facilities as intended.

This theme was intended to find out if the sanitation facilities at schools are used as prescribed for maximum performance. The expectation is that the facilities are designed to dispose human waste and toilet paper only and should be clean and functional at all times. The study found that the general consensus by the respondents is that the facilities are not used as intended. On this theme, the PSTT group said the facilities were not used as intended. Not only human waste and toilet paper are disposed of in the toilets. The PSTT group say that it is their observation that learners dispose other solid materials such as sanitary pads, condoms, weaves and anything that is not longer wanted is thrown into the toilet. Municipalities do not collect waste in rural areas and materials such as sanitary pads and other related materials cannot be disposed anywhere due to cultural beliefs and myths. So the toilets are not used as intended. Hard papers, stones and other materials are reported by PSTT as being used due to lack of toilet papers. The researcher has firsthand experience on what is being reported by the PSTT members. During sanitation school sanitation projects monitoring, the researcher observed what is being reported and had trusted that this would change as health and hygiene and user-education was provided during the facilities handover.

This is conceded by learners who agree that regardless of disposing foreign materials (such as sanitary pads, hard papers, plastics and other materials) that they can use, the facilities are in a mess. The study also found that in one of the schools, boys are

using the nearby bushes as toilets because their sanitation facilities are severely vandalised to an extent that they cannot be used.

The learners in one of the school complained that there is a block of four (4) seats that is used as a storeroom for old books while they do not have enough sanitation facilities for learners. This was confirmed by the related SGB group that argues and claims that they (SGB) do not have any alternative storage and if they can throw the books away, the school may be in crisis as they referred to the Department of Basic Education scandal that they were throwing text books.

The misuse of the facilities has a negative bearing towards their lifespan. The challenge is that foreign materials such as sanitary pads may not compost and makes the toilet to fill up quickly. This also has economic factor as the facilities would require constant emptying, that is relatively expensive as it is done by a private consultant.

The school that use the toilet block as book store was reprimanded and advised to store the books elsewhere where it is suitable. This is creating unnecessary challenge of overcrowding at the toilets and shortage of learners' toilet seats as per required ratio.

4.2.5 Themes related to SGB and Learners' Representative Council

Theme 1: Compliance of the school management to operate and maintain the toilets.

This theme explores the focus groups' perspectives on matters related to daily and ongoing requirements of operation and maintenance of the facilities. It also seeks to determine if the school management comply with the requirements and what hampers them from achieving this. Only one SGB reported that it did empty the manholes after long intervals, but generally, all SGBs are doing nothing on the daily operation and maintenance issues related to students' toilets. During the school visits for interviews, the researcher had an opportunity to observe the conditions of the sanitation facilities. The researcher inspected the sanitation facilities and noticed that the toilets were not operated and maintained as required. Based on the researcher's observations, one may conclude that learners' toilets are neglected in terms of operation and maintenance. The researcher learnt that there was no compliance to the operation and maintenance of the

facilities. They appeared not to be cleaned, content at the back which was supposed to be raked was not raked, and vandalised items were not fixed or replaced. The researcher further noticed that the facilities that appeared to be compliant were the staff facilities. These did not need major operation and maintenance. The researcher concludes that this is because the staff toilets are lockable and have less staff using them. The staff can also afford to buy tissues and cleaning equipment; they also have dedicated cleaning personnel. If the learners received similar treatment to the one accorded to staff, there would be a positive appearance on compliance.

All the SGB groups indicated that the ongoing operation and maintenance was not easy to achieve because they were not monitored. The SGB groups noted that the requirement that only human waste and toilet paper be disposed into the toilet areas was hard to achieve because they were not supplied with tissues. Besides, frequent monitoring of urine and manhole emptying the researcher learnt that its compliance was not achieved regardless of the training provided (during facilities' handover) by the implementing agents. For the SGB group members it is a taboo in the community to monitor waste levels and it is also regarded as being hazardous to one's health as personal protective equipment does not exist. Replacement materials such as wind masters, manhole covers and toilet seat pedestals and covers are reported by the SGB groups to be unavailable locally.

The SGB groups concurred that generally, the toilets are expensive to maintain. There is no estimation on maintenance costs, but the equipment is expensive when bought from the supplier and are not available everywhere for comparison of costs. The equipment requires specialised technical personnel and maintenance. Personnel may be expensive and schools do not have the funds for such projects. During the facilities handover the researcher was present and the provincial Department of Basic Education expected the grounds men to attend to sanitation matters as well and were part of the trained personnel.

During the sanitation programme implementation, the researcher, being part of the programme management, learnt that there are norms and standard budgets that are meant to fund ongoing activities at schools, including Enviro Loo facilities operation and

maintenance, curriculum related issues and maintenance of machinery such as photocopying machines, printing equipment and computers. The SGB groups pointed out that the budget was limited and the management directed most of the funds to curriculum activities. This includes stationery that is highly in demand. It appears that there is a general shortage of funds to maintain the toilets as curriculum comes first.

Theme 2: Learners' understanding of operations of the facilities

This theme is important for learners to understand because without understanding of how the Enviro Loo operates, they would not be able to comply with requirements such as not throwing any materials into the toilet and how the system works (e.g. toilet sit cover should always be closed when not in use and the wind master must keep on spinning). Learners were provided with training on user education and operation and maintenance of the facilities so that they may treat the facilities accordingly and if they noticed something wrong, they may be able to identify and report to the school management.

This theme seeks to find out if learners had understanding of how the Enviro Loo operates. Two learner groups claimed that learners never received training on how the facilities operate. They stated that they were not yet registered at the school when the facilities were constructed. This is where the ongoing user education and operation and maintenance awareness comes in because schools always have new learner generations. The other learner group had mixed answers. In this school, 4 learners agreed that they received user education while 11 said they did not. In reality, user education was provided to all schools (including learners) before the facilities were handed over to the schools. The school management signed the form confirming that user education was provided. This was part of handover signatures that also confirmed that the construction of sanitation facilities was completed.

This theme concedes with the Department of Water and Sanitation that encourages that health and hygiene and user education should be provided on an on-going process. This is because behaviour change is not easy to achieve through a single workshop on

health and hygiene and user education. The burden for the school may be that such service is provided by the municipality environmental health practitioners who are not attached to school services. There is a need for advocacy from the department of education side to liaise with the local municipality to provide such services.

Theme 3: Learners' understanding on Maintenance

In respect of how the facilities are supposed to be maintained, two schools maintained that they were not trained on maintenance issues while the other school reported that the rule that you break you pay should be used. All toilets in all schools are not cleaned on a regular basis and in most cases they are not cleaned at all.

4.2.6 Themes related to PSTT, SGB and Learners' Representative Council

Theme 1: The general acceptability of the Enviro Loo sanitation technology

This theme seeks to find out if the Enviro Loo is generally acceptable in the province. Studying the feasibility of a sanitation system in (Thailand, Schouw & Tjell 2003) defines acceptability through two subjective ideas:

- The socio-cultural acceptance focusing on the perceptions of the user, and
- The practical acceptance which is the perception of the user and their behaviour in terms of the facility.

(Momba et al. 2013) point out the factors which hinder the acceptance of a new system as follows:

- Un-affordability
- if the unit is not considered to be beneficial by community members
- community members will have to abide by what decision-makers decide
- if the system compromises community members' values

These factors are in line with what the study found. The PSTT group stated that from the literate persons' (designers/engineers) perspective, the Enviro Loo is highly acceptable. While considering the provincial social context towards sanitation, the

technology is not acceptable because traditionally, coming in contact with human waste is highly undesirable (the system compromises community members' sanitary practices). People prefer a toilet because they want to avoid coming in contact with human waste. But this is contrary to their expectation because the Enviro Loo exposes them again in shallow pits that are not raked on time and they are expected to monitor and empty the waste content on a regular basis as part of operation and maintenance (and this is not done in most cases because schools do not have the money to pay the contractors and they cannot do it themselves).

Although the raking and emptying of the facilities bears economic value in that it may create jobs, there is huge variance as compared to undermining community values. The researcher's experience as working under sanitation unit has noted with interest how similar activities of emptying full pit toilets in KZN was discouraged by the previous minister of water and sanitation. This activity is as well not that differ from the bucket system that the department is striving to eradicate. Besides raking and emptying and using the dry waste as compost, its disposal is not well elaborated. The untreated waste cannot be used as compost at the school gardens without further studies on pathogens that might still be active or be reactivated during rainy seasons. The recycling of waste needs to be scientifically studied and approved to prevent waterborne diseases and other environmental contaminations.

There is also little information and skills on operation and maintenance. The toilets are not emptied often and this causes them to be breeding grounds for mosquitoes. The PSTT indicated that when the designers designed the Enviro Loo, they neglected to acknowledge that the waste has to be treated before, even if it is dry because there are pathogens and other macro-organisms that may become active again and may be harmful to human health. The PSTT stated that the technology is based on protection of underground water, but there are many other desirable factors they did not consider. Even if the waste is dumped or used, during the rainy season the pathogens may be reactivated.

The system was described by the PSTT as one that has an element of disrespecting humanity, because community members are forced to come in contact with human waste (the shallow pits when not raked expose human waste and this makes it look like a toilet which is full or a bucket sanitation system). The PSTT said that the designers undermined and disrespected the rural people's intelligence and that social factors were not considered. The technology is said to have been just dumped at schools and the schools cannot maintain them, as supported by (Momba et al. 2013) who emphasise that community participation and acceptance of new sanitation technology systems are crucial in ensuring the success of intervention projects. They further assert that these aspects must therefore be an integral component of the requirements and of standards or criteria based on which the technology is assessed and selected. This is further supported by (Pacey 2005) who emphasises that if sanitation improvements in rural and urban areas are to be widely accepted, the relevant social and cultural factors have to be taken into consideration during planning and implementation.

According to the PSTT group the technology is not cost effective. It is very expensive to implement and to operate and maintain. According to this group, the technology is not acceptable in respect of social and economic factors. This is evident as schools do not afford to operate and maintain the facilities. Implementation of sanitation technology that is commonly used by the community is important. Fixing of the broken items is regarded as expensive and proper study needs to be conducted on estimation of maintenance costs for Enviro Loo sanitation technology, given the previous findings that the facilities are vandalised and some items are (such as wind masters) not longer operational.

The School Governing Body as well supported the fact that the technology is not acceptable. They argued that the toilets fill up quickly and are extremely demanding and expensive to operate and maintain. They also complained of health hazards, given the shallowness of the pits. (Robinson & James 2005) believe that understanding what the consumer wants and can afford as well as knowing their willingness to pay is clearly important. When the needs of people are ignored and the local context is not taken into account, sanitation schemes are bound to fail.

The Learners' Representative Council as well further emphasised the unacceptability of the Enviro Loo sanitation technology because of the following:

In terms of design, shallow pits that expose waste, urinals for boys and lack of disability equipment for learners with disabilities as well as the lack of sanitary pads for girls.

Based on the findings, one may say with ease that the technology is generally not acceptable due to the above mentioned factors.

Theme 2: Behaviour towards the acceptability of Enviro Loo

This theme seeks to explore if there are social and cultural factors that the communities practise may have impact on the acceptability of the Enviro Loo sanitation technology system at schools. (Gunnerson et al. 1982:20) maintains that choices and behaviour related to sanitation are usually deeply rooted in a cultural understanding. (Douglas 1966) further maintains that the socio-cultural environment where an individual grows up influences the acceptance of a new sanitation system. This is in accord with the PSTT group's response that confirmed that indeed there are socio-cultural factors that affect the acceptability of the Enviro Loo. The group pointed out that the communities in Limpopo Province are faecophobic (societies, persons/cultures with strong taboos against handling and talking about human faeces). With the introduction of the Enviro Loo technology that is shallow and requires ongoing monitoring of human waste through the manhole and emptying the waste content through the manhole when it is full, this practice is least desirable and very disturbing to the community. Thus the previous theme has conceded that the technology is not acceptable. This theme's finding further elaborates on the reason why.

The PSTT group asserts that most of the rural communities do not afford to buy toilet paper. As a result unwanted objects are thrown into the toilets and these materials are not allowed in the Enviro Loo as they make the system to be dysfunctional. This is in support of (Still & Foxon 2012) who observe that in Asian cultures 'washing' is preferred over 'wiping' as the cleansing method. The researcher has previously shared the experience that it is very rare to find toilet papers at schools sanitation facilities. As

such, what are learners expected to use, if they school is not providing for toilet papers and sanitary pads disposals. The Department of Basic Education has learnt that most learners cannot afford to pay for school fees and introduced fees free education system for all and other programmes such as school feeding scheme. Strengthening of sanitation services at school also need to be prioritised, not only on providing the infrastructure, but also on sanitary services such as sanitary pads, their disposal means as well as the provision of toilet papers to curb this problem. The supply of sanitary pads for girl learners during their periods seems to be gaining momentum, but advocacy on this aspect needs to be beefed up to accelerate such provisions.

In public school toilets, the toilet seat pedestals are mostly not tidy. As a result, most learners prefer squatting on the toilet seat pedestal. Girls dispose of their sanitary pads into the toilet because of the belief that they might be used for witchcraft and that the owner might be bewitched (they have a belief that they may bleed nonstop or be made barren). This is supported by (Kanyembe 2011) who suggests that girls during their period should always make sure that they dispose of their sanitary materials (cloth/pads/tissue/cotton) in a pit latrine. This is in contrast with the operational requirements of the Enviro Loo which do not accept other materials rather than human waste and toilet paper.

The researcher was once confronted by the learners against the disposal of sanitary pads to the Enviro Loo facilities. This was complicated by the fact that during the implementation of the Enviro Loo facilities, the old pit latrines were to be demolished as they are deemed unsafe to learners (learners were used to dispose their sanitary pads into pit latrines). This created frustrations to the learners, especially ladies who cited the above mention belief of bewitching. It should however be noted that it is not easy to change one's belief system. Even if it does not have the profound grounds one may not just discard it as a myth. The unavailability of the disposal bins and incineration facilities for the school made the situation complex and the school management was advised to act promptly to the learners' concerns as the disposal of the sanitary pads would have negative impacts.

According to (Water Information Network – South Africa 2012) the existing literature on gender mainstreaming in the water and sanitation sector is silent on menstrual hygiene management (MHM). With the implementation of the Enviro Loo sanitation at school, this matter is becoming sensitive as girls are not allowed to dispose their sanitary pads into the toilets. This is aggravated by the fact that the school management does not make any provisions for such. Efforts in school sanitation to address this issue have ignored menstrual management in latrine design and construction.

Menstrual hygiene management is a new phenomenon that is being advocated to be highly sensitive and needs to be addressed at schools. (Still et al. 2009: 3) contest that “From the South African perspective, national research and surveys undertaken suggests that approximately 30% of girls do not attend school during menstruation, these girls are in the main from poorer communities where access to sanitary resources is difficult”. During the implementation of the Enviro Loo facilities, old conventional pit toilets were to be demolished in all schools that benefited from Enviro Loo. Girls raised concerns and frustrations as the old toilets could cater for the disposals of their sanitary pads. The PSTT is advocating for improved sanitation technology that may see the dawn of sanitation facilities that cater for MHM. According to the research, 60% of women and girls in South Africa do not have access to traditional sanitary ware (pads and tampons). The resultant absenteeism during menstruation leads to a critical loss of learning time. On average, about 4 days per month can be lost, which can add up to 48 days of schooling across the years that a girl should be in school.

According to the PSTT group, along with prohibitive costs, other major constraints which prevent the benefits of improved sanitation services from reaching marginal populations are lack of information, ineffective institutions, and the choice of inappropriate technical designs. Often the result is non-use, misuse, and poor maintenance of existing facilities. To strengthen the matter on socio-cultural factors is the response by one of the members of the SGB who stated that moral degeneration is blamed on learners' behaviour. The SGB maintains that learners do not have manners anymore and are out of control. They claim that learners do not listen and do as they please. Besides, toilets

are not taken seriously in rural areas and thus, they do not take care of them. The school Governing Body does not take management of sanitation facilities as one of their mandate. Thus, there is no control over sanitation facilities.

One of the SGB groups indicated that “our culture does not allow any contact with human waste. Even to look backwards or inside the pit, is not customary”. The school maintains that they cannot make compost (as expected by the designers) and even if they can make manure, the vegetable cannot be eaten within that community. This includes even if the manure is used in the flowering garden. They said they can only use the manure if they are not aware that they are made from human waste. The school argues that the manhole is designed to empty the waste contents and their culture does not allow coming in contact with waste. While other schools’ argument on social and cultural behaviour that may affect the sanitation system, the other school claims that coming in contact with human waste in the community is not acceptable to the community. The fact that they see the piling up of waste in the shallow pit repels them from using the toilet. They mentioned that the old traditional deep pits with some improvements could be alternate acceptable pits. As a result users do not clean pedestals after use.

Theme 3: The impact of inconsiderate behaviour on Enviro Loo sanitation.

This theme seeks to find out how socio-cultural factors are affecting the maximum operation of the Enviro Loo toilets at schools. The fact that the communities are faecophobic makes schools not to monitor and empty the manholes as required. The faecophobic factor generally makes the community not to treat toilets as expected. Toilets are regarded as untidy, filthy and not treated with the respect and dignity it deserves. As a result, the toilets are neglected and not taken care of. Vandalism is prevalent and the toilets get full quickly if not monitored and emptied. Disposing and throwing of foreign objects and materials in the toilet makes the system not to function properly and they get full quickly. Lack of health and hygiene and user education makes learners to use toilets inappropriately. This leads to the toilets not longer user-friendly, untidy and filthy.

Theme 4: Means to improve the acceptability of Enviro Loo sanitation technology

This theme serves to highlight some of the possible recommendations proposed by the group on what can be done to improve the acceptability of the Enviro Loo sanitation at schools. (Deakin et al. 2002; Tayler et al. 2003) assert that drawing on the understanding of the local context, different options and mechanisms for triggering behaviour change should be explored. The following are the PSTT group's proposed mitigating factors on how the situation can be improved:

- Set up a dedicated disposable area for sanitary pads closer to the toilet facilities for convenience.
- Provide incineration facilities for sanitary pads.
- Make available separate urinals for boys to keep seat pedestals clean at all times.
- Provide Health & Hygiene and user Education awareness on an ongoing basis because of the arrival of new intake of learners every year.
- Schools must try to include other stakeholders such as municipalities refuse removals, use of the Environmental Health Practitioners for Health & Hygiene and user education on sanitation services. This will improve good sanitation practices and curb the misuse and vandalism of the facilities.
- There is a need to engage with the Department of Agriculture so that they may explore the use of waste as compost. This will decrease the burden of emptying of the toilets.
- The Department of Education should hire dedicated and qualified sanitation personnel to deal with schools sanitation matters just like in curriculum development. This will help on the ongoing monitoring and inspections of sanitation services at schools.

- Explore and improve on what is already implemented within the community to improve accessibility and relevancy to the community in terms of skills and capacity to maintain the facilities.

The study further explored on the means that may be used to improve the acceptability of Enviro Loo sanitation technology at schools from the SGB point of view. Specific attention was given to ownership, operation and maintenance as well as improving good sanitation practices

In respect of ownership, the study looked at ways to improve the ownership of the facilities. The SGB of the first school reported that acceptability may be improved if the SGB and learners are re-educated on the importance of sanitation and how to operate and maintain the Enviro Loo. This is because there is a new generation of learners every year and ongoing user education would help them revive and internalise the importance of good hygiene practices. The SGB of the second school urges that user education is important. They emphasised that re-introduction of school inspection system like in previous years, noting that when inspectors come, they inspect the conditions of the toilets as well and school management is accountable and is forced to maintain the toilets for the school image. The other SGB paid more focus on the improvement of the designs and to include urinals for boys and dedicated area for disposal and incineration of sanitary pads for female learners. The SGB also singled out the question of overcrowding. The SGB recommended that the number of toilets should be increased to meet the acceptable ratio of 40 learners per toilet seat. The number of learners is reported to be increasing every year and when the toilets were allocated, the provincial Department of Basic Education based the number of toilets required on the previous number of learners enrolled.

Theme 5: Means to improve operation and maintenance of Enviro Loo sanitation.

The study seeks to find out on means to improve on operation and maintenance of the Enviroloo sanitation system. The first SGB group maintained that the Department of Education should provide additional or dedicated and ring-in-fence funds specifically for

sanitation operations and maintenance purposes. They argued that there is no budget for toilet paper and fixing dysfunctional materials such as broken doors, windows vent pipes and wind masters and other related equipment. The second SGB group asserts that operation and maintenance of the Enviro Loo systems are very expensive and needs expert services as it cannot be done by lay person. They said that it is impossible to maintain them as they do not require water when cleaning. The second SGB group emphasized the introduction of toilet staff that watch over toilets specifically as the only solution; just like with public toilets where people pay to use the facilities. In contrast, they cited that it can be a challenge at schools because media might depict it in a negative way blaming the schools for charging the learners to use the toilets while such schools are regarded as no fees schools because of their impoverished background. The last SGB also brought forward the issue of collection of tissue from learners by schools. The idea would be that learners should bring tissues to the school management which would control them in the manner that when a learner goes to the toilet, there should be a person hired by the school. This person would give learners a tissue as they get into the toilet. This proposal was rejected because the SGB indicated the challenge of remunerating the person since they have financial challenges. Nonetheless, it was resolved that it is better if the SGB can find a person who manages the toilets and charge 50 cents per learner as they get into the toilet, but the toilet papers are collected from the learners. This should safeguard not preventing learners who cannot afford 50 cents to use the toilets. The 50 cents would be used to pay the person who will be looking after the toilets. The toilets master must be trained and paid and the SGB should inform the parents and learners. It is the function of the SGB to manage the toilets. The SGB said it is not responsible for the toilets, but was encouraged to take the lead and monitor the facilities. Similar to the first SGB group, the other SGB reiterated the issue of making funds for operation and maintenance available. They assert that the re-training of the learners and school management on the issues of operation and maintenance would improve the acceptability (regardless of previous training provided during the facilities' handover). They said that they would make rules that bind every concerned stakeholder and increase stakeholder participation and get a toilet guard or someone to always monitor the toilets.

Theme 6: Learners' good sanitation practices.

This theme tries to find out a way for the improvement of Enviro Loo through practising good sanitation hygiene practices. Good sanitation hygiene practice includes the washing of hands after using the toilets as well as proper care of the facilities in terms of cleanliness. The first learners' group emphasised that ongoing health and hygiene and user education must be done at least on a continual basis. Partnering with other stakeholders (such as the Department of Health for Environmental Health Practitioners to make awareness on ongoing health and hygiene, Department of Public works to assist on fixing vandalised items etc) may assist. The second learners' group pointed out on the condition that water availability needs to be improved. The third learners' group also reiterated the importance of user education as being highly recommended. The learners also asserted that the school must establish subcommittees that would focus its attention on sanitation matters. Furthermore, the study looked at the means that may be used to improve the acceptability of Enviro Loo sanitation technology at schools from the learners' perspective in respect of ownership, vandalism, care and good sanitation hygiene practice.

In respect of ownership the first group said that they have a sense of owning the toilets and feel the toilets belong to them. They recommend that one person should go to the toilets at a time because when they go with friends, friends do graffiti on walls and doors as they wait for each other. While the first group accepts the ownership, the second group said that they do not own the toilets. When asked what they think needs to be done to improve ownership of those toilets because they belong to learners, they responded that it was not easy to develop a feeling of ownership towards the toilets as they are used by many learners. They said that even if they may have desire for ownership that would not apply to all learners. The third group conceded that they can take ownership if the toilets are fixed and user education is provided.

Regarding vandalism, the first group of learners recommended that strong structures that are intact need to be used. While the second group felt that it can be prevented through the implementation of the rules that if you break you pay for the system is used.

And the third group similarly said that any form of vandalism or breakage must be reported to the management and the culprits should be punished.

When it comes to care, the first group of learners maintained that they preferred that the cleaners should take care of the toilets. Their argument was based on the fact that learners do not clean toilets and feel it would be unfair treatment. They said they paid R50.00 per annum per learner for a cleaner, thus they feel they should not clean the toilets. There is a person who works two to three days per week. The SGB reports that the person is a general cleaner and toilets are not part of her job description as she cleans classes and the school surrounding. Learners felt they would rather pay for a person to take care of the toilets. They also felt that dedicated toilets per grade grouping would work. The first group conceded with the second group, arguing that they needed someone to care for them. They can look for someone to sit at the entrance and charge as learners get in. It was proposed that a camera be placed to monitor, but arguments rose that learners' privacy would be compromised. With a person next to the toilet to monitor the facilities against vandalism and misuse, the learners pointed out that the disadvantage is that they are not free when there is someone nearby. The proposal for punishment to clean toilets when a learner contravenes school rules was not welcome as well. This is because learners are not supposed to miss classes due to punishment and the personnel who punish the learner must remain with the learner after school, which is inconvenient for both the learner and the personnel because of transportation problems.

The third group was of a different perspective. They wanted lockable toilets and keys to be kept by teachers. If they get instructions, they feel that they can use the toilets properly. They said they behaved well at home and in malls and so if someone cleaned them randomly, they could be clean. They could also take care of the toilets if there was available water and relevant cleaning equipment. They proposed that if they contributed R5.00 per person per month, the amount could be used to buy toilet paper since the school could not afford such an undertaking. This is contrary to what the SGB said when the researcher proposed a similar idea; lack of budget was cited as the problem. The learner group proposed that the learner committee into the issue.

In respect of good sanitation hygiene practice, the first group said that they always washed hands after using the toilets. This is in coincidence with the second group that conceded that they also did wash hands after using the toilets, but the handwashing basins drainage systems were always blocked. Some learners said never used the toilets at school, citing that the toilets were not user-friendly. The third group was of a different perspective. They mentioned that there was no water for hygiene practices. Third learners' group also mentioned that there were not enough toilets for girls. They said that this was due to high enrolment number of girls than before and that the teachers occupy all 4 seats that should have been shared with the learners. To aggravate this situation, the management uses another block as a storeroom). As a result, girls have 2 blocks of four (4) toilet seats each, while boys have 1 block of 4 toilet seats, which is vandalised. If the toilets are cleaned, they can take good care of them. The learners' group said that they complained that they were helpless about the current state of the toilets.

4.3. Conclusion

The general conclusion that can be made based on the analysis of the data as supplied by the focus groups is that there are social factors that affect the acceptability of Enviro Loo sanitation technology system at schools. The factors cited are:

- The Limpopo community is a faecophobic society (societies, persons/ cultures with strong taboos against handling and talking about human faeces);
- Lack of operation and maintenance skills including affordability;
- Lack of consultations and community participation with school management on sanitation technology system of choice;
- Lack of consideration to relevant social and cultural sanitation practices during planning and implementation;
- Poor hygiene practices;
- Myths against disposal of sanitary pads and condoms;
- Moral degeneration (learners are out of control in respect of sanitation practices);

- General un-profound understanding in villages that sanitation facilities are not viewed with respect and dignity they deserve,
- Not accepting the Enviro Loo sanitation technology system, and
- Peer pressure that influences learners to carry out acts of vandalism.

The study further found that there are ways to improve the acceptability of the Enviro Loo sanitation technology system. The ways proposed are:

- Set up a dedicated disposable area for pads closer to the toilet facilities for convenience;
- Make available separate urinals for boys. .
- Have incineration facilities for pads.
- Provide Health & Hygiene and user Education awareness in an ongoing basis;
- Schools must try to include other stakeholders such as municipalities, refuse removals, environmental health practitioners working with Health & Hygiene and user education on sanitation services. This will improve good sanitation practices and curb the misuse and vandalism of the facilities.
- There is a need to engage with the Department of Agriculture so that they may explore the use of waste as compost. This will decrease the burden of emptying of the toilets.
- The Department of Education should hire dedicated and qualified sanitation personnel to deal with schools sanitation matters; this will help in monitoring and inspection of sanitation services, and
- Explore and improve on what is already implemented within the community to improve accessibility and relevance to the community in terms of skills and capacity to maintain the facilities.

CHAPTER 5: SUMMARY, RECOMMENDATIONS, AND CONCLUSION

5.1. SUMMARY

Regarding the social factors that affect the acceptability of the Enviro Loo, all focus groups indicated that there are social factors that affect the facilities' acceptability. The integration of stakeholders' participation that are interested and related to sanitation services is of utmost importance. The respondents pointed out that there was no stakeholder participation and this made it difficult for the schools to manage sanitation, given that it is not their field of specialisation. Health and hygiene and user education also play a very important role. It is however important to acknowledge that these activities should be done on an ongoing basis since it is not easy to change the behaviour of people so that they can adopt and adapt to a new sanitation technology system. In addition, schools always have new generations registered who are not familiar with the sanitation technology.

The respondents confirmed that health and hygiene and user education awareness was done even though some of the respondents said it was not. This cannot be disputed because they might be part of the generation that joined the school after the programme was implemented. Myths, taboos, negative behaviour and other social beliefs around good sanitary practice are some of the weaknesses the technology choice overlooked. The oversight that Limpopo Province is dominated by faecophobic communities is a fatal disaster that even threatens the sustainability of the facilities. Lack of knowledge and skills on sanitation facilities, inspections and maladministration also contribute to the unacceptability of the Enviro Loo system.

Finally, the responses show that there are ways of improving the acceptability of the Enviro Loo sanitation technology systems at schools and a number of respondents made some recommendations based on their experiences and expertise.

5.2 Implications of the Study

The following are the implications of the study:

- There is a need for regular monitoring of sanitation, not just monitoring of inputs-outputs (i.e. funds utilised and toilets built), but monitoring of outcomes such as latrine usage, prevalence of open defecation, vandalism, handwashing, and depositing of foreign materials.
- There is a need for sanitation infrastructure management system programme.
- Stakeholders should be engaged more in respect of sanitation related matters, for example: Environmental health inspectors, Department of Water and Sanitation, Department of Public Works, to mention a few.
- Learners should be controlled more to check vandalism and misconduct such as truancy and smoking.
- Unattended vandalised facilities will result in high cost of refurbishment and in some instances lead to reversed backlog as the vandalised facilities cannot be used.
- There should be structural adjustment: increase specialised personnel on building inspections from local schools to departmental circuit offices, at provincial and national levels.
- The Department of Education has to explore other sources of funds for sanitation operation and maintenance, or either set aside the sanitation budget from the norms and standards fund.
- The sanitation management style is not forthcoming and this makes the facilities to be vulnerable to vandalism and misuse.
- The technology choice overlooked the importance of socio cultural factors when planned and implemented, thus it over emphasised to be most cost effective, environmental friendly and universal. The technology option failed to identify that Limpopo is dominated by Faecophobic communities.
- There is a need to institutionalise schools sanitation to advocate and oversee engagement of stakeholders and monitor the effectiveness of the implementation

of the sanitation programme. The Human Rights Commission, which is one of the stakeholders, is not effective as it has a broad spectrum.

5.3 RECOMMENDATIONS

5.3.1 Recommendations in respect of Social factors that affect the acceptability of the Enviro Loo sanitation technology

- Schools must try to include other stakeholders' involvement such as municipalities' refuse removals, Environmental Health Practitioners for Health and Hygiene and user education on sanitation services. This will improve good sanitation practice and curb the misuse and vandalism of the facilities.
- Structural adjustment.
- The number of toilets should be increased to meet the acceptable ratio of 40 learners per toilet seat. The number of learners is reported to be increasing every year. When the toilets were allocated, the provincial Department of Education based the number of toilets required on the previous number of learners enrolled.
- There are no means to control learners against moral degeneration, vandalism and misconduct such as truancy.
- The implementation of the rule that if you break you pay.
- The technology choice overlooked the importance of socio-cultural factors when it was planned and implemented; thus it over emphasised being cost effective, environmentally friendly and universal. The technology option failed to identify that Limpopo Province is dominated by faecophobic communities.

5.3.2 Recommendations in respect of means to improve the acceptability of the Enviro Loo system in schools

- Conduct Health and Hygiene and user Education awareness campaigns in an ongoing basis, as schools receive new entrants every year.

- Frequent improvement of sanitation advocacy programmes.
- Explore the possibilities of improving on what is already being implemented within the community to get the people accept the relevance of the project to the community in terms of skills and capacity to maintain the facilities.
- There should be structural adjustment: increase specialised personnel on sanitation infrastructure management systems from local schools to departmental circuit offices, at provincial and national levels.
- Encourage the Department of Education to participate on water and sanitation school programmes such as *Baswa le metse*; this includes the observations of the annual Sanitation Week, World Toilet Day, Global Handwashing Day etc.
- Everyone should be encouraged to pay attention, participate and observe sanitation matters, including having interest media systems.

5. 4. Conclusion

Based on the main research questions, the study revealed that there are socio-cultural factors that affect the acceptability of the Enviro Loo sanitation technology system in Limpopo Province. This is evident in the fact that all the respondents pointed out the social barriers with some of their practical experiences of the technology. The study discovered that behaviour change takes time to set in. This study highlights that beneficiaries revert to their old habits (of not practising good sanitation practice) very quickly if the new sanitation technology system becomes blocked or is broke, and if no one is available to provide timely advice on how to handle the matter. The study further revealed that there are means to improve the acceptability of the Enviro Loo sanitation technology system in schools, and that there is a need for broader sanitation advocacy awareness programmes to diffuse the technology, as well as a need for regular monitoring of the system.

5.5. Suggestions for future research

This study has not covered every sub-domain of socio-cultural factors that affect the acceptability of the Enviro Loo system in schools. Future research in this field is

necessary especially in relation to rural areas. More needs to be known about this technology, that is, how it works, how it can be maintained and how it can be improved. This will raise the acceptability level and in the end it will improve its functioning. The following are the proposed fields for further research:

- Estimate of the cost of operation and maintenance of the Enviro Loo technology system.
- Budget allocation for the various activities related to the adoption of Enviro Loo system.
- Design issues that might improve the acceptability of the Enviro Loo system.
- Investigate if the old traditional deep pits with some improvements could be alternate acceptable pits for improved technology.

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ANNEXURES

Annexure A	Provincial Sanitation Task Team Terms of Reference
Annexure B	Sanitation Technology Options
Annexure C	Enviro Loo Procedures Manual Operations, Monitoring and Basic Maintenance of Enviro Loo Facility
Annexure D	Interview Guide
Annexure E	Request letters to Conduct Research Study from the PSTT Forum and the School Governing Body

ANNEXURE A



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

PROVINCIAL SANITATION TASK TEAM

TERMS OF REFERENCE

(DRAFT 1)

1. Background

The right to access to a basic level of sanitation service is clearly stipulated in the Constitution of South Africa (Act 108 of 1996). Government in an endeavor to fulfill its commitment to a “better life for all” through the provision of basic services amongst other programs is taking steps to create a structure in the spirit of cooperative governance to investigate and derive ways of ensuring delivery of sanitation is realized.

There are specific challenges in different areas across the country which include; population influx which results in an ever increasing backlog on basic services, expectation of higher levels of service, predominantly waterborne sanitation even within the fast spreading informal settlements and pits getting full in rural areas. The bulk of water and sanitation backlogs are linked to the informal settlements. When communities are frustrated, they take it to the streets and demand basic services from the municipalities. This impact on councilors as representatives of the people, and sometimes ordinary people in the community become victims.

The South African Constitution further spells out the essence of cooperative governance amongst the sphere spheres of government – national, provincial and local government in realizing the delivery of basic services. Given the multiple components of the sanitation delivery chain, it makes sense to promote cooperative governance in order to share resources while delivering sustainable sanitation services. The issue of roles and responsibilities should be very clear due to the fragmentation of sanitation services fragmented across sector departments and other institutions including the private sector.

Secondly, a more focused approach is essential to support municipalities to deal with these challenges. Political commitment and strengthened collaboration towards mutual agenda created an enabling environment for municipalities to meet the targets. If all parties are committed to achieving the goals set by Government these challenges will be overcome.

2. Purpose and Objectives of the Provincial Sanitation Task Team

The purpose of the provincial Task Team is to ensure coordination and joint planning at provincial level for the delivery of sanitation services in line with national policy and targets. The main objective is to identify and address bottlenecks in the delivery of this services and come up with strategies and interventions to address them.

3. PSTT Membership

The PSTT is a strategic body consisting of government departments and relevant organizations involved directly or indirectly in the implementation of the sanitation programme. The PSTT comprises of the following representatives:

- Water Service Authorities
- DWS
- Department of Local Government and Housing
- Department of Health
- SALGA
- DBE
- DHS
- Civil Society

4. Frequency of PSTT meetings

The PSTT meetings are held on a bi-monthly basis, to take place on a rotational basis between the regional line Departments and the District Municipalities. They will also be held when a need arises.

5. PSTT Reporting

The PSTT is a sub-committee to the National Sanitation Task Team will give feed back to the National Sanitation Task Team with regard to strategies and progress on programmes implemented in the province.

6. Scope of Work

The scope of the work will include:

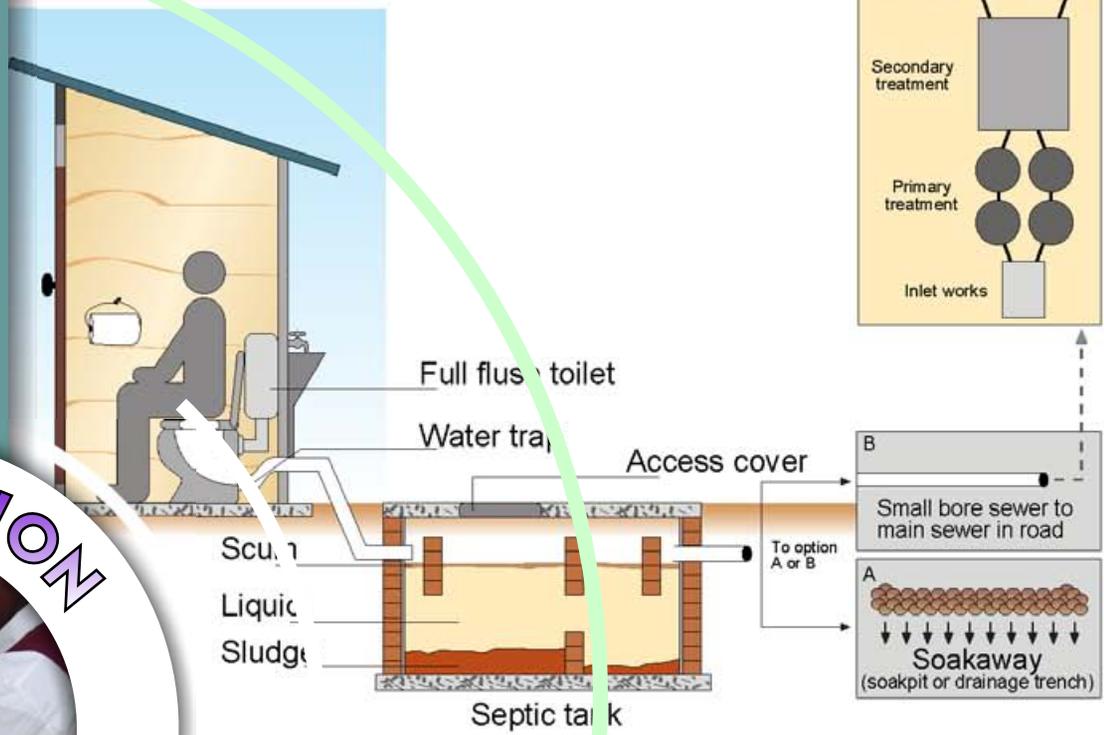
- Oversight of implementation of sanitation projects to proactively identify non-adherence to norms and standards
- To identify areas with without access to basic services with a potential to attract media “hot spots”
- Development of database of status of sanitation in both formal and informal settlements
- Implement the National Task Team programme,
- to identify and unblock bottlenecks in the implementation of sanitation projects and come up with strategies and interventions to bridge the gaps

- optimal utilization of resources to deal with sanitation delivery challenges and to put mechanisms in place to accelerate the rate of delivery

7. Outputs

The outputs of the PSTT will have to include:

- A well functioning PSTT and subcommittees,
- Database of all areas without access to basic services both at informal and formal settlements
- Provincial progress reports
- Intervention strategies to deal with bottlenecks
- Implementation of priority activities as identified under the PSTT adopted strategy;
- Information available to national; provincial departments related to sanitation and to all other participating stakeholders,



SANITATION TECHNOLOGY OPTIONS



water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

1. INTRODUCTION

The full range of technical options for providing adequate basic sanitation is still not widely known nor are the characteristics of the different options well understood. In particular, there is little appreciation of the long-term financial, environmental and institutional implications of operating and maintaining the various sanitation systems. As a result, in many cases communities and local governments are choosing technical options that, in the long term, are unaffordable and/or unsustainable.

Challenges arise from the wide range of options available and the differing environments and conditions to which each is suited. Experience shows that it is important to allow local involvement in the choice of solutions, but with a full grasp of the requirements of each option. The options include the ventilated improved pit toilet in all its variations, composting toilets, separation toilets, dehydration type toilets, on-site wet systems such as aquaprivies and septic tanks, and a range of full water borne systems.

The choice of technology is not only based on the technical aspects of each technology, but also on such factors as the permanence of the settlement, financial costs and affordability, design life, expectations and preferences, institutional capacity, the potential for job creation, and environmental considerations. This guideline will present the different technical, and to some extent financial, properties of the various technology options which have proved to be viable for large scale use within the South African context. The variety of proprietary systems are not named nor addressed individually, but usually can be classified as a member of one of the generic categories of sanitation systems addressed within this guideline.

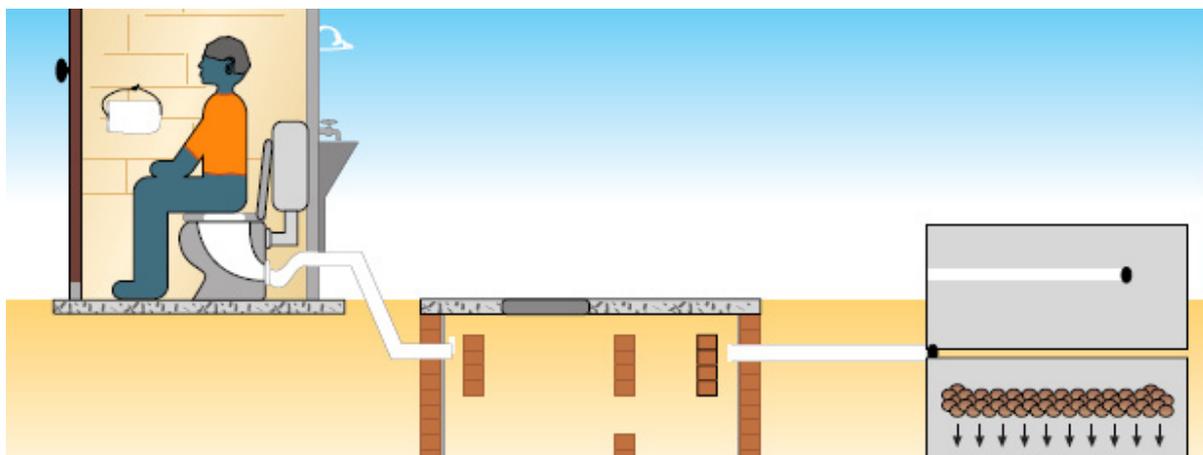
In this document, you will read more about the various technical options that meet the requirements for the provision of basic sanitation and the operational and maintenance requirements of each of these options. Some of the sustainability requirements, e.g. affordability, operation and maintenance, and institutional responsibilities are also addressed. A brief technology choice guide is also provided, but should be subject to local assessment of sustainability and acceptability in each case.

The options are divided into two categories: Dry on-plot systems (that do not require water for operation) and wet systems (that do require water for operation). Within the wet systems there is a further division into those systems that are fully on-site, and those that have both an on-site and an off-site component. The following information is provided for each technical option described:

- A sketch drawing of the recommended option
- a description of the option
- an explanation of the principles of operation
- operational and maintenance requirements and responsibilities for households and institutions
- a summary of costs
- notes on previous user experiences and comments on these

It should be noted in the introduction that the drawings are not meant as technical specifications for each of the sanitation types, but to illustrate the basic features. Additional technical details can be obtained from technical specifications obtainable from DWAF, SABS, WRC and CSIR, as well as from other literature.

Please note: The capital and operating costs of a given technology may vary widely between locations - depending on locally available materials, construction method, extent of existing infrastructure, etc.



2. CONSTRUCTION REQUIREMENTS

There are a number of approaches to and requirements for the construction of the physical sanitation facilities that are not related to a specific technology choice. The approach adopted can lead to increased community participation and ownership, the enhancement of job creation and skills development, and contribute to the long-term sustainability of the facility. However the approach must not result in the construction of poor quality facilities that the households and communities find inferior or unacceptable. It is therefore important that no matter what technology is chosen, the construction be done in a way that both promotes community ownership and job creation, and a high quality product that people will be proud of and that will function effectively according to the design principles during its lifetime.

In South Africa the following minimum construction specifications have been adopted for domestic toilets:

- The superstructure must provide adequate privacy and be constructed with a floor, walls and a roof of material adequate for long-term low maintenance usage. The superstructure must be provided with an opening which will give natural lighting and ventilation and the area of such opening shall be not less than 0,2 m².
- A latrine shall be provided with a seat and pedestal at a height of between 350mm and 450mm and fitted with a fly-proof lid.
- No excavation for a latrine substructure (e.g. pit, digester or septic tank) shall be sited within 3 m of a building or of a boundary of the site on which it is located.
- For digesters and septic tanks the excavation should be such that the tank can be adequately covered. In the case of plastic digesters or septic tanks, these should be adequately anchored to prevent them floating when empty in the case of a high water table.
- Outside latrines should not be built under or near trees, and should be located so that a vacuum tanker is able to approach to within 30 m of the pit or digester with the difference in levels between the pit and the surface upon which the tanker stands being not more than 2,0 m;
- Pits in unstable soils shall be fully lined. Unlined pits should be circular and should not exceed 1,5 m in diameter.
- Measures should be taken to prevent rainwater, soil, rubbish and other foreign material from entering the system. Separate provisions shall be made for the disposal of grey-water and other household waste.
- Pits of pit latrines shall be ventilated with a ventilation pipe of nominal diameter at least 110 mm and screened with a non-corrosive material which is resistant to ultraviolet radiation to prevent insects from entering or from escaping from substructures. The vent pipe should be installed such that its height is at least 2,5 m above the ground level, and 500 mm above the highest point of the roof.
- The upper 500 mm of any pit should be impervious, with openings to be provided for seepage out the pit from 500 mm below ground.

3. SUSTAINABILITY OF SANITATION SYSTEMS

The sustainability of a sanitation system is usually the most important consideration when selecting a specific technology option for a community. Sustainability refers not only to measures to minimize breakdowns and costs in the operation of a scheme, but also refers to measures

taken to maximize its positive social impact while minimizing any negative environmental impacts.

The following sections briefly outline some of the key requirements for promoting sustainability of sanitation systems and their relationship to choice of technology.

3.1 User education and participation in technology choice

- 3.1.1 It is imperative that representatives of the community for whom the sanitation project is to benefit be consulted and fully informed of the sanitation technology options that could be considered. The representatives must be part of the decision making process, and should in turn inform the residents of the options and choice.
- 3.1.2 It is the responsibility of the local authority to ensure that the necessary level of user education on the proper use, care and maintenance of the selected sanitation technology is provided; this will vary depending on the system to be installed.
- 3.1.3 As a general rule, the greater the household/community responsibility for operation and maintenance of the system, the more extensive must be the programme of user education, and the lower the tariffs and municipal O&M costs.
- 3.1.4 Conversely the greater the institutional responsibility for O&M, the greater the need for system monitoring by the local authority and effective cost-recovery from the users to provide the necessary resources for O&M.

Factors to be addressed by a programme of user education include:

- establishing structures in the community to facilitate and support effective O&M
- correct operation of the facility,
- the level of household/community responsibility for O&M of the proposed system,
- what to do when the pit is full or septic tank needs desludging,
- use of suitable/acceptable anal cleansing material,
- design life of the facility,
- implications of system failure (on personal health and on the environment),
- where to obtain assistance when problems are experienced,
- cost recovery awareness.

3.2 Health and hygiene promotion

- 3.2.1 It is the responsibility of the local authority to ensure that a project implementation health awareness programme followed by an ongoing programme of health and hygiene promotion is established.
- 3.2.2 Any programme must focus on the particular needs of different communities, in line with the level of service to be developed.
- 3.2.3 Factors to be addressed by a programme of sanitation health and hygiene promotion should be formulated following a comprehensive participatory process (PHAST), and may include:
 - safe disposal of urine and faeces including desiccated and composted wastes,
 - good personal hygiene practices,
 - importance of clean toilets,
 - food hygiene,
 - keeping stored water clean and hygienic,
 - safe disposal of wastewater,
 - implications of inappropriate hygiene practices and associated diseases.

3.3 Operation and maintenance tasks and plant& equipment availability

- 3.3.1** Households are responsible for the operation and maintenance of the sanitation system components located on their own erf, but the municipality may provide support for undertaking bigger tasks such as pit or septic tank emptying, moving top structures, or unblocking sewers.
- 3.3.2** It is the responsibility of the local authority to ensure that all transport, treatment and disposal facilities and equipment for handling sanitation wastes are appropriate to local conditions and of sufficient capacity to deal with the wastes associated with the level of service to be provided.
- 3.3.3** The operation and maintenance requirements of the transport, treatment and disposal facilities and equipment and all their associated costs must be planned for.
- 3.3.4** Back-up/emergency procedures are the responsibility of the local authority and must be addressed as part of the ongoing O&M requirements.
- 3.3.5** In the case of pit or tank emptying when the need for this has been established, particular factors to consider include:
- availability of suitable emptying equipment,
 - accessibility of pit/tank for emptying equipment,
 - proximity/access to local treatment facility or suitable disposal arrangements,
 - suitability of emptying strategy (i.e. ad hoc, rotational, systematic),
 - provision for recurrent expenditure.
- 3.3.6** The following are the general requirements for operation and maintenance of the various sanitation options. These should be fully assessed and detailed during the design stage of the specific projects:

Sanitation scheme	O&M tasks	Skills level	Time requirements	Equipment and materials	Comments
All latrines	Maintaining structure & pedestal	Maintenance skills	± 1 day per year	Some cement, paint, wood	May be done by home owner or small contractor
VIP Latrines	Cleaning vent pipe	None	1/2 hour per month		Undertaken by home owner
	Emptying pit	Brief training	1 day in 5 to 10 years	Vacuum tanker or hand equipment + roughage for composting sludge + safety clothing	Composting is not generally practiced, but holds potential for lowering costs and creating jobs
UDS latrines	Emptying pit	None	1/2 day each year	None	Most activities can be undertaken by home owner
Aquaprivy	Removing sludge from tank	Brief training	± 1/4 day every 3 months	Vacuum tanker + roughage for composting sludge	Composting is not generally practiced, but holds potential for lowering costs and creating jobs
	Maintaining soak pit	Brief training	Monthly for grease trap	None	Soak pit may need to be unblocked or moved every 5 to 10 years in some soils
Flush toilet with septic tank and adsorption trench	Repairs to pipes	Pipe skills	± 1 day every 5 years	Pipes and joints	May be done by home owner or small contractor
	Removing sludge from septic tank	Brief training	± 1/4 day every 3 years	Vacuum tanker + roughage for composting sludge	Composting is not generally practiced, but holds potential for lowering costs and creating jobs
	Maintaining soil adsorption trench	Brief training	Monthly for grease trap	None	Soak pit may need to be unblocked or moved every 5 to 10 years in some soils
Flush toilet with septic tank, solids free sewer and pond treatment	Repairs to pipes	Pipe skills	± 1 day every 6 years	Pipes and joints	May be done by home owner or small contractor
	Removing sludge from septic tanks	Brief training	± 1/4 day every 3 years per household	Vacuum tanker + roughage for composting sludge	Composting is not generally practiced, but holds potential for lowering costs and creating jobs
	Maintaining stabilization pond	Brief training	Daily	Minor tools	This can provide permanent job positions for 2 to 5 people.
Full waterborne sanitation	Repairs to pipes	Pipe skills	± 1 day every 6 months	Pipes and joints	May be done by home owner or small contractor (if on-site) or municipality (if off-site).
	Sewer blockages	Minor training	± 1 day per week	Rodding equipment + transport	May be done by municipality or small contractor
	Operating and maintaining wastewater treatment works	Full training to diploma level	Daily	Monitoring equipment + tools	Municipal responsibility providing permanent job positions for 4 to 10 people.
Sewage pump stations	Maintaining pumps, clearing screens and grit channels	Full training to certificate level	± 4 hours per week	Pump maintenance tools, safety clothing	Municipal responsibility but pump maintenance may be contracted in.

3.4 Cost recovery

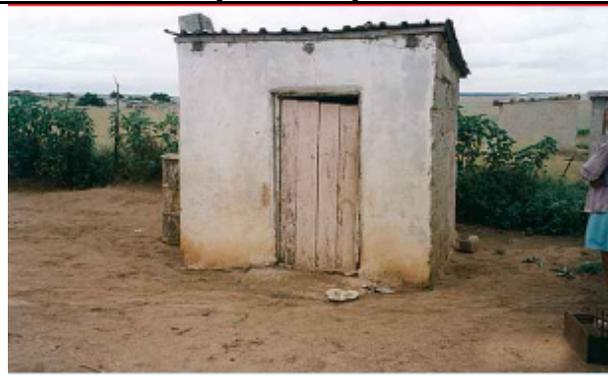
- 3.4.1** It is the responsibility of the local authority to ensure that the recurrent costs of the level of service to be developed are identified in full during the planning stage.
- 3.4.2** Along with any user education programme, issues around cost recovery awareness and the implications of non-payment must be addressed on an ongoing basis; this in itself constitutes an O&M cost.
- 3.4.3** Factors to be considered include:
- affordability in the medium to long term,
 - interim and emergency sources of funding,
 - availability of equitable share for subsidy of the poor
 - willingness to pay,
 - subsidy policies (pensioners, disabled, etc.).

4. Sanitation technology choice

4.1 Options not recommended

The options below are not recommended for large-scale use since they do not meet the safety and environmental criteria for a basic level of service under general circumstances.

Unimproved pit toilet



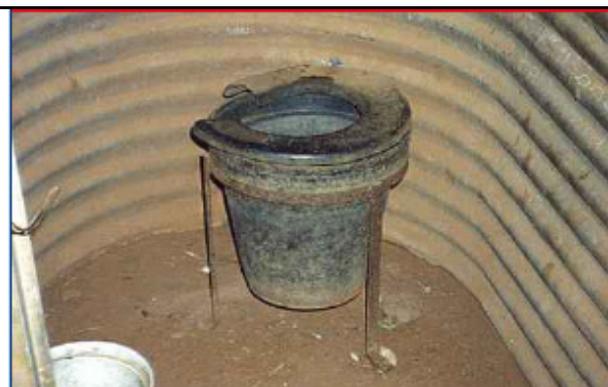
This system is not recommended (subject to bad smells and insect infestation). Consists of a top-structure around and /or over a pit, generally unlined where soil conditions allow, with a pedestal or squat-plate. There is no ventilation pipe

Chemical toilet



This system is only suitable for short-term temporary use such as special functions (it is expensive and requires regular emptying). There are various modern types. These utilise a water- diluted chemical in a receptacle below the toilet seat to render excreta harmless and odourless. These are generally standalone units.

Bucket toilet



This system is not recommended due to the exposure of the bucket contents to insects and vermin that can spread disease both during use and when emptying. Consists of a top-structure with the seat positioned above a bucket or other container located in a small compartment beneath.

Communal toilets



This system should only be considered for temporary use where a high level of cleanliness and maintenance can be assured. Consists of toilet "blocks", which may be based on dry or wet systems as outlined in the following descriptions.

4.2 Factors to consider in the choice of a sanitation technology

The selection of an appropriate technology from a range of possibilities is the key to the successful and sustainable operation of any facility. Choice of technology is often considered a simple process, but is usually quite complex requiring careful assessment of factors, consultation with the beneficiaries and the operating authority, and an understanding of the integration of factors affecting the sustainability of a system.

The process of selecting an option for a particular application may follow a step-wise sequence as shown in the layout below.

Step 1: Confirm goal and objectives

- What is to be achieved and why?
- Is it a realistic goal and will it address the main problem(s)?
- Are there sub-objectives that should be prioritized?

Step 2: Analysis of constraints and promoters

- Social issues
- Health issues
- Technological issues
- Economic issues
- Financial issues
- Institutional issues
- Environmental issues

Step 3: Output

- Selection of technology
- Specification of implementation methodology
- Plan for ongoing operation, maintenance and hygiene awareness
- Economic plan including sustainability of jobs and financing of O&M

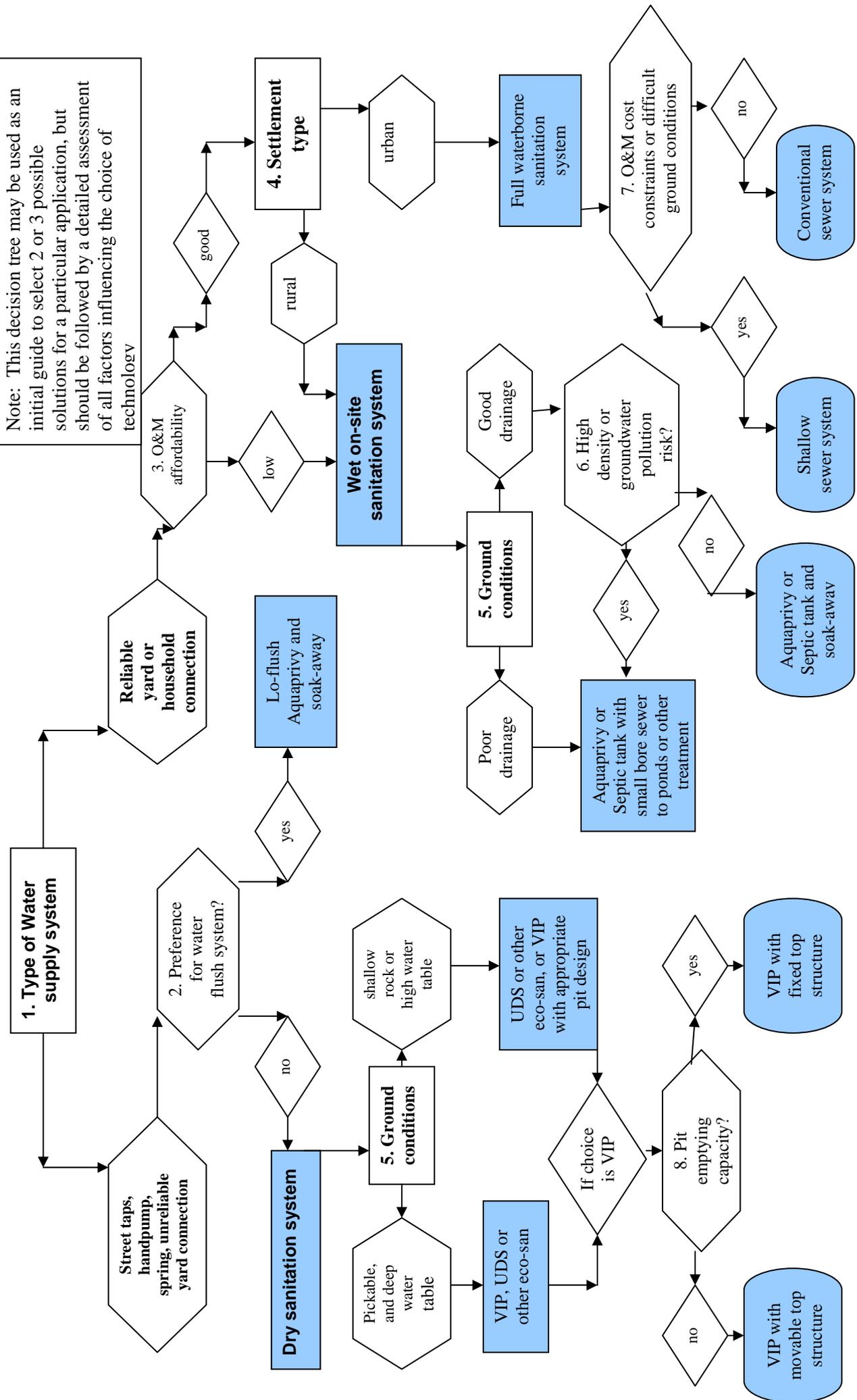
These three steps are illustrated in the following example framework:

Issue or factor	Effect or implication	Output or impact
Step 1: Goal and objectives		
Goal: Improve the health and dignity of residents	Minimum basic sanitation for settlement type and effective H&H education	
Objectives (e.g.): 1. Ensure acceptable sanitation service 2. Ensure affordable sanitation service 3. Maximise social benefits 4. Protect the environment	1. consult with residents prior to selecting technology option 2. assess operation and maintenance costs at planning stage 3. assess potential for job creation and skills development 4. assess environmental impact through application of Groundwater Protocol	1. residents are informed and participate in decision making 2. financial requirements and tariffs are known beforehand 3. local employment is maximized 4. environmental impacts are well managed
Step 2: Analysis of constraints and promoters	<ul style="list-style-type: none"> • Capital costs • Recurrent costs • Job creation potential • Availability and reliability of water • Ground conditions (construction and/or drainage aspects) • Operational requirements • Environmental protection • Settlement location and layout • Past experience and preferences • Existing infrastructure 	<ul style="list-style-type: none"> • Ensure affordability of capital and O&M costs • Maximize employment benefits for local residents • Ensure ongoing operational viability • Prevent pollution of surface or ground water • Ensure appropriate level of service for each community • Maximise links to existing infrastructure and services.
Step 3: Output Selection of technology Specification of	<ul style="list-style-type: none"> • All stakeholders involved in technology selection • Technology is most appropriate 	<ul style="list-style-type: none"> • Acceptable sanitation solution • Sustainable sanitation systems

Issue or factor	Effect or implication	Output or impact
implementation methodology Plan for ongoing operation, maintenance and hygiene awareness Economic plan including sustainability of jobs and financing of O&M	for specific application <ul style="list-style-type: none"> • Implementation approach ensures participation and maximizes local benefits including job creation, support local material suppliers, strengthens local management capacity. • Ongoing sustainability ensured • Health benefits maximized 	<ul style="list-style-type: none"> • Short and longer term local employment creation • Local skills development • Reduction in sanitation related illness

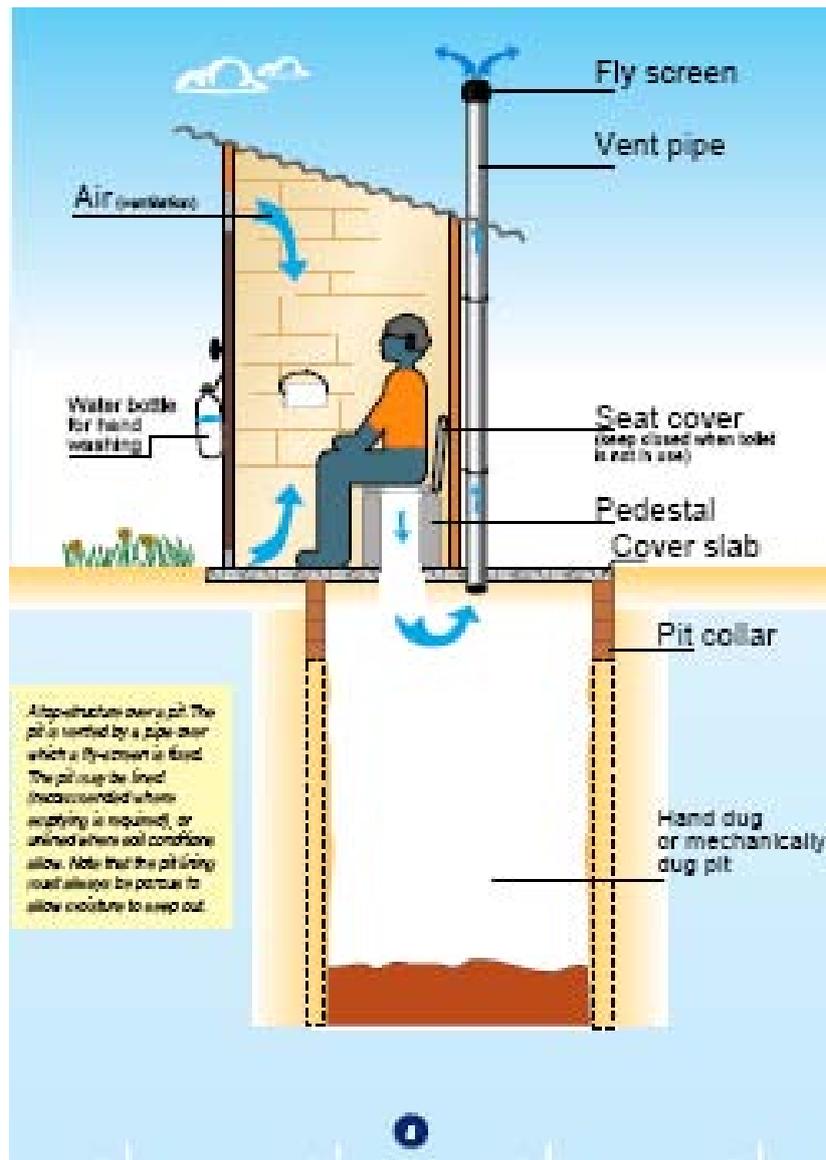
The following technology decision tree is provided as a support in the initial screening of technology options for a particular application. However, a thorough feasibility study should be undertaken before finalizing the selection:

Decision Tree for selection of optimum sanitation solution



5. RECOMMENDED SANITATION TECHNOLOGY OPTIONS

5.1 Dry on-plot systems - **Ventilated Improved Pit (VIP) toilet**



5.1.1 Fixed Top Structure – pit emptied

1. Principles of operation

Waste drops into the pit where the organic material decomposes and excess liquids percolate into the surrounding soil. Natural airflow through the top-structure and moving across the top of the vent pipe removes smells and vents gases from the pit to the atmosphere. A darkened interior is maintained causing insects entering the pit to be attracted towards the light at the top of the vent pipe and trapped by the fly screen. A separate hand washing facility is required.

2. Operational and institutional requirements

The VIP should be located to prevent ingress of storm water to pit, as well as to prevent the contamination of local groundwater that is used for drinking. The system cannot accept domestic wastewater, nor can it be installed inside the house. Ensure that there is access to the pit for mechanical pit-emptying equipment, and availability of facilities for sludge treatment and disposal. Repair or replace damaged or worn materials to ensure the proper functioning of the toilet.

3. Costs

- Capital:** May range from R3,000 – R4,500, depending on location, choice of materials and other specific project requirements.
- Maintenance:** R80 to R200 per year if emptied once in 5 years, or R30 to R70 per year if emptied once in 15 years. The pit emptying frequency depends on the pit volume and number of users in the household. An average pit emptying frequency of 8 years is generally accepted for planning purposes.
- Operating:** Household cleansing materials, water for hand washing

4. Experience and Comment

VIPs are widely used internationally and in rural and peri-urban areas of South Africa. These systems are most successful in water-scarce and less densely populated environments. Failures are generally due to inadequate user education and/or poor design and construction. The system has been found to be robust, not prone to negative impacts due to the failure of other services, and widely affordable even to the poorest. Minor adaptations to the pit can be made where shallow rock or high groundwater tables occur.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

Maintaining as dark an interior as is acceptable and taking precautions to restrict the exit of flies from the pit into the toilet superstructure (e.g. by lowering the seat cover when not in use). Repair/replacement of damaged or worn out materials (e.g. vent pipe, fly screen) to ensure optimal functioning of the ventilation system. Daily cleaning of the pedestal and interior of the toilet, and maintaining the hand-washing facility.

5.2. Off-site components (usually responsibility of the local authority)

The O&M and institutional responsibilities include:

- Management and supervision arrangements for mechanical pit -emptying, sludge transfer, treatment and disposal
- Plant, equipment and vehicle O&M .
- Ongoing user education and health and hygiene promotion

6. Other construction and operational considerations

The following questions need to be answered to understand the construction and operational challenges involved with operating this technical option:

Is pit substructure stable enough to ensure no risk of collapse on emptying?

Are pits accessible for emptying?

What options are available for sludge treatment and disposal?

Are there objects being thrown into the pits that may block the suction pipe (cans, bottles, rags)

Are locally manufactured materials of adequate quality for the intended lifespan of the system?

7. Upgrading Options

VIP toilets can be upgraded to other sanitation technology types. This will usually mean closure of the pit and reuse of the top structure, with removal of the pedestal and refitting with a flush-type pedestal. Additional plumbing and the downstream drainage system and facilities for the treatment and disposal of wastes will need to be installed. One alternative option is to install a urine diversion pedestal and continue to use the pit for the disposal of the solids, while the urine is diverted to an alternative disposal system.

5.1.2 Movable Top Structure – pit not emptied

1. Principles of operation

As for fixed top structure above

2. Operational and institutional requirements

As for fixed top structure above. There should also be land available to dig a new pit and move the top structure when the pit is full.

3. Costs

Capital: May range from R3,000 – R4,500, depending on householder input and choice of materials and cost.

Maintenance: Additional capital costs incurred every 5 to 15 years when old pit is full. With fully movable top structures the main costs will be for the new pit, Where the superstructure must also be rebuilt, there may be some savings from re-use of materials.

Operating: Household cleansing materials, water for hand washing

4. Experience and Comment

VIPS that are not emptied are widely used in South Africa and other developing countries. When the pit is full, the household will dig another pit and transfer the superstructure to the new pit. The old pit should be covered with soil at least 0.5m deep to prevent possible contact with gardening and other surface level activities.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

As for fixed top structure above

In addition when the pit is full, the following is required:

- digging of new pit
- relocating/rebuilding top structure
- backfilling and safe sealing of full pit

5.2. Off-site components (usually responsibility of the local authority)

The local authority is responsible for:

- Ongoing user education and health and hygiene promotion

6. Other construction and operational considerations

The following questions need to be answered to understand the construction and operational challenges involved with operating this technical option:

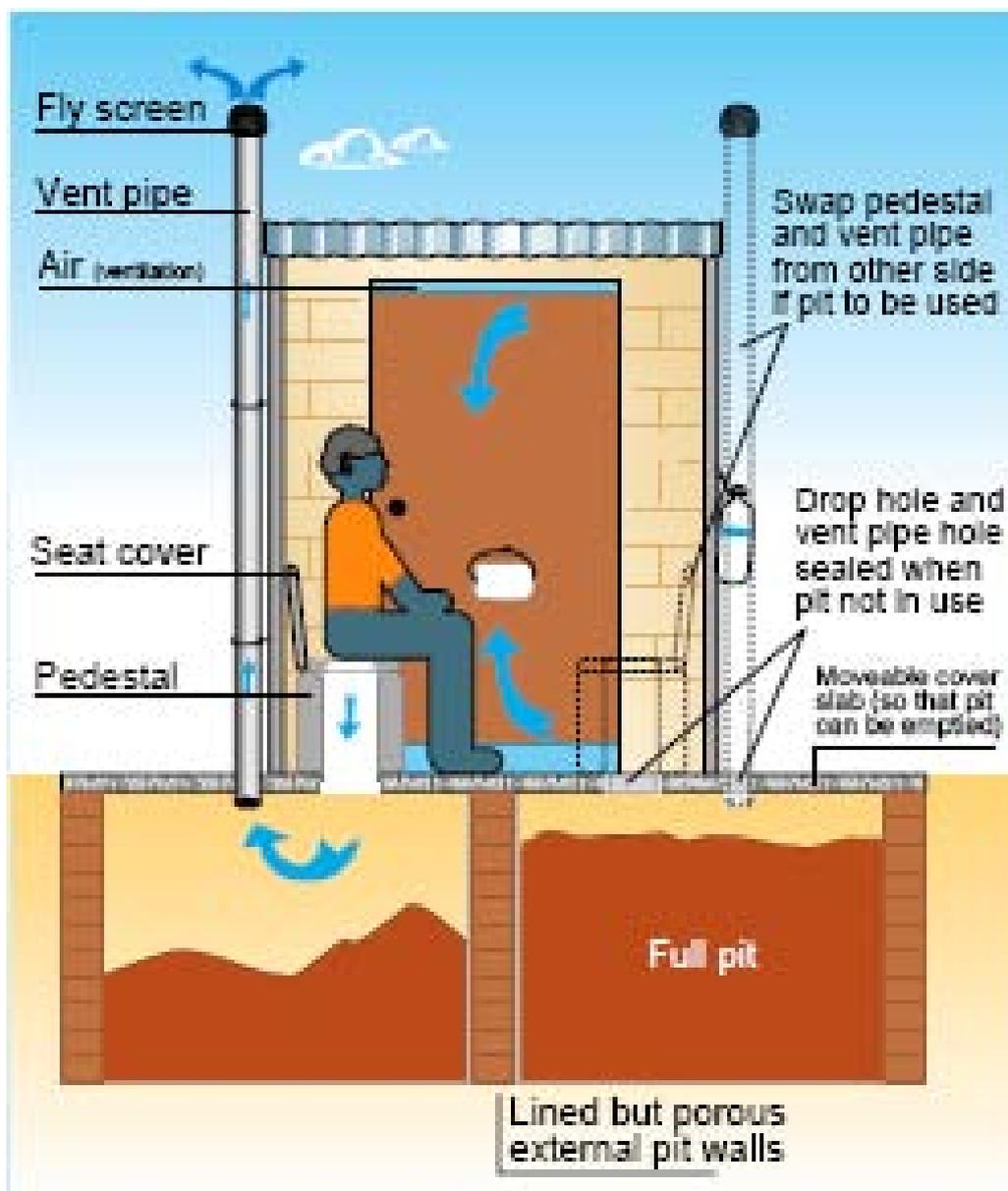
Is pit superstructure stable enough to be able to move when the pit is full?

Is there a need for special equipment to move top structures?

Are locally manufactured materials of adequate quality for the intended moving of the top structure?

7. Upgrading Options (as for fixed top structure above)

5.2 Dry on-plot system - Ventilated Improved Double Pit (VIDP) toilet



A single top-structure over 2 shallow pits, side by side. Only one pit - vented by a pipe protected with a fly screen - is in use at any time. Generally lined and the central wall fully sealed to ensure isolation of one pit from the other.

1. Principles of operation

The principles of operation are the same as for the VIP toilet. One pit is used until filled to within about half a meter of the top. The pedestal and vent pipe holes are to be completely sealed before the other pit is used. The contents of the first pit are dug out after a period of at least two years, once the contents have become less harmful. The first pit can then be reused when the second pit is full, while the second pit is allowed to stand and be emptied after 2 to 3 years.

2. Operational and institutional requirements

The operational and institutional requirements are similar to that for the VIP toilet, except that promotion of manual emptying by the householder is required, and the safe use of the

decomposed waste as a soil conditioner on the plot is possible. A suitable disposal site for the sludge should be available close to the structure.

3. Costs

Capital: May range from R3,500 – R6,000, depending on householder input and choice of materials and cost.

Maintenance: R35-R135 every 2 to 3 years depending on house-holder willingness to handle wastes, availability of local contractors, and the location of disposal site.

Operating: Household cleansing materials, water for hand washing

4. Experience and Comment

Resistance to handle decomposed waste and the timely changeover of pits by householders has often been overcome through education and demonstration. This VIP alternative is often applicable where rocky or groundwater conditions prohibit deep excavation.

However it has also been found that even with a water-tight wall between the pits, there is still moisture that seeps from the pit in use to the pit that is decomposing, and hence the contents of the decomposing pit does not dry out.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

Communities or households are responsible for the:

- manual emptying of full pit after at least 2 years of decomposition
- disposal of decomposed sludge
- repair/replacement of damaged/worn out materials

Maintaining as dark an interior as is acceptable or restricting egress of flies from the pit into the toilet top-structure (e.g. by lowering the seat cover). Daily cleaning of pedestal and interior is recommended. A hand washing facility is required.

5.2. Off-site components (usually responsibility of the local authority)

The local authority is responsible for:

- user education
- health and hygiene promotion

6. Other construction and operational considerations

The following questions need to be answered to understand the operational and construction challenges involved with operating this technical option:

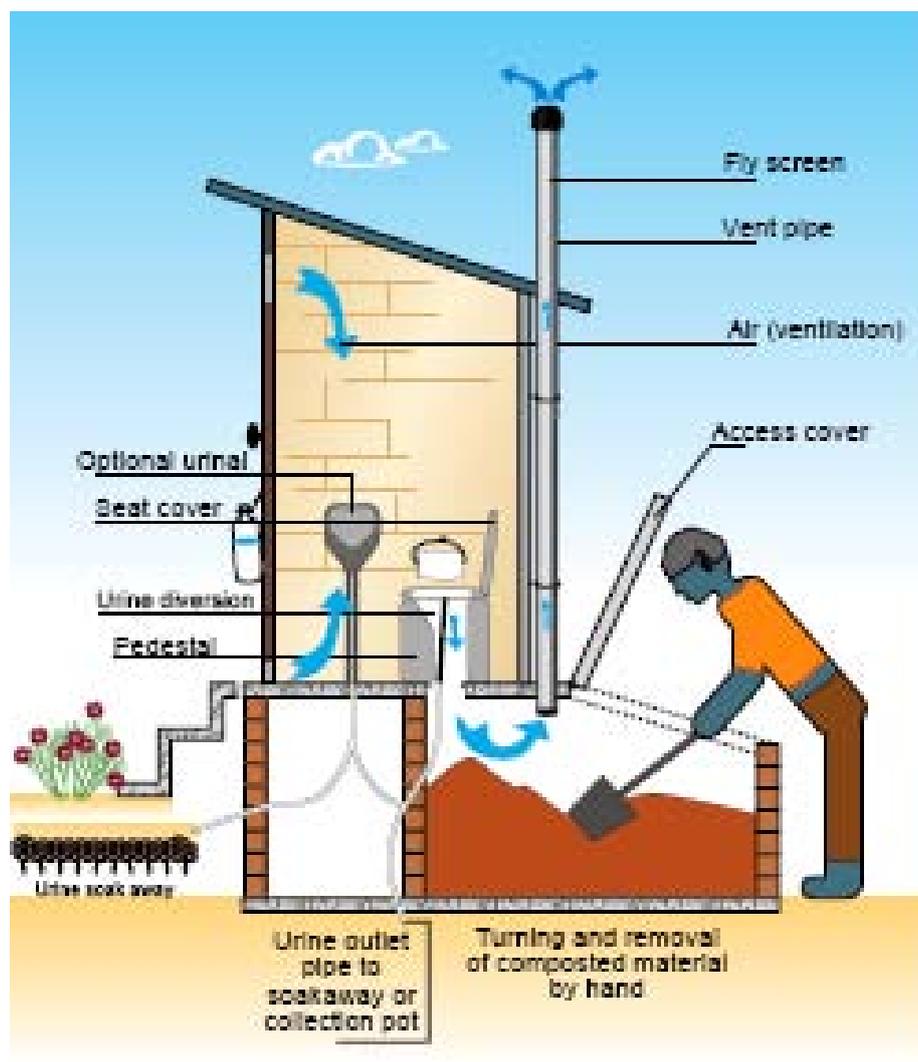
Is there user acceptance of handling decomposed waste?

Is suitable land available nearby for disposal of decomposed waste?

Are there sludge disposal arrangements available in the case where handling of waste at household level is unacceptable?

7. Upgrading Options (as for fixed top structure VIP above)

5.3 Dry on-plot system Composting or desiccating (e.g. urine diversion system - UDS) toilets



A single top-structure over a sealed container, which could be one of two chambers side by side (as for the VIDP), with access for the removal of decomposed waste. A vent pipe may be installed to encourage drying of the waste.

1. Principles of operation

Waste is deposited in the chamber below the pedestal. For composting toilets, dry absorbent organic material, such as wood ash, straw or vegetable matter is added after each use to absorb odours, control moisture and facilitate biological breakdown (composting). In desiccating toilets, the solid wastes dry out rapidly through enhanced airflow or with the help of additional dry material like wood or coal ash. In these cases the urine may be separated from the solids to improve the rate of drying of the faeces. The urine is separated or diverted through the use of specially adapted pedestals. The urine may be collected and used as a fertilizer, or drained to a soak pit where it will seep into the soil. In desiccation systems, ventilation systems are often enhanced to facilitate the rapid evaporation of moisture.

2. Operational and institutional requirements

Composting or desiccating toilets do not accept domestic wastewater. It is important to teach and train the householder how to operate the toilet properly by for example manual 'turning' of compost and removal of composted or desiccated material when required. A suitable disposal site or area for the desiccated or composted dry wastes is required, usually a garden compost heap or a pit where it can be buried.

3. Costs

- Capital:** (variable depending on system and householder input): R 3 500 for community contractor built systems up to R7 500 for some commercial systems.
- Maintenance:** R45 – R650 per annum, depending on local government involvement and householder willingness to handle waste, taking into account different disposal options.
- Operating:** Cleansing materials, soap and water for hand washing

4. Experience and Comment

Control of moisture content is vital for proper operation of the composting or desiccating toilet. Contents may become too wet if not used properly, making the vault contents malodorous and difficult and unhygienic to empty. Urine diversion systems are still being pioneered and monitored in South Africa, but they are being widely accepted by certain municipalities and communities where it is working without significant problems. The burning of compost prior to removal is also being tested in South Africa.

Proprietary systems have been piloted in South Africa, generally with inconclusive results as to their likely success on a large scale and under varying conditions.

User educational requirements and continuous input is significant for proper operation in terms of the composting and desiccating processes.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

Communities and households are responsible for the:

- repair/replacement of damaged/worn out materials
- disposal of composted sludge
- application of ash and/or vegetable matter after use
- control of urine diversion system and emptying of containers when or where required
- manual raking and emptying of the dried or composted contents of the chamber

5.2. Off-site components (usually responsibility of the local authority)

The local authority is responsible for:

- user education
- health and hygiene promotion
- Monitoring the proper use and management of the systems at households

6. Other construction and operational considerations

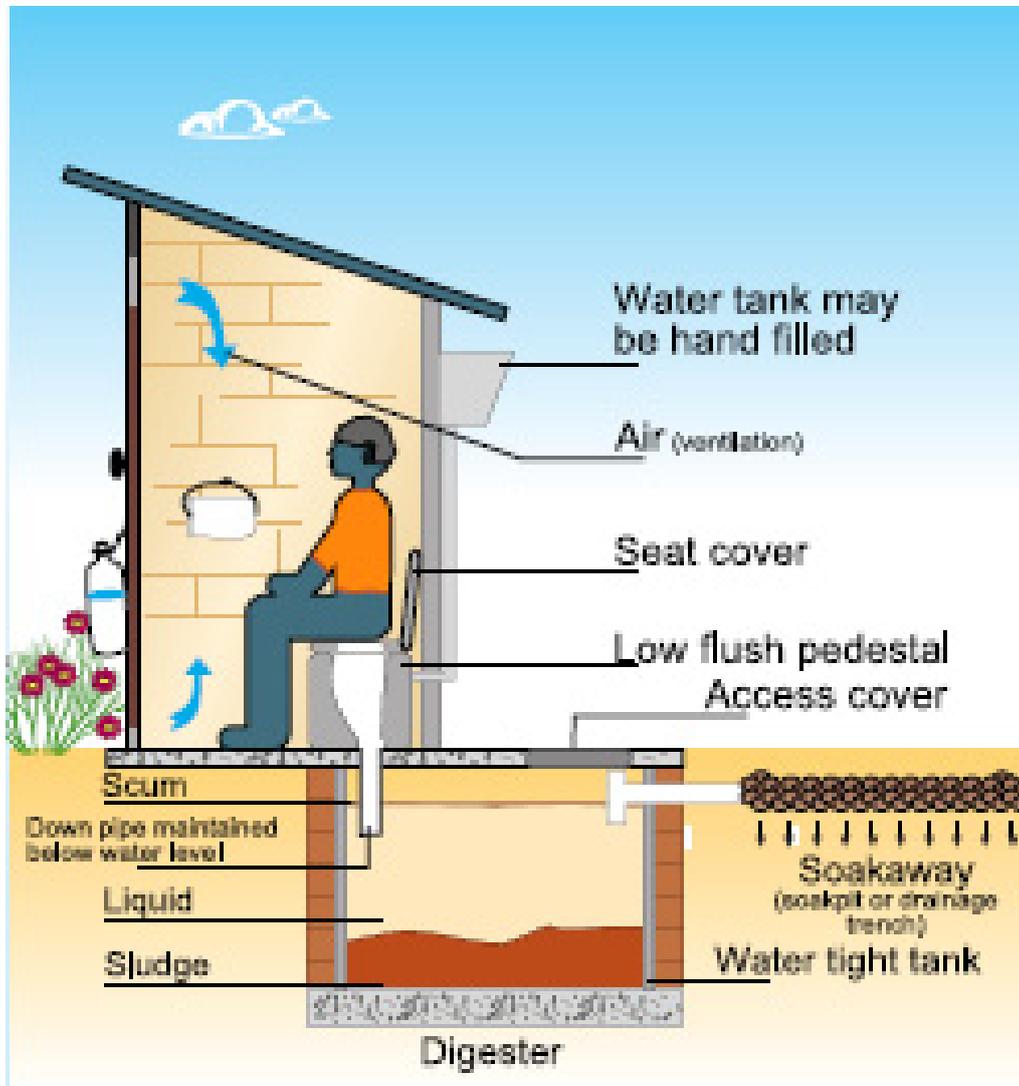
The following questions need to be answered to understand the institutional challenges involved with operating this technical option:

- Is there user acceptance of handling composted waste?
- Is suitable anal cleansing material that will readily decompose being used?
- Is suitable land available nearby for disposal of composted waste, or can the wastes be buried or placed on a compost heap for future use in the household garden?

7. Upgrading Options (as for fixed top structure VIP above)

5.4 Wet on-plot system

Loflos or aquaprivy toilet with soakaway



A toilet with a water-seal arrangement: a straight or curved chute running from the seat to below the water level with some form of waste collection and disposal system.

1. Principles of operation

After use, the toilet pan or pedestal may be flushed with one to two litres of water. Some pans have a tipping flap at the bottom of the pan that holds a small amount of water, opening when flushed. This flap acts as a seal between the pedestal and the digester. The wastes from the pan drop into a digester directly underneath the toilet, or just offset from the toilet structure.

An aqua-privy requires an initial filling of the digester with water for the effective digestion of wastes and to keep the end of the pedestal chute submerged, and thus forms a “rough water seal” between the pan and the digester contents. The solid portion of the waste partly decomposes within the digester, while the liquids are displaced with each use. The displaced

liquids flow to a soak-away. The digester requires desludging from time to time (usually between one and three years, depending on the volume of the digester).

2. Operational and institutional requirements

The aqua-privy is appropriate where a flush type latrine is desired but only small volumes of water are available, usually carried by hand from a street or yard tap. The system can also accept domestic wastewater provided the soak-away is sized accordingly.

For proper operation of the system ensure access to the digester cover by mechanical equipment for the emptying of digester waste. In addition it is necessary to provide an acceptable subsoil drainage system for excess liquids and the availability of sludge treatment and disposal facilities within the proximity of the settlement.

3. Costs

Capital: R3 200-R5 500 which can increase where soils not well suited to drainage.

Maintenance: R195-R390 per annum where subsoil drainage is available.

Operation: Water for initial filling of digester, and ongoing for flushing (up to 20 litres per day), as well as cleaning materials and soap and water for hand washing.

4. Experience and Comment

The system is internationally accepted. Blockages may occur through use of inappropriate anal cleansing material.

Experience in South Africa has seen varied success, with failures through lack of user education and/or poor design and construction. The problem of carrying water to be able to flush the toilet has been problematic in some situations. The requirement of an effective and affordable sludge emptying service has also resulted in poor performance in some cases.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

Communities and households are responsible for the:

- transporting of water to the system
- repair/ replacement of damaged/worn out materials
- sustaining the “rough” water seal (i.e. ensuring the digester remains full of water)

5.2. Off-site components (usually responsibility of the local authority)

The off-site O&M requirements (usually local authority is responsibility) include:

- mechanical emptying of digester,
- sludge transfer, treatment and disposal
- maintenance of treatment plant, equipment and vehicles
- cost recovery
- user education
- health and hygiene promotion

6. Other institutional considerations

The following questions need to be answered to understand the institutional challenges involved with operating this technical option:

- Is suitable anal cleansing material being used?
- Is suitable land and space available for soak-away?
- Is there access for desludging of digester/tank.
- What options are available for sludge treatment and disposal. Keep in mind this is dependent on the type of sludge, the availability of land and the capacity of existing treatment facilities?
- Is the integrity of tank and installation procedure ensured?

7. Upgrading Options

The aquaprivy or LoFlos toilet can be upgraded in either or both of two methods:

7.1 Conversion to full-flush toilet

In this case the pedestal is replaced with a full-flush pedestal and appropriate plumbing. The existing digester may be retained if the upgrade includes an on-site digester, or may need to be replaced if the upgrade is for conventional sewers or if the existing digester is unsuitable for a full-flush system.

7.2 Conversion to off-site transport of liquid wastes

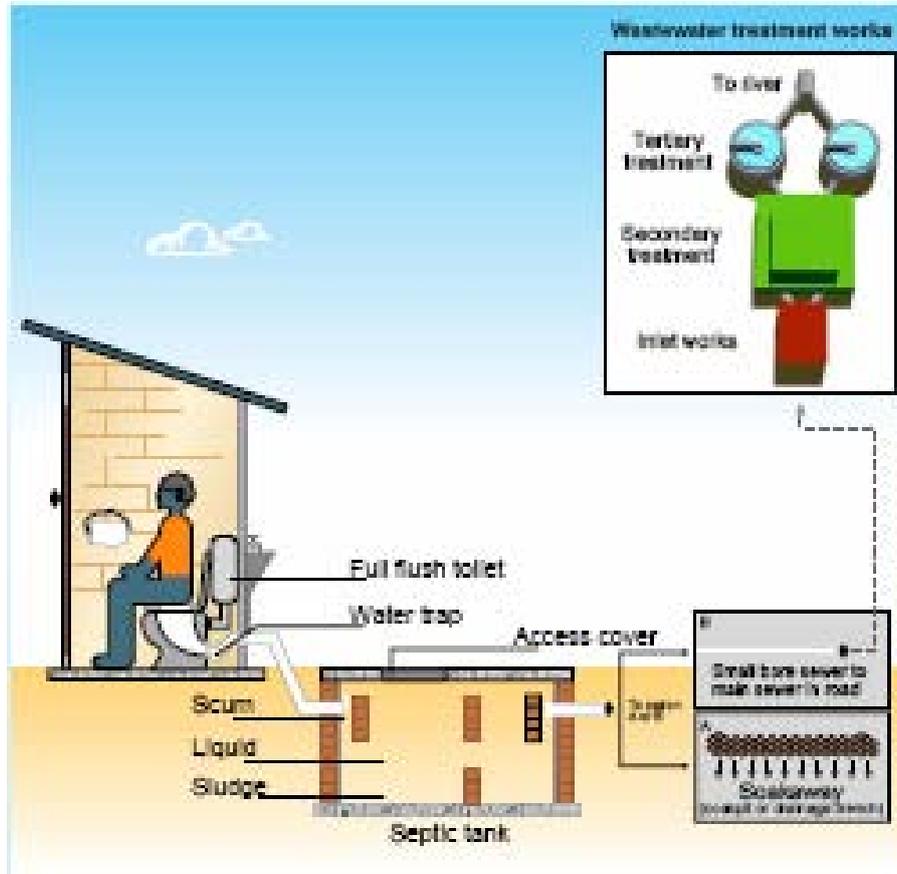
In this case the digester outlet may be connected to a small-bore sewer system and the liquid wastes transported to a suitable treatment facility. This upgrade would then replace on-site soak-aways.

7.3 Conversion to full flush and small-bore sewer

In this case both the above upgrades are instituted, with a full flush pedestal flushing into the digester, and the liquid wastes transported in a small-bore sewer to a suitable treatment facility.

5.5 Wet on- or off-plot systems

Septic tank and soak-away



Septic tank and soakaway: An in-house full flush-toilet connected via pipe and plumbing fixtures to an underground watertight settling chamber (the 'digester') with a liquids outlet to a subsoil drainage/soakaway system.

1. Principles of operation

Human wastes from the toilet is flushed into a septic tank that acts as a settling chamber for the solids. The liquid is retained in the septic tank for at least 24 hours, but may be up to 10 days. Domestic wastewater may also be drained into the septic tank, or alternatively directly into the soak-away. In the septic tank solids settle out to the bottom where they undergo biological digestion.

The liquids pass out of the tank and into a subsoil drainage system (soak-away). Digested sludge gradually builds up in the tank and requires eventual removal by tanker.

2. Operational and institutional requirements

The septic tank and soak-away system requires a reliable household water connection. Specific design criteria must be applied to the settlement tank and soak-away system. This option is applicable only in areas of low settlement density and where soils have a high ability to drain effluent away. For the optimal functioning of the system, ensure access for the emptying of tanks by vacuum tanker, and the availability of sludge treatment facilities.

3. Costs

Capital:	R9 100 - R11 050.
Maintenance:	R300 to R600 to empty the septic tank of sludge, approximately every 3 years.
Operating:	Water for ongoing flushing (up to 60 litres per day), as well as cleaning materials and soap and water for hand washing.

4. Experience and Comment

The system is widely used by formal rural households, recreation resorts, remote clinics, and farming areas, where reliable water supply is available. The septic tank and soak-away provides a high level of service and user convenience. Failures in the operation of the system are experienced due to poor design and construction, and use of inappropriate anal cleansing material. The soak-away system is particularly prone to clogging in the long-term if not designed according to detailed soil testing, or if the septic tank is not desludged at regular intervals (to prevent solids being carried into the soak-away). In some cases soak-aways are allowed to dry out from time to time through having a dual system. In some cases the large amount of water disposed of in the soak-away results in the contamination of the local groundwater resource.

5. O&M requirements and responsibilities

5.3. On-site components (usually responsibility of household)

Communities and households are responsible for the repair/ replacement of damaged/worn out on-site materials. Households are also responsible for clearing pipe blockages, maintaining the soak-away, and requesting emptying of the sludge from the septic tank when necessary.

5.4. Off-site components (usually responsibility of the local authority)

The local authority is responsible for the management and facilitation of:

- mechanical emptying of digesters,
- sludge transfer, treatment and disposal plant,
- Maintenance of equipment and vehicles
- cost recovery
- user education
- health and hygiene promotion

6. Other institutional considerations

The following questions need to be answered to understand the institutional challenges involved with operating this technical option:

- Is there the necessary reliable household water connection?
- Is there access to septic tanks for desludging of tanks when required?
- Are local water resources unaffected or protected from the seepage from the soak-aways?
- Is suitable land and space available for the soak-away?
- What options are available for sludge treatment and disposal. Keep in mind it is dependent on the type of sludge, availability of land and the capacity of existing treatment facilities?

7. Upgrading Options

The full flush toilet with septic tank and soak-away can be upgraded as follows:

7.1 Conversion to small bore sewer system

In this case the outlet of the septic tanks are linked to a small-bore sewer system, and transported to a treatment facility. This would then bypass all on-site soak-aways.

7.2 Conversion of septic tank into a treatment unit

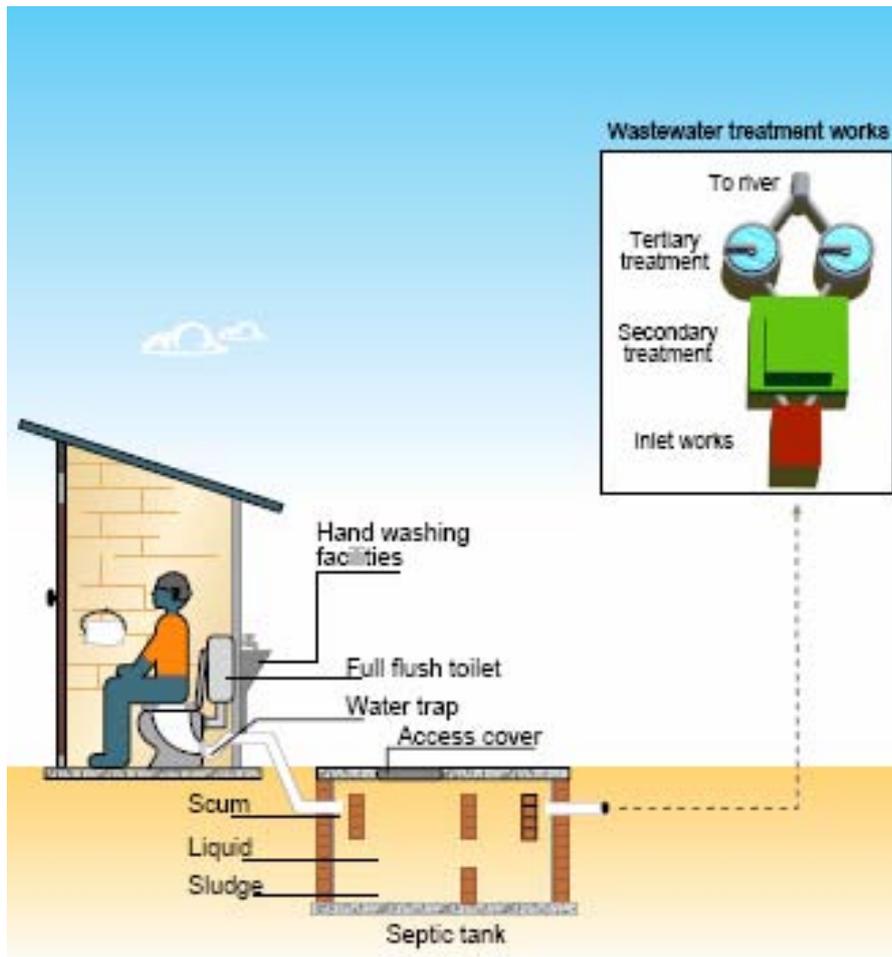
The septic tank can be converted into a small on-site activated sludge type treatment unit, providing a much higher quality effluent for possible limited re-use.

7.3 Installation of household level package treatment plant

A household level package treatment plant may be installed to treat the septic tank effluent, rendering it safe to reuse e.g. for irrigation purposes.

5.6 Wet off-plot systems

Small bore solids-free sewer



1. Principles of operation

The principles of operation are the same as for the septic tank and soak-away, except that the liquid effluent is conveyed by a system of small-diameter pipes to a wastewater treatment system (which may be located close to the community, or linked to the municipal works via existing sewerage pipelines).

2. Operational and institutional requirements

As for a septic tank and soak-away system, a reliable household water connection is needed. For optimal functioning ensure access for emptying of the septic tank, and the availability of sludge treatment and disposal. Routine maintenance of the pipe network is essential.

3. Costs

Capital: R7 050 - R12 000 per household.

Maintenance: R300 to R600 to empty the septic tank of sludge, approximately every 3 years, plus R100 to R300 per household per annum for the maintenance of the sewers and treatment facility.

Operating: Water for ongoing flushing (up to 60 litres per day), as well as cleaning materials and soap and water for hand washing.

4. Experience and Comment

The system is not widely used in South Africa, except where existing septic tank and soak-away systems have been converted for convenience and/or environmental reasons. Failures experienced are as for septic tanks, but problems with soak-aways are avoided. Some problems may occur due to the lack of maintenance of the pipe network.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

Communities and households are responsible for the repair/ replacement of damaged/worn out on-site materials. Households are also responsible for clearing pipe blockages and requesting emptying of the sludge from the septic tank when necessary.

5.2. Off-site components (usually responsibility of the local authority)

The local authority is responsible for the management and supervision arrangements for:

- sewer pipe lines and treatment plant
- mechanical emptying of septic tanks,
- sludge transfer, treatment and disposal plant,
- maintenance of equipment and vehicles
- cost recovery
- user education
- health and hygiene promotion

6. Other institutional considerations

The following questions need to be answered to understand the institutional challenges involved with operating this technical option:

- Is there the necessary reliable household water connection?
- Is there access for vehicles for desludging of septic tanks?
- What options are available for sludge treatment and disposal. Keep in mind it is dependent on the type of sludge, availability of land and the capacity of existing treatment facilities.

7. Upgrading Options

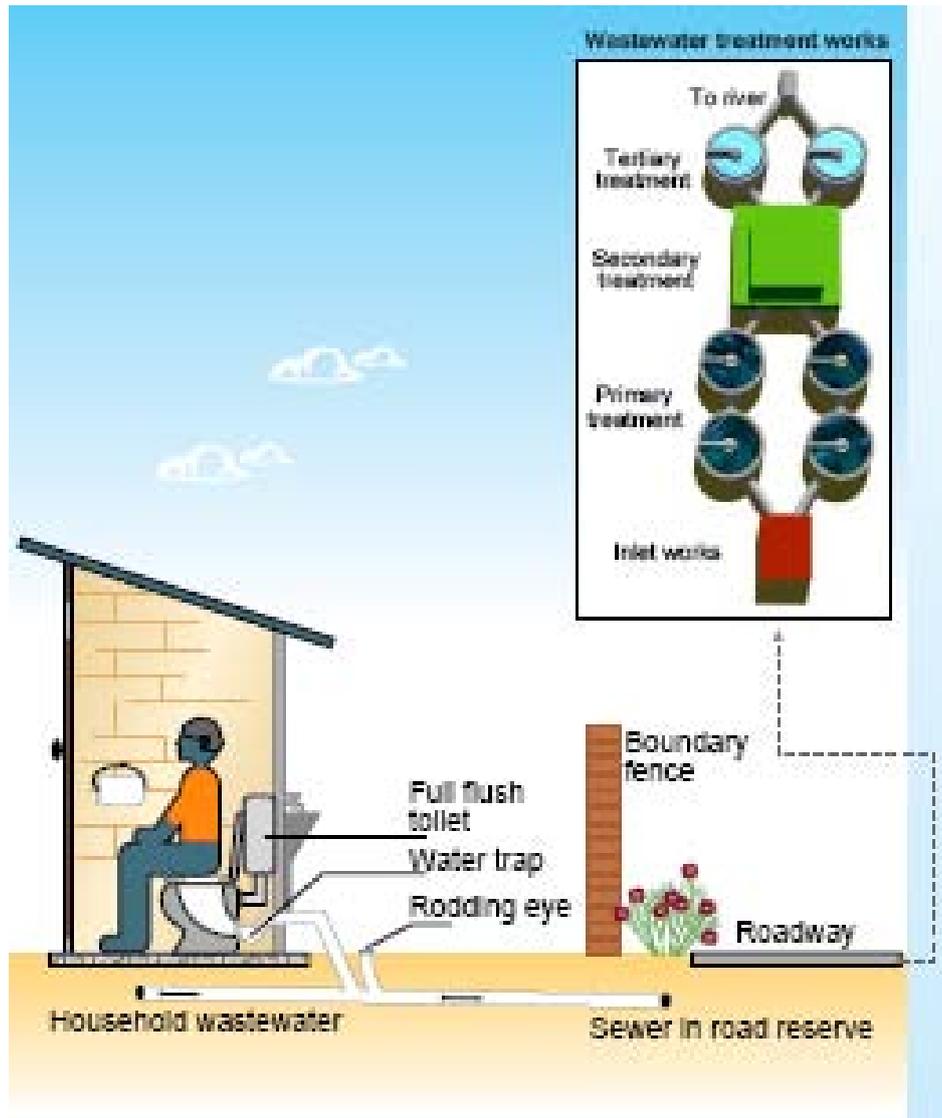
The full flush toilet with septic tank and small-bore sewer can be upgraded as follows:

7.1 Conversion to conventional sewerage system

In this case the existing septic tanks will be by-passes or discarded, and all wastes will be transported in a conventional sewer network. The small bore sewer system will also need to be replaced with a conventional sewer. The advantage would be that septic tanks will not need to be desludged.

5.7 Wet off-plot systems

Full or conventional waterborne sewerage



An in-house full-flush toilet connected to a sewer (pipe) network which drains to a wastewater treatment facility.

1. Principles of operation

Waste from the toilet is flushed, using between 6 and 13 litres of water per flush, into the sewer system for removal to a central treatment facility. A clean water seal is maintained in the toilet pan after each flush. Domestic wastewater is also drained into the sewers.

The sewer system may require pump stations if the topography is not suitable for gravity transport of all the sewerage within the communities. There are several types of wastewater treatment facilities that treat the wastes to a suitable quality prior to discharge into a stream or for re-use in municipal parks and gardens.

2. Operational and institutional requirements

The operation of full or conventional waterborne sewerage requires a reliable and uninterrupted household water connection and spatially regular permanent settlements.

Stringent design criteria must be applied throughout the sewerage network to ensure the uninterrupted flow of wastes to the treatment works. Skilled, organised and effective operation

and maintenance capability is required for sewers and the full functioning of wastewater treatment facilities.

3. Costs

Capital: R8,000 - R15,000 per household including the on-site facilities and the sewer mains and sewerage treatment facilities.

Maintenance: R 250 – R 500 per household per annum for maintenance of sewers, pumps, and treatment facilities

Operating: R300-R1,000 per household per annum (depending on the complexity of the treatment facility and pump station requirements).

4. Experience and Comment

The system is widely used and generally the level of service aspired by most South Africans. Where the systems are poorly maintained, or if there are frequent water supply interruptions, the result is a poor level of service where the facility may not be usable for a number of days, and may pose a serious threat to the environment. Appropriate anal cleansing material is required to prevent pipeline blockages.

The health risks in the event of failure are severe in comparison to onsite, dry sanitation systems.

Problems have been experienced with leaking and blocked sewers that may not be repaired timeously, inadequate treatment due to overloading or poor operation, and difficulties with cost recovery.

5. O&M requirements and responsibilities

5.3. On-site components (usually responsibility of household)

Communities and households are responsible for the repair/replacement of damaged or worn out on-site materials, and for clearing any blockages that may occur on the home-owners own property.

5.4. Off-site components (usually responsibility of the local authority)

The local authority is responsible for the management arrangements for:

- O&M of sewage reticulation system
- O&M of the wastewater treatment facility
- leak and blockage detection and monitoring
- emergency contingencies
- cost recovery
- user education
- health and hygiene promotion

6. Other institutional considerations

The following questions need to be answered to understand the institutional challenges involved with operating this technical option:

- Is there the necessary household water connection?
- Is the water supply reliable at all times?
- Is there access to an adequate sewage treatment facility with sufficient capacity?
- Is suitable anal cleansing material being used?
- Is sufficient capacity available in terms of human resources and skills to operate and maintain the system?

7. Upgrading or Conversion Options

Should an existing full waterborne sewage system not be able to function properly due to one of the failure possibilities mentioned above (lack of water, lack of O&M capacity, poor cost recovery), it is possible to convert the system to an alternative, at least until such time as the cause of failure can be addressed:

7.1 Conversion to solids interceptor system

In this case a septic tank or digester is installed at each household to capture the solids, allowing only liquid wastes to be transported to the treatment facility. This will greatly reduce sewer blockages and treatment requirements.

3.7 Conversion to low flush toilet pedestals

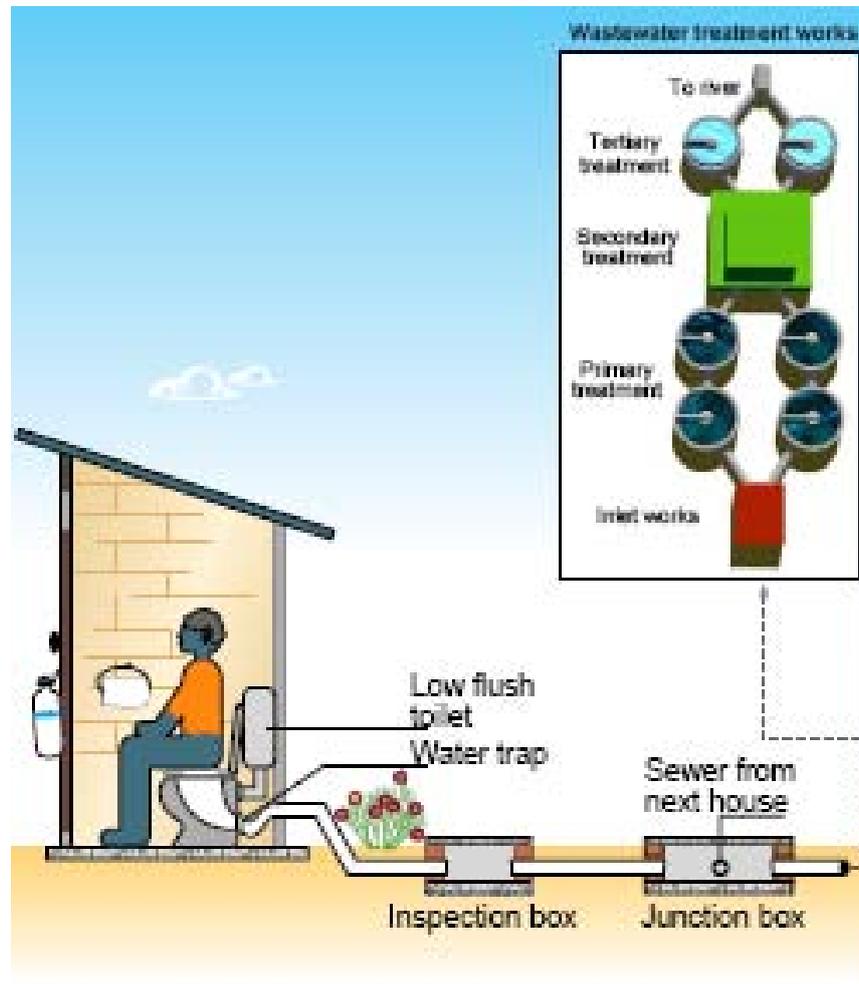
In this case the flush systems (and if necessary the pedestals) are replaced with low flush systems (2 to 6 liters per flush), saving considerably on water use, and hence also treatment requirements. Care must be taken to ensure that there remains sufficient water to transport the solids in the sewer network.

3.8 Conversion to low flush toilets with on-site solids interception

This would be the application of both the above conversions, saving considerably on water use, sewer blockages and pumping, and treatment requirements.

5.8 Wet off-plot system

Conventional waterborne system with shallow sewerage



A toilet, usually in-house, flushed using lower volumes of water than either conventional sewerage or septic tanks, to smaller diameter sewers laid at flatter gradients and shallower depths between dwellings on a block. On-site shallow inspection chambers are provided.

1. Principles of operation

Waste from the toilet, and usually also domestic wastewater, is flushed into a sewer system, with an option of using low flush pedestals to reduce the amount of water that is flushed. The internal sewer network is laid at a shallow depth (1 – 1.5m) with a flatter gradient, within the property of homeowners rather than in the street reserve. Householders accept responsibility for maintaining the sewers that run through their properties, and are supported by making accessible pipe clearing rods which people are trained to use when required.

The bulk sewers are as for conventional sewer systems, and the treatment of the wastes is as for conventional sewerage.

2. Operational and institutional requirements

The conventional waterborne system with shallow sewerage requires a reliable and uninterrupted household water connection. The sewer lines can, however, be laid out in a less formal or spatially regular pattern, and are thus suitable for less formal or more dense settlements.

Less stringent design criteria may be applied, but organised and effective operation and maintenance capacity within the community is required. This can be delegated to residents for the on-site portion of the sewers. Significant user education and acceptance of shared management of the system is critical

Skilled, organised and effective operation and maintenance capability is required for the functioning of the bulk sewers and the wastewater treatment facilities.

3. Costs

Capital: R 5,000 to R 9,000 per household -savings of up to 50% over conventional sewerage capital costs.

Maintenance: R 150 – R 200 per household per annum, assuming that all on-site (block sewer) maintenance is undertaken by the households themselves.

Operating: R 150 – R 300 per household per annum (depending on the complexity of the treatment facility and any pump station requirements).

4. Experience and Comment

The system has not been used widely in South Africa although it has been applied, with reported success, under a wide range of conditions in a number of South American countries, Ghana, Pakistan and Greece.

Pilot projects have been completed in Gauteng, Durban and Free State, with ongoing monitoring to determine overall success and sustainability. These currently indicate savings of up to 50% over conventional sewerage capital costs.

5. O&M requirements and responsibilities

5.1. On-site components (usually responsibility of household)

Communities and households are responsible for the:

- repair/ replacement of damaged/worn out on-site components
- operation and maintenance of mid-block collector sewers and associated access chambers, to agreed household/ community boundary.

5.2. Off-site components (usually responsibility of the local authority)

The local authority is responsible for the management arrangements for:

- O&M of bulk sewer system and internal sewers from agreed community boundary.
- leak and blockage detection/monitoring
- emergency contingencies
- cost recovery
- user education
- health and hygiene promotion

6. Other institutional considerations

The following questions need to be answered to understand the institutional challenges involved with operating this technical option:

- Is there the necessary household water connection?
- Is the water supply reliable at all times?
- Is there an agreed allocation of responsibility shared between householder and local authority?
- Is access to sufficient sewage treatment capacity available?
- Is sufficient capacity available in terms of human resources and skills to operate and maintain the system?

7. Upgrading Options

The full flush toilet with shallow sewers can be upgraded as follows:

7.1 Conversion to conventional sewerage system

In this case the existing shallow mid-block sewers would be removed or discarded, and all wastes will be transported in a conventional sewer network outside of the property boundaries. The municipality would then take full responsibility for the maintenance of the sewer network.

6. NOTE ON PROPRIETARY (COMMERCIAL) SANITATION SYSTEMS

A number of commercial sanitation systems have been developed and are offered as solutions to household sanitation challenges. These generally fall within one of the types of sanitation systems described in section 5 above. Many of these are of a good design and are fully acceptable systems, meeting the requirements of the specific type of technology. The factory assembly of these units ensures consistency of the units, ensuring they meet the design requirements of the particular type of sanitation system.

The precautions that need to be taken when adopting a commercial system is that it is to ensure that it is the most appropriate solution for the particular application, and that it has been tested within the environment for which it is proposed for use.

Although commercial proprietary systems may result in less local employment creation during the implementation of a project, they may be preferred by residents due to their appearance and functional characteristics, and hence should not be set aside on the basis of reduced employment creation only. In many cases commercial enterprises are able to set up manufacturing yards within the district where the projects are to be implemented provided a sufficient number of units are to be ordered. This will result in local longer-term job creation at those sites.

It is recommended that all commercial unit suppliers ensure that their units have been certified by the Agremont Board for “fitness for use” for the particular application they are intended. Agremont are located at the CSIR in Pretoria.

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Enviro Loo User Education

Monitoring & Basic Maintenance of an Enviro Loo Facility



Prepared by:
AGES (Pty) Ltd

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1. OBJECTIVES OF THIS MANUAL

The objectives of this manual are:

- To provide the school management with the monitoring and basic maintenance knowledge to contribute towards the proper and effective utilization of the Enviro Loo system;
- To provide basic knowledge of correct and safe monitoring and basic maintenance of the Enviro Loo to maintenance staff.

2. GENERAL MONITORING AND MAINTENANCE WORK COVERED IN THIS MANUAL

The School Management, with the aid of their maintenance staff, shall only be allowed to monitor and perform basic and emergency maintenance procedures on the Enviro Loo system.

The School Management or their maintenance staff may not remove sewage or any objects from the drying area or liquid holding area.

The services of a Contractor, with the necessary resources to execute the work safely and in accordance with legal requirements, must be summonsed when the liquid holding area and drying area need to be emptied.

3. WEEKLY MONITORING AND MAINTENANCE OF THE ENVIROLOO FACILITY

Regular monitoring is essential to ensure that the Enviro Loo system functions, and continues to function effectively.

Sample Inspection Forms are included in this document to assist the School Management, Responsible persons and Maintenance staff.

These Inspection Forms must be completed after the weekly inspection, monitoring and maintenance procedure has been performed.

It is essential that structures are created at the school, whereby maintenance staff can report their findings, and the inspection forms are processed in order to ensure timely maintenance.

The following monitoring and maintenance procedure needs to be performed on a weekly basis to ensure timely maintenance:

3.1 Monitor the Condition of the Wind Master, Ventilation Pipe and Bracket

1. The wind master on top of the external vent pipe is an air driven suction fan which pulls air from the outside and moves it through the system, causing the solids and liquids inside the system to dry out and reduce.
2. Ensure that the wind master is moving freely, even in a very light breeze.
3. The vent pipe must be in good condition and securely fastened to the wall by the bracket.
4. The bracket must be in good condition.
5. Damaged or broken components need to be replaced without delay to keep the system functioning effectively.



3.2 Monitor the Condition of the Top Unit and Inspection Cover

1. Ensure the top unit is in good condition.
2. Ensure that the inspection cover on the top unit is in place and in good order.
3. Ensure that all 4 screws securing the inspection cover to the top unit are available and securely fastened.
4. Open or damaged inspection covers may pose the following risks:
 - Users may gain access to the contents in the solid waste holding area, and this may lead to contact with sewage;
 - The air flow within the Enviro Loo system causes the liquid and solid waste to dry out. This process cannot function efficiently if the inspection cover is not tightly fastened.
 - Open inspection covers provide access for insects and rodents to the system.
5. Damaged or absent components need to be replaced without delay to keep the system functioning effectively.



3.3 Monitor the Condition of the Infrastructure

1. Weekly inspections of the Enviro Loo facility must be carried out to ensure that all components are in good, maintained condition:

- Doors & door handles;
- Windows & opening mechanisms;
- Basins, taps and water pipes;
- Toilet pans and seats;
- Floors, walls and roofs.



2. Damaged or absent components must be replaced without delay to ensure that the facility remains in good, maintained condition.

3.4 Monitor the Level of the Contents in the Drying Area

1. The level of the contents inside the drying area needs to be monitored to ensure that the area is emptied and the contents removed before the area becomes over-filled.
2. A full drying area prevents adequate airflow. This causes liquid levels to rise faster than it was designed to, and prevents contents inside the drying area to dry out properly.



3. Removal of the contents inside the drying area needs to be performed by a competent contractor with the necessary resources to conduct the work in a safe manner and in accordance with the various legal requirements.

3.5 Monitor the Liquid Level

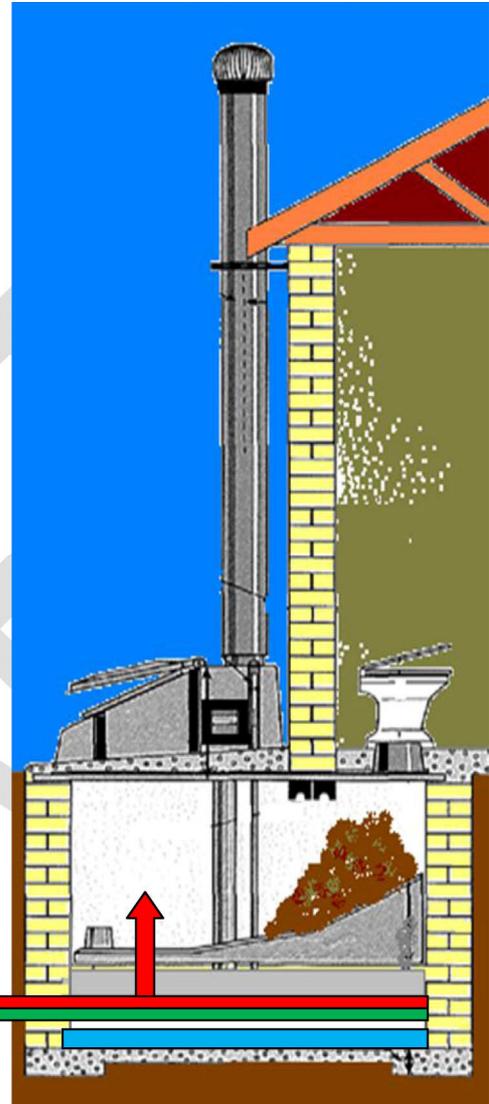
1. The Liquid Level must be monitored on a weekly basis to prevent:

(i) **High Liquid Levels:**

- High liquid levels inside the liquid waste holding area prevents adequate air movement, causing the liquid not to evaporate and contents inside the drying area not to dry out as rapidly as designed to.
- This leads to systems functioning ineffectively, and may cause flooded systems.

(ii) **Flooded Liquid Waste Holding Areas:**

- Flooded systems occur when the liquid level rises above the drying plate, soaking the dry waste in the drying area.
- Flooded systems do not function at all, causing bad odour and excessive flies.



Liquid level less than 12 cm below the drying plate: Urgent emptying of the liquid holding area needs to be arranged, to prevent:

- **Anaerobic condition, bad odour , inadequate air movement**

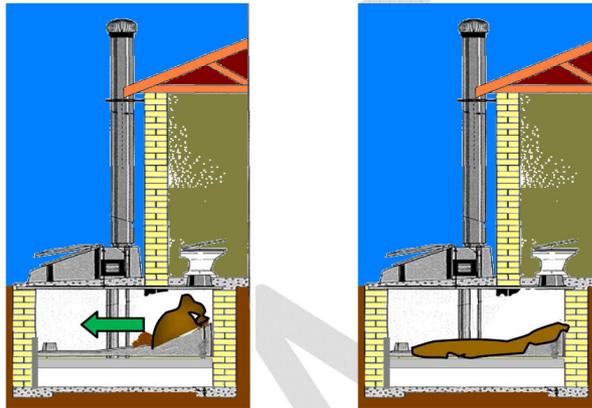
**Liquid level more than 12cm below drying plate:
The system is in good operating condition**

- In the event of flooded systems, the drying area and liquid holding area need to be emptied and the system activated again.

2. Weekly monitoring and timely emptying of the liquid holding area will prevent flooded systems and high liquid levels.
3. Liquid levels must not rise above 12cm from the drying plate.
4. Removal of the liquid needs to be performed by a competent contractor with the necessary resources to conduct the work in a safe manner and in accordance with the various legal requirements.

3.6 Rake the Contents in the Drying Area

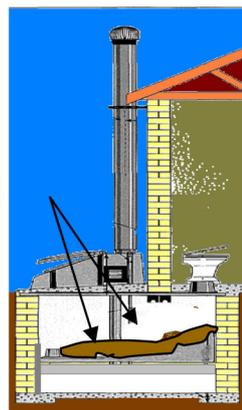
1. Due to a high volume of users, the solid waste may accumulate at the front of the drying area underneath the toilet pan, and the drying area may appear to be full.
2. The contents inside the drying area must be raked to the back to ensure that they are evenly spread across the drying rack.
3. This will improve the drying process of the contents inside the drying area.



3.7 Management of Excessive Flies or Mosquitoes

1. Excessive Flies:

- Distribute one cup of lime over the contents in the drying area.

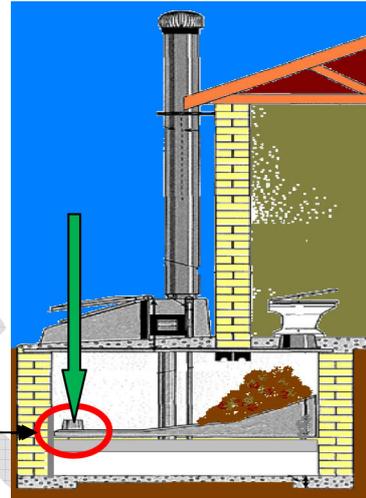


2. Excessive Mosquitoes:

- Pour one cup of chlorine into the liquid holding area, through the inspection hole in the drying plate.

Chlorine may not come into contact with the contents of the drying area, as this will destroy the micro- biological process within the system.

Service Hole



4. OCCUPATIONAL HEALTH AND SAFETY

It is essential that the school management and maintenance staff who perform the basic maintenance procedure and monitoring of the Enviro Loo facility take note of the Occupational Health and Safety requirements before commencing with such work.

Important

- It is essential to note that the Occupational Health and Safety information included in this document are only aimed at assisting the school maintenance staff, as far as possible, to perform the maintenance work safely, with limited risk to maintenance staff and users.
- Not all the requirements of the Occupational Health and Safety Act are addressed and this must NOT be regarded as a comprehensive guide.
- Only maintenance work covered within the guidance of this manual is addressed.

This excludes any work where:

- There is a risk of splashing;
- Raw sewage, sewage sludge or objects contaminated by sewage, will be removed from the system and disposed of;
- All other work to the system which is not included in this manual.

Source: HSE: Working with sewage: The health hazards-A guide for employees.

4.1 What is Sewage?

- *Raw sewage is a mainly wet substance containing excrement and debris, such as sanitary towels, bottles, cans, plastic etc.*
- *Excrement is the major source of harmful micro-organisms, including bacteria, viruses and parasites.*

4.2 What are the Health Risks?

Exposure to sewage or its products may result in a number of illnesses. These include:

1. Gastroenteritis: Cramping stomach pains, diarrhoea, vomiting
2. Hepatitis: Inflammation of the liver, and jaundice.
3. Infection of skin and eyes
4. Weill's disease: A flu-like illness with persistent and severe headache, transmitted by rat urine. Damage to liver, kidneys and blood may occur and the condition can be fatal.
5. Occupational asthma: Attacks of breathlessness, chest tightness and wheezing, and produced by the inhalation of living or dead organisms.
6. Alveolitis: This is inflammation of the lung, with fever, breathlessness, dry cough, and aching muscles and joints.

4.3 How do they Enter the Body?

1. The most common way is by hand-to-mouth contact:
 - During eating, drinking and smoking
 - By wiping the face with contaminated hands or gloves
 - By licking splashes from the skin
2. By skin contact through cuts, scratches or wounds.
3. Certain organisms can enter the body through the surfaces of the eyes, nose and mouth.
4. By breathing them in, as dust, aerosol or mist.

4.4 Protecting Workers from the Risk to Health

1. Micro-organisms are an inherent part of sewage; therefore the hazard cannot be eliminated.
2. The following measures can reduce the risk of infection or illness:

4.4.1 Training, Instruction and Supervision

Ensure that employees understand the hazards and risks and safe work procedures through proper training, instruction and supervision;

4.4.2 Personal Protective Equipment

1. Provide suitable personal protective equipment. These must include:
 - Waterproof/abrasion resistant gloves,
 - Overalls
 - Gumboots;
 - Eye protection;
 - Respiratory Equipment.
2. Ensure regular inspection of, and replacement of damaged, personal protective equipment.
3. Ensure personal protective equipment is properly decontaminated, disinfected and stored.

4.4.3 Tools and Equipment

1. Ensure that correct tools and equipment for the work to be done are selected.
2. Ensure that tools and equipment are regularly inspected and damaged tools and equipment are replaced.
3. Ensure tools and equipment are properly decontaminated, disinfected and stored after use.

4.4.4 Welfare Facilities

1. Adequate welfare facilities must be provided to employees.
2. These includes:
 - Clean water;

- Soap;
- Disinfectant;
- Hand drying towel.

4.4.5 First Aid Equipment

1. Provide adequate first aid equipment for cleaning wounds.
2. These must include:
 - Clean water and sterile wipes for cleaning wounds;
 - Sterile, waterproof, adhesive dressing.

4.4.6 Medical Monitoring

The health of employees who are at risk of being exposed to sewage must be monitored according to a Protocol.

4.4.7 Emergency Procedures

1. Emergency procedures must be in place in the event of incidents.
2. These must include:
 - Procedures and Instructions for decontamination and disinfection in event of skin contact with sewage;
 - Procedures and Instructions to follow where any person is injured during the maintenance work (This will include cuts to hands).

5. MONITORING PROCEDURE TO BE PERFORMED FROM OUTSIDE THE CLOSED ENVIRO LOO SYSTEM

The following needs to be monitored on a weekly basis.

5.1 Monitor the Condition of the Wind Master, Ventilation Pipe and Bracket

1. The wind master on top of the external vent pipe is an air driven suction fan which pulls air from the outside and moves it through the system, causing the solids and liquids inside the system to dry out and reduce.
2. Ensure that the wind master is operating freely even in a very light breeze.

3. The vent pipe must be in good condition and securely fastened to the wall by the bracket.
4. The bracket must be in good condition.



5.2 Monitor the Condition of the Top Unit and Inspection Cover

1. Ensure the top unit is in good condition.
2. Ensure that the inspection cover on the top unit is in place and in good order.
3. Ensure that all 4 screws securing the inspection cover to the top unit are available and securely fastened.
4. Open inspection holes or damaged inspection covers may pose the following risks:
 - Users may gain access to the contents in the solid waste holding area, and this may lead to contact with sewage;
 - The air flow within the Enviro Loo system causes the liquid and solid waste to dry out. This process cannot function efficiently if the inspection cover is not tightly fastened.
 - Open inspection covers provide access for insects and rodents to the system.



5.3 Monitor the Condition of the Facility

Weekly inspections of the Enviro Loo facility must be carried out to ensure the following items are in good, maintained condition:

- Doors & door handles;
- Windows & opening mechanisms;
- Basins, taps and water pipes;
- Toilet pans and seats;
- Floors and roofs.



5.4 Monitor the Liquid Level (for units with External Liquid level indicators)

1. The liquid level indicator is facing the inspection cover on the right.
2. The liquid level is indicated as LOW (green, HALF (Orange) or FULL (Red).
3. It must be reported to the responsible person if the liquid level is indicated as between HALF and FULL in order to arrange timely emptying of the liquid holding area.
4. If the liquid level is indicated as being FULL, the inspection cover must be opened to ensure that the liquid level is not above the drying plate. If the liquid level is above the drying plate, it means that the system is flooded and the liquid holding area and drying area need to be emptied immediately. The starter pack and the enzymes need to be added to the cleaned system to activate the Enviro Loo system again.

6. THE MAINTENANCE AND MONITORING PROCEDURE INSIDE THE CLOSED ENVIRO LOO SYSTEM: TOOLS, EQUIPMENT AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The tools, equipment and personal protective equipment (PPE), which shall be used during the maintenance procedure, must be dedicated for exclusive use during the maintenance procedure.

These tools, equipment and PPE may not be used for any purpose other than that of maintenance of the Enviro Loo system.

6.1 Basic Maintenance Starter Kit

This kit is available from the Enviro Loo supplier and shall include:

6.1.1 Rake

Long Handle Narrow Rake: The rake will be used to rake the solid waste in the drying area.

6.1.2 Buckets

1. 20l bucket, marked with a red 'WATER' label:
2. 20l Bucket, marked with a black 'SOAP' label: This shall be used to prepare the soap which will be used to wash gloved hands and tools.
3. 20l Bucket, marked with a blue 'DISINFECTANT' label: This will be used to prepare the disinfectant which will be used to disinfect gloved hands, tools and equipment.

6.1.3 Personal Protective equipment

1. Yellow plastic gloves: This will protect the staff members' hands against skin contact with sewage during the maintenance procedure.
2. Eye protection: This will protect eyes in the event of accidental splashes.
3. Hair net: To prevent or reduce the risk of hair being contaminated by sewage.
4. Dust mask: This will protect the maintenance staff against inhalation of dust during the maintenance procedure.

6.1.4 Soap and Disinfectant

1. Disinfectant: This will be used to disinfect the tools and equipment used during the maintenance procedure. The substance contains hazardous chemical substances and must be handled with care. The substance must be used and diluted according to label instructions.
2. Soap: This will be used for washing gloved hands, tools and equipment used during the maintenance procedure. The substance must be used and diluted according to label instructions.

6.1.5 Cleaning Equipment

1. Small Brush: This will be used to decontaminate, wash and disinfect the rake.
2. Broom: This will be used to sweep the concrete slab before the maintenance procedure will be carried out.
3. Brush and scoop: This will be used to clean spillages –which occurs during the maintenance procedure- from the concrete slab.
4. Mop: This will be used to wash and disinfect the concrete slab and top unit after the maintenance procedure has been carried out.

6.1.6 Plastic sheets

1. 2m * 2m White Plastic Sheet: To place the contaminated brush, rake and tools on during the maintenance procedure.
2. 2m * 2m Red Plastic Sheet: To be used for rinsed tools and equipment used during the maintenance procedure.
3. 2m * 2m Black Plastic Sheet: To be used for washed tools and equipment used during the maintenance procedure.
4. 2m * 2m Blue 2m Plastic Sheet: To be used for disinfected tools and equipment used during the maintenance procedure.

6.2 To be supplied by the School Management Authority

1. Overalls: 2 pairs per person to provide for 'incidents' where overalls are soiled during the maintenance procedure and have to be replaced.
2. Gumboots: To protect the maintenance staff from contact with sewage during the maintenance and monitoring procedure.
3. 120ℓ clean water to be used during the maintenance procedure.
4. Waterproof adhesive for use by maintenance staff to cover open wounds before the maintenance procedure is carried out.
5. Disinfectant to disinfect open wounds after maintenance procedure has been carried out or where an injury was suffered during the maintenance procedure.

6.3 Tools, Equipment and PPE to be supplied by the School Management on a Continuous Basis

Damaged or lost tools, equipment and PPE must be provided by the School Authority on a continuous basis.

7. THE MAINTENANCE AND MONITORING PROCEDURE: WORKING INSIDE THE CLOSED ENVIRO LOO SYSTEM

The following procedure must be followed by all maintenance staff when performing maintenance work on the Enviro Loo.

7.1 Personal Protective Equipment (PPE)

1. Ensure all open wounds, cuts and scratches on hands and face are covered with waterproof adhesive.
2. Inspect the PPE and ensure that it is in a good condition.
3. Wear the correct and adequate PPE:
 - Face/ dust mask;
 - Plastic gloves;
 - Overalls;
 - Gumboots;
 - Eye protection;
 - Hairnet;
4. PPE must be worn at all times during the maintenance procedure.
5. The decontamination and disinfecting procedure must be followed when PPE are removed during the maintenance process e.g.:
 - Lunch time;
 - During breaks;
6. PPE which have not been decontaminated and disinfected may NOT be removed from the work area.

7.2 Tools, Equipment and Cleaning Equipment

1. Place the black, red and blue plastic sheets provided at a safe distance from the concrete slab of the block where maintenance work will be performed in order to prevent contact with sewage.
2. Place the red bucket with the 'WATER' label next to the red plastic sheet.
3. Place the 20ℓ bucket with the black 'SOAP' label next to the black plastic sheet.
4. Dilute the soap according to label instructions.
5. Place the 20ℓ bucket with the blue 'DISINFECTANT' label next to the blue plastic sheet.

6. Dilute the disinfectant according to label instructions.
7. Place the white plastic sheet next to the concrete slab of the block which will be worked on.
8. Place the long handle rake, brush and scoop, and mop on top of the white plastic sheet.

7.3 Secure the Area

1. Never perform maintenance work when the facility is in use.
2. Ensure the entrances to the block which will be worked on, are blocked/ barricaded to prevent users from entering.
3. Ensure the areas around the inspection lids, where maintenance work will be performed are clear of people at all times during the maintenance procedure.
4. Remove all vegetation from the concrete slab.
5. Sweep the concrete slab with the broom to remove all visible dirt.

7.4 Open the Inspection Covers

1. Remove the 2 screws on the edges of the inspection lids of all 4 units in the block, with the nr 8 spanner or socket and fold the lid back.
2. Place the screws and the inspection lids at a safe distance from the inspection holes, to prevent contact with sewage.
3. From this point forward it is important to remember the following:
 - Decontaminate and disinfect your hands before eating, drinking and smoking.
 - Do not touch or wipe your face with contaminated hands or gloves.

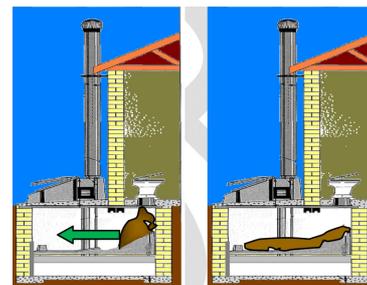
7.5 Check the Liquid Level (for systems without external liquid level indicators)

1. Monitor the liquid level by looking through the service hole situated on the rear side of the drying plate, right underneath the inspection cover.
2. **The liquid level must be below 12 cm from the drying plate.**
3. **If the liquid level is less than 12cm from the drying plate, it indicates that the liquid holding tank is close to being full and needs to be emptied without delay, in order to ensure that the system continues to function effectively and adequate airflow is allowed.**

4. If the liquid level is above the drying plate, it means that the liquid holding tank is full and needs to be emptied immediately. The services of a competent Contractor must be obtained.
 - Record the findings on your inspection list.
 - **Do not attempt to remove the liquid.**
5. There are many legal requirements which have to be complied with when Hazardous Biological Waste (sewage) is removed, transported and disposed of.
6. Perform the inspection on all 4 units in the block when the tanks are not linked to each other.

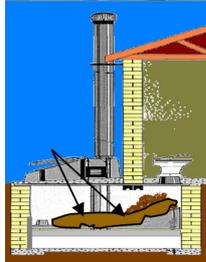
6.1 Rake the Solid Waste to the back

1. Due to a high volume of users, the solid waste may accumulate at the front of the drying area underneath the toilet pan, and it may appear to be full.
2. Use the rake and move the solid waste from the front of the drying rack to the back.
3. The solid waste must be spread evenly across the drying rack.
4. Do not remove any objects or material from the tank.
 - All objects inside the tank will be contaminated with sewage.
 - There are many legal requirements which have to be complied with when hazardous biological waste (sewage) is removed, transported and disposed of.
5. Record the following on the Inspection List and report it to the School Principal or Responsible Person:
 - The presence of many foreign objects inside the drying area;
 - The status of the drying area: e.g. halfway full, full etc.
6. Decontaminate the rake before removing it from the pit:
 - Keep the edge of the rake above the inspection hole and use the brush supplied for this purpose to brush off the solid waste from the rake.
 - Place the brush and rake on the white plastic sheet or move the rake to the next inspection hole.
 - Do not put the brush and rake on the concrete slab or the ground around the slab or the plastic.
7. Perform the task on all four units in the block.



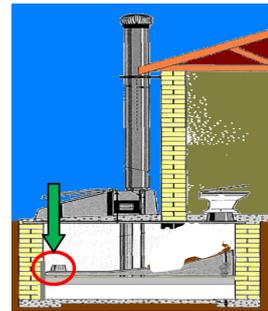
6.2 When Excessive Flies are experienced around the Facility

Distribute one cup of lime over the contents on the drying rack.



6.3 When Excessive Mosquitoes are Present around the Inspection Hole in the Drying Plate

1. Pour one cup full of chlorine down the inspection hole into the liquid holding area.
2. The chlorine must never be poured onto the solid waste on the drying rack as this will inhibit the micro-biological action.
3. Chlorine is a hazardous chemical substance and health and safety regulations must be adhered to when this substance is used.



6.4 Wash and Disinfect Hands

This hand washing and disinfecting procedure must be followed when gloved hands are cleaned during or after the maintenance procedure, or where direct contact with sewage occurred.

1. Do not remove the gloves from hands until all the steps in this procedure have been followed.
2. If there are visible signs of excrement on the gloves they may not be washed in the 'SOAP' bucket unless the following have been done:
 - Use a piece of toilet paper and remove as much of the excrement as possible from the gloves;
 - Keep hands above the inspection opening and dispose of the toilet paper inside the drying area;

3. Rinse the gloved hands thoroughly in the 'WATER' bucket until no sign of dirt is visible.
4. Wash the gloved hands thoroughly in the 'SOAP' bucket.
5. Shake excess water off the gloved hands.
6. Dip gloved hands in the 'DISINFECTANT' bucket.
7. Shake off excess water from gloved hands.

6.5 Close the Inspection Covers

1. Perform the following procedure with washed and disinfected, gloved hands:
2. Replace the inspection lids and fasten the screws on all the inspection lids in the block.
3. Ensure the inspection lid is properly sealed. There must be no gaps between the lid and top unit.

6.6 Clean and Disinfect the Concrete Slab

1. Use the brush and scoop and remove all visible dirt from the concrete slab.
2. Dispose of all dirt in the solid waste holding area.
3. Place the brush and scoop on the white plastic sheet.
4. Use the mop and soap from the 'SOAP' bucket and wash the outside of the inspection lids, top unit and concrete slab.
5. Squeeze excess water from the mop.
6. Dip the mop in the disinfectant from the 'DISINFECTANT' bucket and 'disinfect' the outside of the inspection lids, top unit and concrete slab.
7. Squeeze excess water from the mop and place on the blue plastic sheet.
8. Move the white plastic sheet and its contents to the next block which will be worked on.

6.7 After Completion of Maintenance on all Blocks

1. Do not remove gloves during the decontamination, washing and disinfecting procedure.
2. The 'cleaner' tools, equipment and PPE must be washed first, followed by the 'dirtier'.

3. Clean tools, equipment and PPE in the following order:

3.1 Rinse (Decontaminate): All tools, equipment and PPE must be rinsed with the water in the 'WATER' bucket first to remove all visible dirt.

3.2 Wash: Following that, all tools, equipment and PPE must be washed with the soap in the 'SOAP' bucket and placed on the black plastic sheet.

3.3 Disinfect: Thereafter all tools, equipment and PPE must be disinfected with the disinfectant in the 'DISINFECTANT' bucket and placed on top of the red plastic sheet until it is dry.

4. Clean the buckets after all the tools, equipment and PPE have been rinsed, washed and disinfected:

1. Rinse the 'WATER' bucket and dispose of the excess water in the soak-away.
2. Thereafter the bucket must be washed and disinfected according to above procedure.
3. Dispose the excess soap in the 'SOAP' bucket in the soak-away, disinfect and place the bucket on the red plastic sheet to dry.
4. Dispose the excess disinfectant in the soak-away and place the bucket on the red plastic sheet to dry.

Important:

No liquid, water, soap or disinfectant may be disposed of inside the liquid holding tank or drying area.

6.8 Storage of Tools, Equipment and PPE

1. Tools, equipment and PPE must be stored in a secure location to prevent them from being used for purposes other than maintenance.
2. Tools, equipment and PPE must not be stored together with hazardous chemical substances.
3. Ensure that tools, equipment and PPE are not stored together with sharp or heavy objects which can cause damage to them.

ANNEXURE D

INTERVIEW GUIDE

Topic: Social Factors that Affect the Acceptability of the Enviro Loo Sanitation
Technology: A Case of Schools in Limpopo Province

SECTION 1

INTERVIEW GUIDE FOR PROVINCIAL SANITATION TASK TEAM (PSTT)

DATE CONVENED:

TIME:

VENUE:

PRESENT STAKEHOLDERS:

ABSENT STAKEHOLDERS:

CHAIRPERSON:

1. What is the general perspective of the task team on sanitation in Limpopo Province?
2. What are the sanitation practices in Limpopo?
3. Which technology system is highly used in the province?
 - 3.1 What is the general acceptability of the Enviro Loo sanitation technology at schools?
 - 3.2 Are the facilities used as intended?
4. What are your observations on school sanitation?

5. Are there socio-cultural factors that affect the acceptance of Enviro Loo at schools?
6. How are they affecting sanitation facilities?
7. Are there any means that may be used to improve the acceptance of Enviro Loo sanitation technology in schools?

SECTION 2

INTERVIEW GUIDE FOR THE SCHOOL GOVERNING BODY (SGB)

DATE CONVENED:

TIME:

VENUE:

NUMBER OF PRESENT MEMBERS:

NUMBER OF ABSENT MEMBERS:

CHIRPERSON:

1. How long has the school been using the Enviro Loo toilets?
2. Have any of the toilets not worked at any time since they were handed over?
3. How many times have any of the toilets not worked?
4. What is the main reason for the toilets not working?
5. Are any of the toilets damaged?
 - 5.1 If yes to (5), what are the contributory factors for the damage?
 - 5.2 What is the extent of the damage?
6. What are your perspectives on Enviro Loo sanitation technology in terms of the following:
 - 6.1 Acceptability.
 - 6.2 User friendliness.
 - 6.3 Operation and maintenance.
 - 6.4 Designs for learners, especially girls, boys, and children with disabilities.
 - 6.5 Socio- cultural factors that affect the system.

6.6 Myths, taboos and beliefs that may contribute to the acceptability or unacceptability of the facilities.

6.7 Learners' behaviour towards good sanitation practices including hygiene.

6.8 Stakeholder involvement.

7. How can the acceptability of the Enviro Loo sanitation technology be improved in respect of the following:

7.1 Ownership.

7.2 Operation and maintenance.

7.3 Good sanitation practices.

SECTION 3

INTERVIEW GUIDE FOR LEARNERS REPRESENTATIVE COUNCIL

DATE CONVENED:

TIME:

VENUE:

NUMBER OF LEARNERS:

CHIRPERSON:

1. What is the type of sanitation technology that is used in your school?

2. Did you receive user education in respect of the facilities related to:
 - a. Operation.
 - b. Maintenance and.
 - c. Good sanitation hygiene practices.

3. Are the learners using the facilities as intended?

4. What are the learner's perspectives towards the facilities in respect of the following?
 - a. Acceptability.
 - b. User-friendliness.
 - c. Good hygiene practice.
 - d. Designs for learners, especially girls, boys, and children with disabilities.

5. Are there any socio-cultural factors that affect the acceptability of the Enviro-Loo system?

6. Who should take care of the facilities in terms of the following:
 - a. Cleanliness.

b. Physical structure.

7. How can the acceptability of the Enviro Loo system be improved in respect of the following?

a. Ownership.

b. Vandalism.

c. Care.

d. Good sanitation hygiene practice.