SFD Promotion Initiative

Amathole District Municipality

Eastern Cape, South Africa

SFD Lite Final Report

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

Date of production: February 2019

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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 Amathole District Municipality, South Africa, 2018

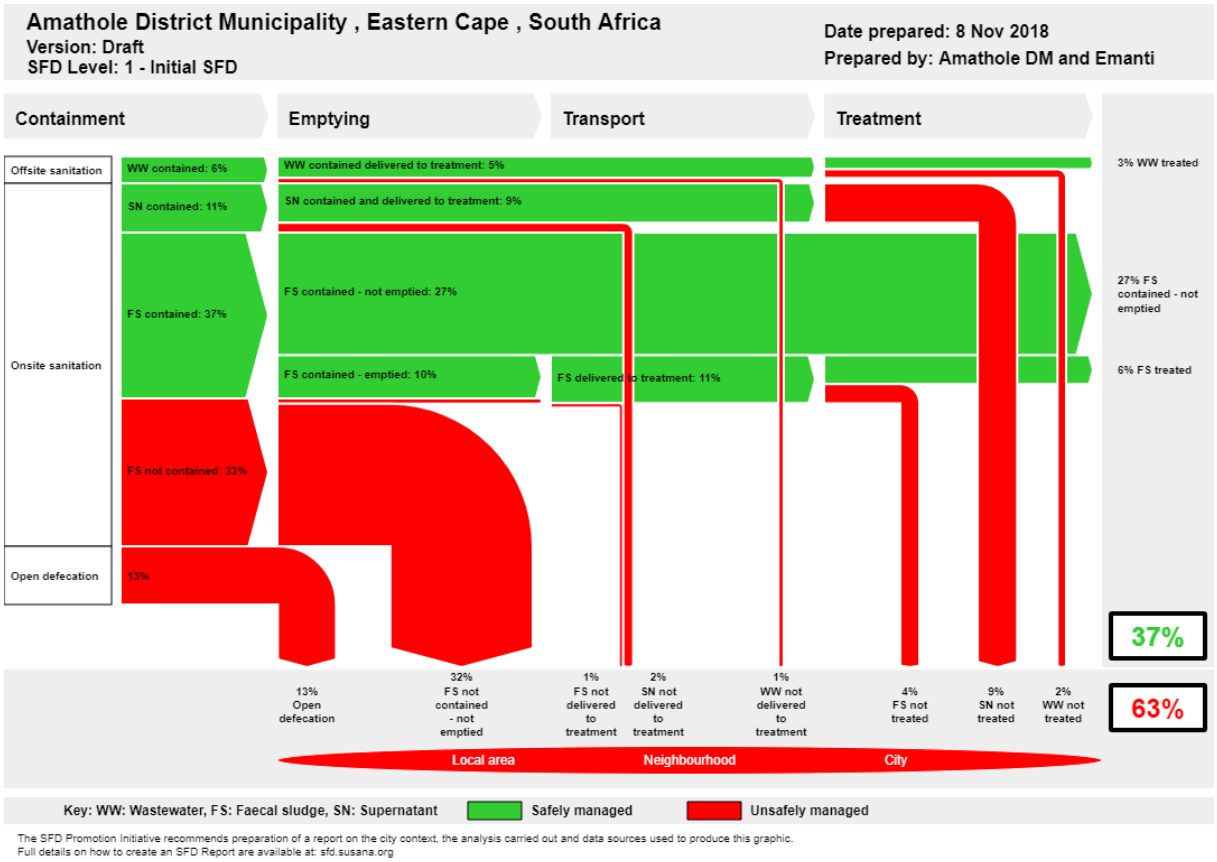
Produced by:

Thabisa Manxodidi, Emanti

Unathi Jack, Emanti

Executive Summary

1. The SFD Graphic



2. Diagram information

Desk or field based:

This is a field based SFD.

Produced by:

Emanti Management (Pty) Ltd, Stellenbosch, South Africa.

Status:

This is a final SFD.

Date of production:

9 November 2018

3. General City Information

Location

Town background

Population

Urban/rural split

Households

Growth rate

Persons per household

Area

Persons per km^2

Rainfall

Temperature

4. Service outcomes

The following sanitation technologies were noted:

- Toilet discharges directly to a centralised foul/ separate sewer – flush toilets are connected directly to the wastewater treatment plant.
- Fully lined tank – sealed, no outlet or overflow – these are either buried concrete tanks, buried plastic tanks or plastic tanks covered with concrete slabs.
- Containment (fully lined tanks, partially lined tanks and pits and unlined pits failed, damaged, collapsed or flooded – with no outlet or overflow – these are the tanks made from cement blocks with two compartments. Seepage emanating from these tanks through these blocks was noted.
- Pit (all types) never emptied, but abandoned when full and covered with soil, no outlet or overflow – these are pits that are not lined and never emptied. When full, the top structure is removed and taken to a new pit. These pits are covered with soil when abandoned.
- Pit (all types) never emptied but abandoned when full but NOT adequately covered with soil, no outlet or overflow – these are pits that are not lined and never emptied. When full, the top structure is removed and taken to a new pit. It is believed that these pits are not adequately covered with soil when abandoned.
- Pit (all types) never emptied but abandoned when full and covered with soil, no outlet or overflow – some of these unlined pits are located where the groundwater table is high. Some of these unlined pits are located in sandy soil type and ground water monitoring results have indicated non-compliance.

5. SFD development process

Data was collected through secondary sources (reports, plans), and then Kei Mouth Ponds was visited to conduct interviews with the relevant stakeholders, including site visits to infrastructure to witness the on-the-ground situation. This information was used to fill in gaps and cross-check data collected.

The data was fed into the SFD Graphic Generator to calculate the excreta flow in terms of percentage of the population.

37% of the excreta is managed safely as there is some treatment at the Amathole District Municipality, but excreta for 63% is not managed safely, as it is not contained and can pollute groundwater sources and the environment.

NOTE: Excreta being safely managed or not is dependent on the containment of the system, and not on whether the waste is safely handled or not.

6. List of data sources

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

- Published reports: Census 2011, Community Survey 2016
- Unpublished documents: IDP, WSDP
- Key informant interviews: ADM

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Abbreviations

ADM	Amathole District Municipality
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
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. District context

The Amathole District Municipality is a Category C municipality situated in the central part of the Eastern Cape. It stretches along the Sunshine Coast from the Fish River Mouth and along the Eastern Seaboard to just south of Hole in the Wall along the Wild Coast. It is bordered to the north by the Amathole Mountain Range. The municipality is comprised of six local municipalities: Mbhashe, Mnquma, Great Kei, Amahlathi, Ngqushwa and Raymond Mhlaba.

Four heritage routes have been developed that are named after Xhosa kings and heroes. They are the Maqoma Route, the Makana Route, the Sandile Route and the Phalo Route. These intertwine with the other tourism routes located within the district, namely the Sunshine Coast Route, the Wild Coast Route, the Amathole Mountain Escape Route and the friendly N6 Route. The area covers 21 117 km².

Cities/Towns: Adelaide, Alice, Amatola Coastal, Bedford, Butterworth, Cathcart, Dutywa, Elliotdale, Fort Beaufort, Hamburg, Hogsback, Kei Mouth, Kei Road, Keiskammahoek, Kentani, Komga, Middeldrift, Morgan Bay, Ngqamakhwe, Peddie, Seymore, Stutterheim, Willowvale.

Figure 1: **Location of Amathole District Municipality**

2. Service outcomes

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

- StatsSA Census (2011)
- StatsSA Community Survey (2016)
- Integrated Development Plan for ADM (2018-2019) (and associated annexures)
- Water Services Development Plan for Amathole District Municipality (2016)

Data on emptying and transport is not currently closely monitored, and is mostly qualitative in nature.

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 Amathole District Municipality. 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
	Amathole DM	SFD promotion initiative		
1	Toilet flushes directly to sewer	Toilet discharges directly to a centralised foul/separate sewer	T1A1C2	6%
2	Septic tank (plastic or concrete)	Fully lined tank (sealed), no outlet or overflow	T1A3C10	11%
3	VIPs – lined with cement blocks and open bottom	Lined pit with semi-permeable walls and open bottom	T1A5C10	37%
4	VIPs – unlined	Unlined pit	T1A6C10	33%
5	Not serviced (rural and informal)	No toilet, open defecation	T1B11C7 to C9	13%

2.1.1 Containment

There is a limited flush toilets in the network covered by Amathole District Municipality, with the off-site formal waterborne sewer system being linked to various oxidation ponds and Wastewater Treatment Works (WWTW) with domestic effluent originating from the network and associated truck-stop.

2.1.2 Emptying and Transport

The conservancy tankers are emptied on by municipal tankers, however these are in poor condition and the numbers are limited. Therefore the municipality is outsourcing honey suckers from privately owned companies which are in good condition. Depending on when the tank is full emptying varies between every 2 to 7 days a week. There are only conservancy tanks that are emptied when they are full.

As the tanks vary in size, it is difficult to estimate the average number of tanks emptied per day. A lack of adequate record checking and verification, and associated data analysis/interpretation also makes this a challenge.

2.1.3 Treatment and disposal

There are 6 local municipalities which form part of the Amathole District Municipality. Each local municipality has associated town/areas/villages with treatment facilities. Treatment occurs at formal wastewater treatment works of the district municipality (formal wastewater treatment varies from oxidation ponds to conventional treatment works). Some of the ADM wastewater treatment facilities are categorised as high risk facilities and require upgrades.

The following on-site containment systems are generally noted for ADM:

- Flush toilet connected to a “septic tank” (concrete) for an individual house/building
- Flush toilet connected to a “septic tank” (concrete) which is shared (communal)
- Flush toilet connected to a “septic tank” (plastic) for an individual house
- Flush toilet connected to a conservancy tank (concrete)
- Community ablution blocks (flush toilets connected to a conservancy tank; replaced previous use of chemical toilets in specific areas)
- VIPs – lined, but open bottom (semi-permeable)
- VIPs – unlined
- Old pit latrines – unlined (noted as “no service”)

There is a mixture of septic tanks (and self-treating) and conservancy tanks (mostly business and in town, and a rate is paid per load disposed to the municipality), but there is a little clarity on the actual number of each type of structure. ADM has a centre station for testing/evaluating different types of toilets before they can be distributed for use by the communities.

2.1.4 Water Conservation and Demand Management

Water losses are a major concern for the Amathole District Municipality (ADM) as they affect not only the operational processes, but also impact the financial, social and environmental aspects of the District. Currently, the average non-revenue water in ADM is 43% while water losses are at an average of 40%.

The institution is in the process of developing its Water Conservation and Water Demand Management (WCDM) strategy. However, a number of interventions are being implemented in order to address some of the challenges listed above. The development of the WCDM strategy to include the implementation of the subsequent Business Plan will ensure a systematic approach in dealing with both the high non-revenue water and water losses.

Amathole DM currently has the following programmes under implementation in Fort Beaufort; Stutterheim; Alice; Kei Road; Butterworth and Peddie.

- House to House Meter Audits
- Leak repair programme: Retrofitting of internal plumbing fixtures
- Bulk and domestic meter installation programme
- Pressure Management
- Zone Discreteness
- Data and Night Flow Analysis
- Valve Audits

2.2 SFD matrix

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

2.2.1 SFD matrix explanation

In this report, all sanitation infrastructure is categorised according to their design and functioning as per SFD terms. Below is a description of each of the sanitation technologies in ADM.

- Toilet discharges directly to a centralised foul/ separate sewer – flush toilets are connected directly to the wastewater treatment plant.
- Fully lined tank – sealed, no outlet or overflow – these are either buried concrete tanks, buried plastic tanks or plastic tanks covered with concrete slabs.
- Containment (fully lined tanks, partially lined tanks and pits and unlined pits failed, damaged, collapsed or flooded – with no outlet or overflow – these are the tanks made from cement blocks with two compartments. Seepage emanating from these tanks through these blocks was noted.

- Pit (all types) never emptied, but abandoned when full and covered with soil, no outlet or overflow – these are pits that are not lined and never emptied. When full, the top structure is removed and taken to a new pit. These pits are covered with soil when abandoned.
- Pit (all types) never emptied but abandoned when full but NOT adequately covered with soil, no outlet or overflow – these are pits that are not lined and never emptied. When full, the top structure is removed and taken to a new pit. It is believed that these pits are not adequately covered with soil when abandoned.
- Pit (all types) never emptied but abandoned when full and covered with soil, no outlet or overflow – some of these unlined pits are located where the groundwater table is high. Some of these unlined pits are located in sandy soil type and ground water monitoring results have indicated non-compliance.

Considering the above, the following is noted:

Off-site
According to municipal interactions, more than 60% of the population are serviced via off-site sanitation. All of the ADM wastewater is transported to the various WWTWs within the respective municipalities.

In order to determine the proportion of wastewater in sewer system that is actually delivered to centralised wastewater treatment works, it needs to be noted that the some of the existing sewer systems in Amathole District Municipality are well beyond their design lives and in poor condition, with a weighted average life remaining of years to be estimated. It is therefore anticipated that leakage will occur.

Once the wastewater reaches the WWTWs, it is treated to meet specified requirements. Considering the various flows per WWTW and associated overall effluent compliance per WWTW, an overall flow weighted compliance of xx% is noted (see table below). This implies that a small proportion of the wastewater is not treated effectively, and can pollute the environment.

On-site
Of the 5,437 conservancy tanks (concrete, sealed, fully lined), 80% (4,350) are considered to be in good condition (i.e. sealed, not leaking), while 20% (1,087) are considered to be in poor condition (i.e. possibly leaking to environment, but don't know where).

Chemical toilets (3,544) as noted by Stats SA (2016) have been replaced my communal ablution blocks connected to a conservancy tank. As these structures are relatively new, it is assumed that 100% (3,544) are in good condition (i.e. sealed, not leaking).

Therefore, a total of 4,350 + 3,544 = 7,894 (3.1% of total households) are considered to be in good condition, while 1,087 (0.4% of total households) are considered to be in poor condition.

Open defecation

Assumed to be 13%, currently, 31 652 households are not serviced. This is considered the sanitation backlog, and needs to be addressed. As Amathole DM do not know the sanitation practices for these households, it is assumed that current sanitation practices are unsafe, and that open defecation is occurring.

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

It can be concluded that excreta of 37% of the population is safely managed in Amathole DM, and that 63% of excreta is discharged into the environment untreated. The following table figure summarizes the percentages of the population using each sanitation technology and the method along the service chain.

Amathole District Municipality , Eastern Cape , South Africa, 8 Nov 2018. SFD Level: 1 - Initial SFD
Population: 214568
Proportion of tanks: septic tanks: 50%, fully lined tanks: 50%, lined, open bottom tanks: 50%

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	6.0	80.0	60.0					
T1A2C2 Septic tank connected to a centralised foul/separate sewer	1.0			80.0	99.0	60.0	80.0	0.0
T1A3C2 Fully lined tank (sealed) connected to a centralised foul/separate sewer	21.0			80.0	99.0	60.0	80.0	0.0
T1A4C8 Lined tank with impermeable walls and open bottom, connected to open ground	3.0			80.0	99.0	60.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	2.0			80.0	99.0	60.0		
T1B11 C7 TO C9 Open defecation	13.0							
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	24.0							
T1B8C10 Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil, no outlet or overflow	0.0							
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	30.0			0.0	0.0	0.0		

Figure 2: SFD Matrix for Amathole DM (2018)

3. Stakeholder engagement: key interviews

The relevant Amathole District Municipality staff were contacted through e-mail, letter and telephone call prior to the visit to the local municipality. 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 Amathole District Municipality, and their associated service providers.

Interactions were held with the managers: Water Services and Sanitation, who also accompanied the team to the site inspection. During the site inspection, interviews were held with the process controllers at the Kei Mouth Ponds, honey suckers driver and pump station controller. As the municipal vacuum truckers are not adequately enough and in good condition, interviews with the driver and assistants were conducted.

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 Amathole District Municipality staff for giving time and necessary information for the assessment.

5. References

1. Amathole District Municipality (2018) *Integrated Development Plan for ADM (2018-2019)* (and associated annexures).
2. Amathole District Municipality (2016) *Water Services Development Plan for Amathole District Municipality*.
3. StatsSA (2011) *Census 2011*.
4. StatsSA (2016) *Community Survey 2016*.

6. Appendix

6.1 SFD Matrix

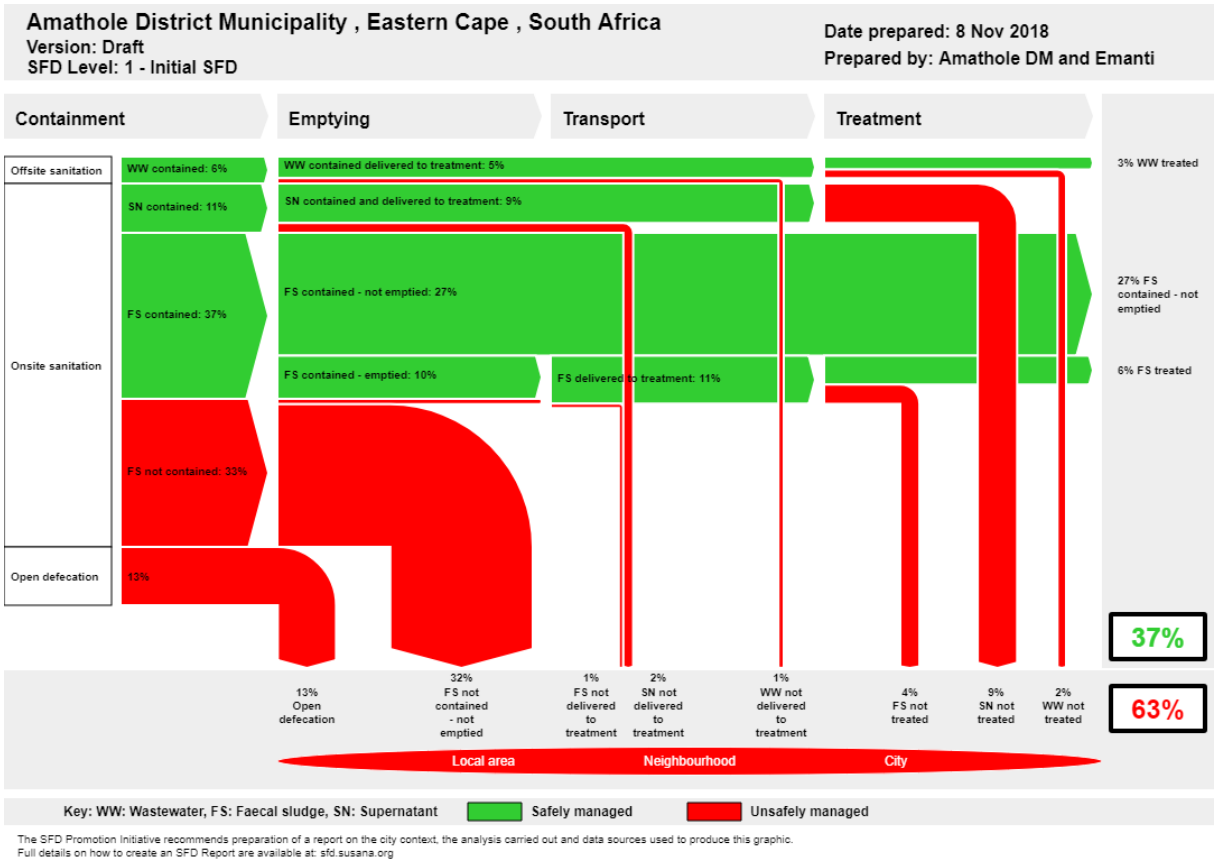

Figure 3: SFD matrix

6.2 Stakeholder identification

Table 3: Stakeholder identification

No.	Stakeholder group	In Amathole DM context
1	City council / Municipal authority/Utility	Water Services Authority (WSA): Amathole District Municipality Water Services Provider (WSP): Amathole District Municipality
2	Ministry in charge of urban sanitation and sewerage	National: Department of Water and Sanitation Provincial: Department of Water and Sanitation (KwaZulu-Natal)
3	Ministry in charge of urban solid waste	National: Department of Environmental Affairs Provincial: Department of Economic Development, Tourism and Environmental Affairs of KwaZulu-Natal (EDTEA)
4	Ministry in charge of urban planning, finances and economic development	National: Department of Human Settlements Provincial: Eastern Cape Department of Human Settlements National: National Treasury Provincial: Eastern Cape Provincial Treasury Provincial: Department of Economic Development, Tourism and Environmental Affairs of Eastern cape (EDTEA)
5	Ministry in charge of environmental protection	National: Department of Environmental Affairs Provincial: Department of Economic Development, Tourism and Environmental Affairs of Eastern Cape (EDTEA)
6	Ministry in charge of health	National: Department of Health Provincial: Eastern Cape Department of Health
7	Service provider for construction of on-site sanitation technologies	Various, by tender appointment
8	Service provider for emptying and transport of faecal sludge	Various, by tender appointment
9	Service provider for operation and maintenance of treatment infrastructure	Performed by Amathole District Municipality
10	Market participants practicing end-use of faecal sludge end products	N/A
11	Service provider for disposal of faecal sludge (sanitary landfill management)	N/A
12	External agencies associated with faecal sludge management services (e.g. NGOs, academic institutions, donors)	N/A

6.3 Tracking of engagement

Table 4: Tracking of stakeholder engagement

Name of organization	Name of contact person	Designation	Date of engagement	Purpose of engagement
Amathole District Municipality	Stephen Nash	GM: WSP	08 November 2018	Introducing SFD, securing support for project Data collection, collation, verification and site visits including key informant interviews. Data gaps, follow-ups Draft report review and finalisation
Amathole District Municipality	Sakhiwo Balfor	Ops Manager	08 November 2018	
Amathole District Municipality	Mkangeli Maseti	SR-Coordinator		
Amathole District Municipality	Mpho	Assistant Manager		
Amathole District Municipality	Vusi Novukela	ISD		
Amathole District Municipality	Nosikhumbuzo Loliwe	Ops Manager	08 November 2018	
Amathole District Municipality	Mongezi Mabele	Ops Manager	08 November 2018	
Amathole District Municipality	Khumbelo Funyufunyu	Sanitation Officer	08 November 2018	
Amathole District Municipality	Peter Songezo	Sanitation P. Officer	08 November 2018	
Amathole District Municipality	Wendy Sithole	Control Technician	08 November 2018	

6.4 Selected pictures taken during visit

Figure 4: Honey sucker discharging

Figure 5: Pit toilet

Figure 6: Kei Mouth Oxidations ponds

Figure 7: Public toilet connected to septic tank

Figure 8: Well-maintained ponds at Kei Mouth

Figure 9: Well-maintained communal toilets