



**Municipal  
Benchmarking  
Initiative**  
water services

*In partnership with:*



## ***Where does all the poop go?***

Helping Develop Excreta Flow Diagrams for South Africa

**SFD MASTERCLASS**

6-7 August 2018

Venue: Moses Mabhida Stadium

## 1. BACKGROUND

In 2012, an estimated 842,000 deaths in middle-and low-income countries were caused by contaminated drinking water, inadequate hand washing facilities, and inappropriate or inadequate sanitation services (WWAP, 2017). Considering this, Excreta / Shit-Flow Diagram (SFD), provided by SFD Promotion Initiative under Sustainable Sanitation Alliance (SuSanA) platform was found to be a preferred tool to understand the sanitation management. SFD is an easy to visualise representation of excreta flows of a city/town and serves as advocacy tool to ensure human excreta is managed safely through the sanitation value chain. The benefit of the tool is that it offers an innovative way to engage relevant stakeholders including political leaders, sanitation experts, and civil society organizations in a co-ordinated dialogue about excreta management. Therefore, it can be used by technical and nontechnical stakeholders and can subsequently be used to support decision-making regarding sanitation planning and programming.

The Water Research Commission has appointed the water and sanitation services delivery consultancy, Emanti Management (Pty) Ltd, to engage with the municipal sector in order to develop SFDs for selected sanitation systems in South Africa. This project aims to provide guidance to decision makers on improving faecal sludge management (FSM) using a tool that considers all the components of the sanitation value chain. The proposed study aims to apply the SFD tool and its standardised methodology in up to 30 municipalities, and supporting the establishment of regional capacity within South Africa to prepare high quality SFDs. This project therefore provides an opportunity to further understand the sanitation situation at a number of municipalities throughout South Africa, and simultaneously develop a national overview of the situation within South Africa. This will allow appropriate strategies to be developed to close any gap within sanitation, wastewater effluent and faecal sludge management in South Africa.

## 2. INTRODUCTION

In an effort to actively contribute to SFD development requirements and process to manage faecal sludge, municipal officials responsible for sanitation services, and key sector partners (including Department of Water and Sanitation, Co-operative Governance and Trade Affairs, Department of public works, and private consultants) converged for an SFD Masterclass. The one and a half day workshop took place at Moses Mabhida from the 7th to the 8th of August 2018. The Master Class was a collaborative initiative between the Municipal Benchmarking Initiative (MBI), the South African Local Government Association (SALGA), Water Research Commission (WRC), eThekweni Municipality's Water and Sanitation Department (EWS) Unit, Centre for Science and Environment (CSE) in India, and the Municipal Institute of Learning (MILE). Practitioners who attended the full course earned 1.5 Continuous Professional Development (CPD) points from the Institute of Municipal Engineering South Africa (IMESA).

### 3. MASTERCLASS PROGRAMME

Item	Presenter	Time
<b>DAY 1: Monday, 6 August 2018</b>		
<b>Welcome</b>	Dr Sudhir Pillay, WRC	10:00 – 10:05
<b>Setting the scene + FS use options</b>	Dr Sudhir Pillay, WRC	10:05 – 10:25
<b>A perspective on sanitation challenges</b>	Department of Water and Sanitation	10:25 – 10:45
<b>SFD Project introduction</b>	Ms Unathi Jack, SFD Team	10:45 – 10:55
<b>eThekwini case study/SFD development experience</b>	Mr Teddy Gounden, eThekwini Water and Sanitation	10:55 – 11:15
<b>BREAK</b>		11:15 – 11:30
<b>SFD Introduction</b>	Mr Bhitush Luthra, CSE	11:30 – 12:00
<b>Terms and variables used to develop SFD</b>	Ms Amrita Bhatnagar, CSE	12:00 – 12:20
<b>Methodology for data collection</b>	Mr Shantanu Kumar Padhi, CSE	12:20 – 13:00
<b>LUNCH</b>		13:00 – 13:45
<b>Introductory exercise – desk based study</b>	SFD Team, CSE	13:45 – 15:00
<b>Introduction to SFD graphic generator</b>	SFD Team, CSE	15:00 – 16:00
<b>DAY 1 Closure</b>		
<b>DAY 2: Tuesday, 7 August 2018</b>		
<b>Recap</b>	All – led by SFD Team, CSE	9:00 – 9:10
<b>Group Discussion</b>	All – led by SFD Team, CSE	9:10 – 9:40
<b>Developing your own SFD exercise: Part 1</b>	All – led by SFD Team, CSE	9:40 – 10:15
<b>BREAK</b>		10:15 – 10:30
<b>Developing your own SFD exercise: Part 2</b>	All – led by SFD Team, CSE	10:30 – 11:30
<b>Next Steps</b>	All – led by SFD Team, CSE	11:30 – 12:00
<b>Wrap up and way forward</b>	All – led by SFD Team, CSE	12:00 – 12:30
<b>LUNCH</b>		12:30 – 13:00
<b>DAY 2 Closure</b>		

#### **4. SHIT FLOW DIAGRAMS IN THE SANITATION VALUE CHAIN**

An excreta/shit flow diagram is a tool to readily visualize, understand and communicate how excreta is managed throughout the sanitation chain within a city or town. It shows how excreta is - or is not - properly managed /"contained" as it is transported from defecation to disposal or end-use, and the fate of all excreta-generated. The significance of SFDs was discussed and noted by participants as a means by which to identify and quantify the "safe sanitation challenge" at a municipality, and then plan and budget accordingly to overcome the challenges. Participants commented on the special value of the SFD information for the influencing of municipal decision making in the current challenging conditions relating to in particular on-site sanitation; notably, the unavailability of blue and green drops the generally poor management of ageing pits latrines, inadequate municipal budgets for such, inadequate municipal policies and management of this function, and limited technical skills for disposal of pit contents.

#### **5. ETHEKWINI MUNICIPLITY SHIT FLOW DIAGRAM**

The EThekwini SFD was developed from January to March 2016 in partnership with UKZN. It was undertaken as field based research, and was classified as a Level 2 SFD (ie containing some interview and site visit information). The compilation of the SFD also comprised of institutional and service delivery analysis. As part of developing the SFD, existing sanitation technologies were taken into account. On-site sanitation technologies within EWS include Urine Diversion toilets, VIP toilets, communal ablution blocks, septic tank flush toilets, and Conservancy tanks flush toilets. In terms of off-site sanitation, these include were flush toilets to central sewer network, ablution block to central sewer, and decentralised package plants that are connected to the pipe network system and discharge into the WWTW. Various techniques were used to collect data including aerial photography, quarterly service delivery and backlog reports, GIS, historical green drop reports, and interviews with key personnel. The outcomes indicated the existence of weaknesses, including wastewater was lost through trunk sewer blockages and package plants treatment efficiency was a challenge.



## SEWER BLOCKAGES AND LEAKAGES

### 1. The presentation reflected on the sewer blockages in the weakness of results. Were sewer leakages considered for SFD?

- In a cases where there is a drop in the flow, triggers are activated which warrant an immediate response.

## EMPTYING OF PITS

### 2. What are the pit emptying methods adopted by EThekwini Municipality?

- Onsite sanitation: There are 35 000 manual emptied pit latrines that are serviced by the City though their construction was discontinued since the year 2000.
- Various issues were taken into account in devising the most efficient methods for emptying such as safety clothing and health impacts.
- In this regard, one of the innovations that came through was the latrine dehydration pasteurization (LADEPA), whereby solid waste is separated from organic waste. The sludge consisting of approximately 30% solids with detritus is forced through a screw compactor with lateral ports through which the sludge is extruded whilst the detritus is ejected at the end of the screw compactor.
- This extruded sludge falls onto a continuous porous steel belt in a thin layer of open textured material.
- In the case of a self-powered system this product then passes through a pre drying system which generates both exhaust and radiator heat with an extractor fan to assist air flow.
- It then passes through the Parsep dryer which is a medium wave infrared radiation with a vacuum to draw the heated air through an open matrix.
- With temps in the Parsep drying area varying between 400 and 600 degrees Celsius, the material is pasteurised and sufficiently dried to approximately 60% solids to allow it to be bagged.

### **3. How often are pits emptied?**

- EThekweni Municipality undertakes this process once every five years, free of charge.
- Equitable share funding from national Treasury is used for the emptying process.

### **4. UD Toilets and Treatment.**

- Prior to roll out of Urine Diversion toilets to rural communities many households did not have any formal toilets ie mostly informal pits and a large percentage of open defecation. The introduction of urine diversion toilets as technology that required far less maintenance than pit toilets was initiated after extensive consultation with councillors and local community. These toilets separates urine and faeces whilst urine is diverted to soak away approximately 100 metres from toilet the UD contents, and was expected to be emptied and buried on site by the householder. In the initial phases of the rollout there was sufficient space to bury the UD contents on-site however, through ongoing research (research collaboration with UKZN) the health risks associated with emptying became a matter of concern for the City. In response, the City then took decision to provide a free emptying service ie one emptying every two years.
- Further challenge to burying on site was rapid densification due to migration that limited space to bury.
- Burying on-site is undertaken where space is available.
- The municipality is also undertaking the Black Soldier Fly pilot project in partnership with Biocycle. The model is structured in such that sludge is transported to the Treatment Works for processing and profits are shared. The SLA talks to the whole value chain.

### **5. What were the benefits of separating water and sanitation operations?**

- Institutionalization of operations led to budget allocations to the functions of water and sanitation separately to focus on backlogs and service delivery.

## **COMMUNITY ABLUTION BLOCKS**

### **6. Are the community ablution blocks a municipal initiative? How are they maintained?**

- Ablution blocks are a municipal initiative intended for informal settlements.
- They are maintained by Caretakers tasked with cleaning the facilities on a daily basis, and remunerated by the municipality.
- Toilet paper and cleaning detergents are provided by the City as to avoid disfunctionality.

- Upon the initial phases of the process, there were engagements with local leadership, councillors and the committee from the individual informal settlements.
- The community is responsible for determining the selection criteria of the caretaker and the appointment of suitable candidates who reside in the area.
- Caretakers are employed through the extended public works programme in a two-year rotation basis.

**7. What are the operation times? Are there any security issues?**

- These ablution facilities have opening and closing times determined by the Committee, and times vary for different communities.
- The decision to set operational times was informed by a variety of factors such as vandalism.
- From a security point of view there were no serious events reported and the system has been efficiently managed thusfar.

**8. Does EThekwini have a policy to implement the ablution blocks?**

- The Sanitation Policy and Practice document makes provision for the ablution blocks as Council approval and budget was required to implement.
- The policy is guided by national regulations.

## STAKEHOLDER ENGAGEMENTS

**9. An educational component should be part of SFD. This might significantly contribute to the reduction of the use of foreign objects that block sewers.**

- EThekwini has a dedicated team working with communities.
- All projects are preceded by community participation and education campaigns.
- Information is also packaged in the toolkit.

## REPORTING MECHANISMS FOR BLOCKAGES/LEAKAGES

**10. In a practical sense, community members seldom report overflow of sewers as they are not personally affected, and this is a challenge. Are there ways of monitoring sewers?**

- A toll-free number is available for people to report any leakages.
- Moreover, there are also pipeline inspectors who conduct inspections of the status of pipe network, especially along the rivers.





### **SFD PRESENTATION TO MUNICIPAL COUNCIL STRUCTURES**

- EThekweni Municipality has not yet presented the SFD to Councillors, but has done so to Senior Management.
- The policy is currently being updated and will be presented to Council for review and approval. This will be an opportunity to also present the updated SFD.

### **IMPLEMENTATION OF SFD IN INDIA**

- The SFD is currently in the process of national operationalization.
- More than 800 SFDs have been developed and are being used to do advocacy for FSM.
- CSE has used SFDs to sensitize various stakeholders including State Governments and National bodies like National Mission for Clean Ganga, and also secures funding for appropriate interventions to improve citywide sanitation.
- SFDs are being used for analysing sanitation to develop better city sanitation plans, various cities from Andhra Pradesh, Telangana, Kerala, Bihar and Uttar Pradesh have used SFDs in their city sanitation plans.

### **SFD AND THE GREENDROP**

- At the moment in South Africa the Green Drop process focusses very much on the waste water treatment works and the collective systems.
- It was recommended by the sector that Green Drop should be expanded to include onsite sanitation system.
- From a water conservation perspective, reality shows that South Africa is a water scare country that can't afford to be using a high volume of treated drinking water to flush toilets.
- Therefore, a reality is both that (i) the removal and replacement of poor /ageing onsite sanitation systems may be a very slow process, and (ii) an open mind should be kept for consideration of emerging innovative on-site sanitation technologies (eg as being persued by the Gates Foundation). This adoption of new technologies will most likely require amendment to municipal by-laws and government regulations to encourage such.
- It was emphasised that the municipal focus on safe sanitation should not be limited to a focus on wastewater works, but rather include the full sanitation chain.

## **POSSIBLE WASTE WATER TREATMENT BUSINESS/EMPLOYMENT OPPORTUNITIES IN INDIA**

- It gets clear from the SFDs that a lot of waste water is going into environment untreated.
- There is a need for sustainable solution for sanitation, as a lot of centralised wastewater treatment systems are failing due to high operational cost and minimum recovery of revenue.
- Therefore, decentralised wastewater treatment systems which promote local reuse of treated wastewater seems to be the way forward.
- Decentralisation would also mean increase in employment opportunities.

## **INDIAN ENVIRONMENTAL RISK ASSESSMENT FOR ONSITE SANITATION**

- SFDs done in India clearly shows major dependence of the community on Onsite Sanitation Systems.
- And there are gaps in all aspects of the sanitation chain, be it design of septic tank implemented on ground or unregulated dumping of extracted faecal sludge.
- Both leaking onsite systems and illegal dumping of faecal sludge in water bodies and open areas cause major risk to environment and eventually human health.

## **OBTAINING BUY-IN**

- It is a common trend that new initiatives take a while to gain momentum.
- In the Indian context, the SFD graphic is developed to all SFD levels, i.e. initial, intermediate and comprehensive levels which differ on contents of report and the procedure of information collection.
- However, municipalities display the most interest as they know their respective cities better.
- Accordingly, SFDs are always developed in consultation with municipalities
- This integrated approach yields positive results in terms of stakeholder buy-in as it is inclusive.

## 7. CONCLUSIONS AND WAY FORWARD

All participants present and from across the sector noted and confirmed the value of the carrying out of SFD's. All municipalities present expressed an interest in being involved in further engagements regarding SFDs via the Water Research Commission initiative, as they perceived it as a very useful and yet relatively achievable process tool. It was noted that in taking SFD's forward it will be very crucial to engage and seek support from political principals and to ensure that participating municipalities have a clearly mandated and supported municipal champion to drive the process internally. Overall, SFD's will assist in achieving a sanitation safety mind-set which will assist in getting the process moving towards a safe and effective sanitation chain. It was noted that all municipalities of KZN should be encouraged by the sector partners to participate in the SFD initiative. All the key learnings obtained from the Masterclass will be shared with respective municipalities.