SFD Promotion Initiative

Tarkastad

Enoch Mgijima Local Municipality, Chris Hani District Municipality

Eastern Cape, South Africa

SFD Lite Final Report

This SFD Lite Report was created through field-based research by Emanti Management and Centre for Science and Environment for a Water Research Commission project and as part of the SFD Promotion Initiative.

Date of production: March 2019

Last update: March 2019

SFD Lite Report

The SFD Promotion Initiative (SFD PI) has developed recommended methods and tools for preparing SFD Graphics and Reports. A full SFD Report consists of the SFD Graphic, the analysis of the service delivery context and enabling environment for service provision in the city for which you are preparing your SFD, and the complete record of data sources used. This analysis allows a systemic understanding of excreta management in the city, with evidence to support it. As a starting point (first step stone) to this (explained in detail in the SFD Manual), the SFD Lite is a simplified reporting template that summarises the key information about the excreta management situation in the city.

SFD Lite Report Tarkastad, South Africa, 2018

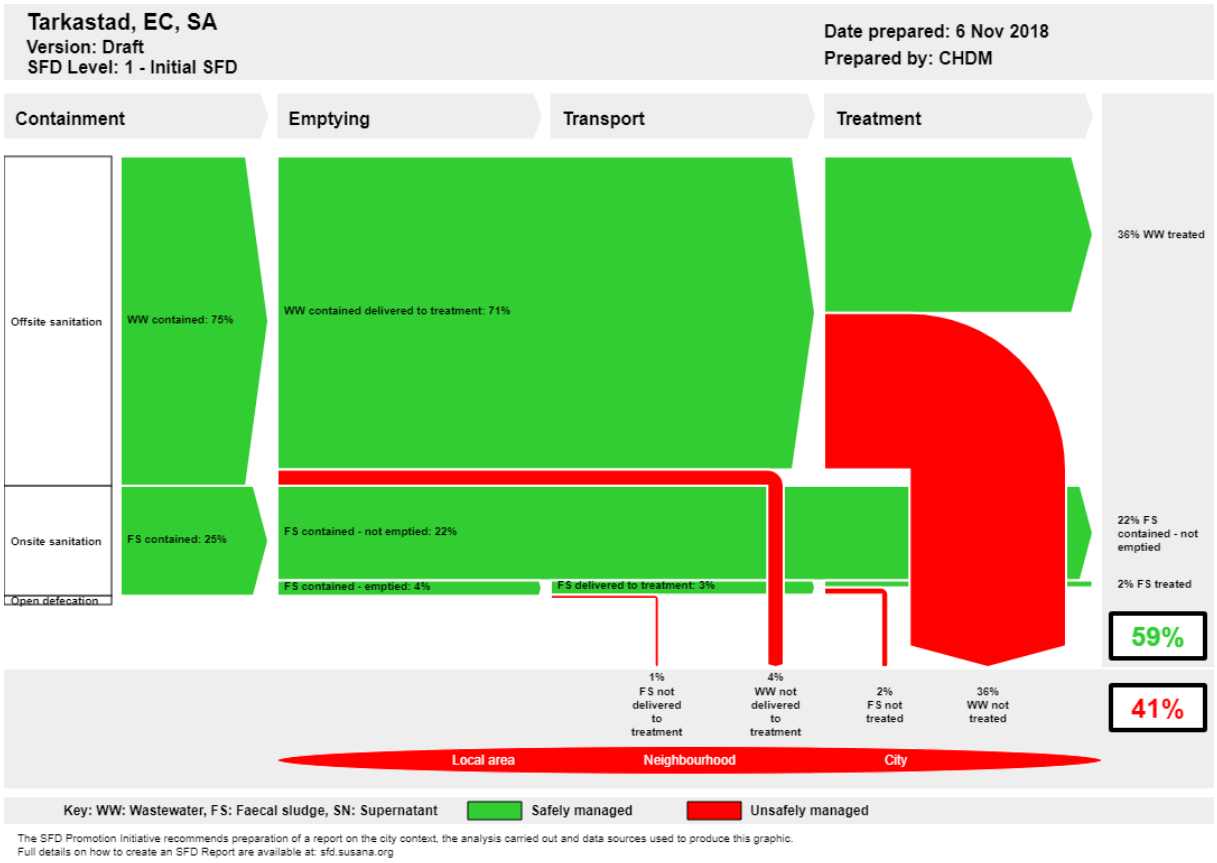
Produced by:

Thabisa Manxodidi, Emanti

Unathi Jack, Emanti

Executive Summary

1. The SFD Graphic



The SFD Promotion Initiative recommends preparation of a report on the city context, the analysis carried out and data sources used to produce this graphic.
Full details on how to create an SFD Report are available at: sfd.susana.org

2. Diagram information

Desk or field based:

This is a field based SFD

Produced by:

Emanti Management (Pty) Ltd, Stellenbosch, South Africa

Centre for Science and Environment (CSE), New Delhi, India

Status:

This is a final SFD

Date of production:

November 2018

3. General City Information

Chris Hani DM recognises that most people will aspire to full waterborne sanitation, and accepts that the minimum acceptable standard is a ventilated, improved pit latrine (VIP).

Chris Hani DM has commissioned a study of appropriate sanitation technology, and the Appropriate Technology document, together with a master plan, which will guide all sanitation infrastructure decisions.

In general, those who can afford to pay for their choice of sanitation system are allowed to do so, and indigent households provided with a VIP at no cost to the household.

4. Service outcomes

The following sanitation technologies were noted:

- Toilet discharges directly to a decentralised foul/separate sewer – toilets are connected directly to the centralised wastewater treatment plant.
- Fully lined tank – sealed, no outlet or overflow – proportion of sludge emptied and delivered to treatment plant.
- Septic tank connected to soak pit – proportion of sludge emptied and delivered to treatment plant.
- Pit (all types) never emptied, but abandoned when full and covered with soil, no outlet or overflow.

5. SFD development process

Data was collected largely through secondary sources (IDP plans). However, a process of completing the SFD Graphic Generator to calculate the excreta flow in terms of percentage of the population was conducted with Chris Hani District municipal officials.

6. List of data sources

Below is the list of data sources used for the development of the SFD.

- StatsSA Census (2011)
- Tarkastad WWTW W_2RAP – 31 Mar 2016
- Sanitation Master Plan (CHDM) – September 2018
- Chris Hani Water Balance Report 2017/2018
- Key informant interviews: Chris Hani District Municipal Officials

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Abbreviations

DM	District Municipality
DWS	Department of Water and Sanitation
FS	Faecal sludge
GDS	Green Drop System
IAM	Infrastructure Asset Management
ICT	Information and Communications Technology
IDP	Integrated Development Plan
IT	Information Technology
CHDM	Chris Hani District Municipality
LG	Local Government
LM	Local Municipality
MuSSA	Municipal Strategic Self-Assessment
NRW	Non-Revenue Water
O&M	Operations and Maintenance
RDP	Reconstruction and Development Programme
SALGA	South African Local Government Association
SDBIP	Service Delivery and Budget Implementation Plan
SFD	Shit Flow Diagram
StatsSA	Statistics South Africa
VIP	Ventilated Improved Pit Latrine
W_2RAP	Wastewater Risk Abatement Plan
WCDM	Water Conservation and Demand Management
WRC	Water Research Commission
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSP	Water Service Provider
WTW	Water Treatment Works
WW	Wastewater
WWTW	Wastewater Treatment Works

1. City context

Enoch Mgijima Local Municipality is located on the Mid-Western boundary of the Chris Hani DM with major centres like Tarkastad to the South and Hofmeyr to the North of the local municipality. The Enoch Mgijima LM boundary is approximately 15 km west of the town of Queenstown which is the District's administrative centre. Tarkastad the local administrative centre for Enoch Mgijima Local Municipality is located about 66 km from Queenstown. Most of the region is reliant on dams, surface water schemes and ground water supply schemes. The two main urban nodes, Tarkastad and Hofmeyr depend solely on groundwater for their water suppliers and the rural areas also depend on underground water supply. The population of the municipality, based on the Census 2011 figures, equalled 33 281 with an estimate of 9 494 households. Identified development nodes within the Enoch Mgijima Local Municipality are:

1. Tarkastad (Primary urban development node)
2. Hofmeyr (Secondary urban development node)

The Local Municipal area stretches over a geographical space of 6 087 km². The area served by the Tarkastad WWTW situated at the lower reaches of the town. The system comprises of four drainage areas, namely Tarkastad Town, Matyhantya, Zola and Ivanlew townships. The effluent from some areas, notably Zola and Ivanlew townships are collected by night soil tanker and deposited into the Tarkastad WWTW. The topography of the catchment in the built-up areas allows for the effluent from all serviced areas to gravitate to pump station one which is then pumped to the main pump station that pumps to the wastewater treatment works. The only effluent that arrives through external energy input is the tankered night soil effluent.

The areas are relatively uneven. The area fall within the water management area 12 (Umzimvubu to Keiskamma), and ultimately forms part of the Great Kei River system. There are no known domestic water abstraction uses downstream of this wastewater treatment system.

Figure 1: Location of Tarkastad within Enoch Mgijima Local Municipality in Chris Hani District Municipality

2. Service outcomes

Service outcome analysis is based on secondary sources. The following key sources of data are used:

- StatsSA Census (2011)
- Tarkastad WWTW W_2RAP – 31 Mar 2016
- Sanitation Master Plan (CHDM) – September 2008
- Chris Hani Water Balance Report 2017/2018

2.1 Overview

This section presents the range of sanitation technologies/infrastructure, methods and services designed to support the management of faecal sludge (FS) and/or wastewater (WW) through the sanitation services chain in Tarkastad. The details on the quantitative estimations are presented in the table below and sections that follow.

Table 1: Sanitation technologies and contribution of excreta in terms of percentage of population

No.	Sanitation technologies and systems as defined by:		SFD reference variable	Percentage of population
	Chris Hani DM	**SFD promotion initiative**		
1	Toilet discharges directly to sewer	Toilet discharges directly to a decentralised foul/separate sewer	T1A1C2	75%
2	Septic tank (plastic or concrete)	Fully lined tank (sealed) no outlet or overflow	T1A3C10	1%
3	Septic tank (plastic or concrete)	Fully lined tank (sealed) connected to a centralised foul/separate sewer	T1A3C2	3%
4	VIPs (urban)	Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	T1B7C10	21%

2.1.1 Containment

There is a limited sewerage network, with the only off-site formal waterborne sewer system being linked to the Tarkastad Wastewater Treatment Works (WWTW) with domestic effluent originating from the Tarkastad and associated truck-stop. There are parts of Tarkastad urban and rural areas where communities use VIP toilets. To-date, these toilets have never been emptied. In rural areas, communities are used to covering up and abandoning a full VIP and relocating the VIP to a new location.

2.1.2 Emptying and Transport

Vacuum tankers are used to empty and transport sewage from the concrete and plastic tanks to Tarkastad WWTW.

2.1.3 Treatment and Disposal

The area served by the Tarkastad WWTW situated at the lower reaches of the town. The system comprises of four drainage areas, namely Tarkastad Town, Matyhantya, Zola and Ivanlew townships. The effluent from some areas, notably Zola and Ivanlew townships are collected by night soil tanker and deposited into the Tarkastad WWTW. The topography of the catchment in the built-up areas allows for the effluent from all serviced areas to gravitate to pump station one which is then pumped to the main pump station that pumps to the wastewater treatment works. The only effluent that arrives through external energy input is the tankered night soil effluent.

2.1.4 Drainage System

The Tarkastad drainage comprises largely domestic consumers with a low to upper lower income profile. The central business district comprises retail in the form of shops providing food (fast food and groceries), clothing and furniture, with institutional services (police, banks, government social services, higher education, etc. Commercial consumers form a smaller portion in numbers because Tarkastad is a rural town. Their contribution however has a bigger impact to the drainage system. The area is generally rural with an urban/township characteristic. There is an informal/undeveloped component to it, with a lower apparent level of service, albeit waterborne, with a distinctly lower economic profile.

The Zola Township is the largest in population with almost half of its household waste draining to pump station one and the other to pump station two. Mathyantya Township is the second largest in population with 298 households after the Tarkastad town. The effluent is domestic from the RDP houses.

2.1.5 Water Conservation and Demand Management

In 2014 Chris Hani District Municipality initiated a project emphasizing Water Conservation and Water Demand Management (WC/WDM) as one of the focus areas. The core WC/WDM project initiatives comprise the following:

- Assessment and testing of flow meters at reservoirs (inlet and outlet) on reservoirs in all CHDM's supply areas including flow reconciliation, water balance determination and prevention of reservoir overflows.
- Installation of Automatic Water Meter Reading devices for the inlet and outlet flow meters at all 20 water treatment works within the district.
- Introduction of pressure reducing valves where these have been identified in previous studies.
- Production of As-built drawings and process flows for all water treatment works.
- Asset inventory of pipe lengths, sizes and age of water systems including infrastructure such as control valves, meters and number of connections in all CHDM urban nodes
- Water meter auditing of residential and bulk water meters throughout the entire district.
- Water system assessment to determine breakage frequency and actual water losses in all CHDM urban nodes.
- Review of the Water Conservation and Water Demand Management Strategy for CHDM.

2.1.6 Access to Water and Sanitation

Access to water and sanitation is imperative to reaffirm people's dignity and the enjoyment of basic human rights. The backlog in water and sanitation provision is still a point of concern. 2001 Census data confirms that about 46% of the total households either source their water some 200 meters away or from boreholes, springs, rainwater tanks, dams/pool/stagnant water, rivers/streams, water vendor and other sources. The situation is worse especially in rural areas. In terms of sanitation, it was also estimated that about 52% of the total households used pit latrines with no ventilation, whilst 13, 8% had no toilet facilities at all.

2.1.7 Refuse

Only 12,4 % of the total households had their refuse removed once a week by the municipality. For the rest, about two thirds used their own refuse dumps a staggering number of 16,1% had no rubbish disposal. This has implications for health and environmental conditions of the people.

2.1.8 Social Facilities

Notwithstanding the fact that no data is available about number and state of social facilities such as clinics, parks, sport facilities, and so on, it can be concluded that these are also inadequate and uneven distributed in various wards. It is therefore not surprising that the provision of social services is still ranked highly as one of the most important community development priorities.

2.2 SFD Matrix

The final SFD for Tarkastad is presented in **Appendix 6.1**.

2.2.1 SFD Matrix Explanation

All the plastic, concrete and cement block tanks are referred to as "septic tanks" by the municipality. These tanks, however, do not have an outlet/discharge point, and therefore are not defined as a septic tank as per SFD definitions. In this report these are categorised according to their design and functioning as per SFD terms. Below is a description of each of the sanitation technologies in Tarkastad.

- Toilet discharges directly to a decentralised foul/separate sewer – toilets are connected directly to the wastewater treatment plant.

- Fully lined tank – sealed, no outlet or overflow – proportion of sludge emptied and delivered to treatment plant.
- Septic tank connected to soak pit – proportion of sludge emptied and delivered to treatment plant.
- Pit (all types) never emptied, but abandoned when full and covered with soil, no outlet or overflow.
- Pit (all types) never emptied but abandoned when full but NOT adequately covered with soil, no outlet or overflow.

Considering the above, the following is noted:

Off-site

According to municipal records, 75% of the sewage is contained but only 71% of that is transported to the treatment works. All of this wastewater is transported to the Tarkastad WWTWs where it is supposed to be treated to meet specified requirements (according to evidence of treatment efficiency, there is non-compliance to treated effluent requirements). 4% is emptied but not transported to the treatment works.

On-site

25% of the facial sludge is contained, with 4% not emptied and 21% treated. Therefore 21% that reaches the wastewater treatment plants, it is assumed that it is treated to meet specified requirements (according to evidence of treatment efficiency, there is non-compliance to treated effluent requirements).

Open defecation

The municipality noted that there is no open defecation as stated by the municipal officials. All households are serviced at Tarkastad.

Table 2: Description of variables used in SFD

Variable	Description
W4a	WW delivered to centralized treatment plant
W5a	WW treated at centralized treatment plant
F3	FS emptied
F4	FS delivered to treatment plant
F5	FS treated

Tarkastad, EC, SA, 6 Nov 2018. SFD Level: 1 - Initial SFD
Population: 7227
Proportion of tanks: septic tanks: 0%, fully lined tanks: 100%, lined, open bottom tanks: 0%

System label	Pop	W4a	W5a	F3	F4	F5	S4d	S5d
System description	Proportion of population using this type of system	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised treatment plants, which is treated	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated	Proportion of supernatant in sewer system, which is delivered to treatment plants	Proportion of supernatant in sewer system that is delivered to treatment plants, which is treated
T1A1C2 Toilet discharges directly to a centralised foul/separate sewer	75.0	95.0	50.0					
T1A3C10 Fully lined tank (sealed), no outlet or overflow	1.0			50.0	50.0	50.0		
T1A3C2 Fully lined tank (sealed) connected to a centralised foul/separate sewer	3.0			100.0	100.0	50.0	100.0	0.0
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	21.0							

Figure 2: SFD Matrix for Tarkastad (2018)

2.2.2 Risk of groundwater contamination

No information was provided in relation to the groundwater contamination.

3. Stakeholder engagement: key interviews

The relevant Chris Hani District Municipality staff were contacted through e-mail, letter and telephone. The purpose of the SFD study and depth of data required was conveyed through an introductory letter to respective staff. Although a number of stakeholders of government departments were noted, this SFD study aimed to focus on interviews with staff from Chris Hani District Municipality and their associated service providers.

4. Acknowledgements

This report was compiled for a Water Research Commission project and as part of the SFD Promotion Initiative. We would like to thank all participating Chris Hani District Municipality officials for giving time and necessary information for the assessment.

5. References

1. StatsSA Census (2011)
2. Tarkastad WWTW W_2RAP – 31 Mar 2016
3. Sanitation Master Plan (CHDM) – September 2008
4. Chris Hani Water Balance Report 2017/2018

6. Appendix

6.1 SFD Matrix

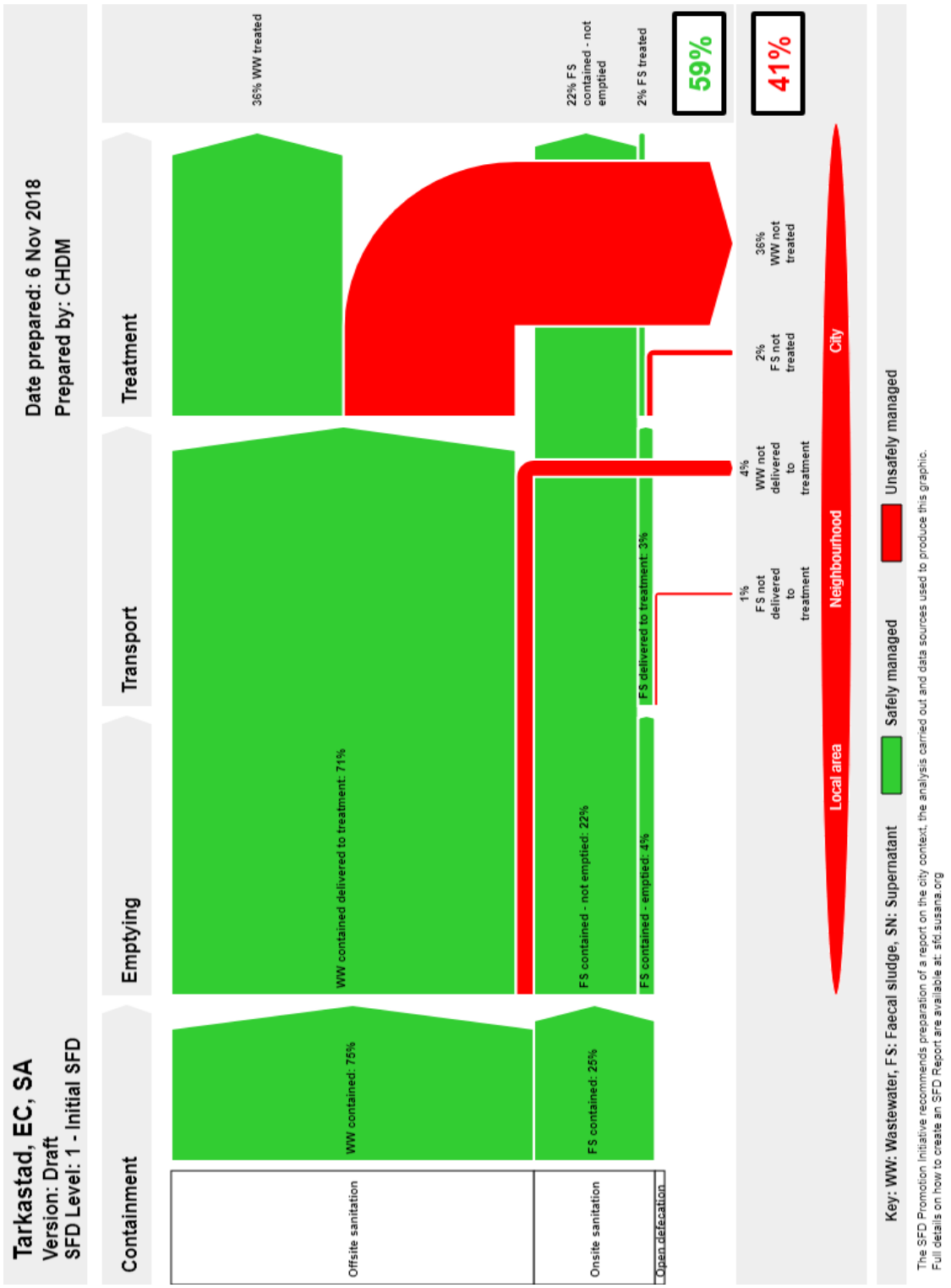

Figure 3: SFD Matrix

6.2 Tracking of Engagement

Table 3: Tracking of stakeholder engagement

Name of organization	Name of contact person	Designation	Date of engagement	Purpose of engagement
Chris Hani District Municipality	Zendani Kuboni	Senior Technician WMIS	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	Mvuyeleni Somkoko	WSP Area Manager	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	MK Ramulifho	Water Quality	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	S. Sinyeke	Civil Technician	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	Zandile Mngomeni	Engineering Technician	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	Sinawo Nzuzo	Technician – WMIS	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	Mphumzi Pama	Civil Technical	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	R. Pottas	Area Manager	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	S. Nzuzo	Technician – WMIS	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	Nkwenkwezi Mfesane	Water Quality Technician	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	N. Bongweni	Senior Technician – WCDM	07 November 2018	Development of the SFD and Site inspection
Chris Hani District Municipality	N. Ncedo	Civil Technician	07 November 2018	Development of the SFD and Site inspection

6.3 Typical Sanitation Toilets