SFD Report

Sakhipur
Bangladesh

Final Report

This SFD Report – Level 2 - was prepared by WaterAid Bangladesh

Date of production: 24/11/2018

Last update: 23/12/2018

SFD Report Sakhipur, Bangladesh, 2018

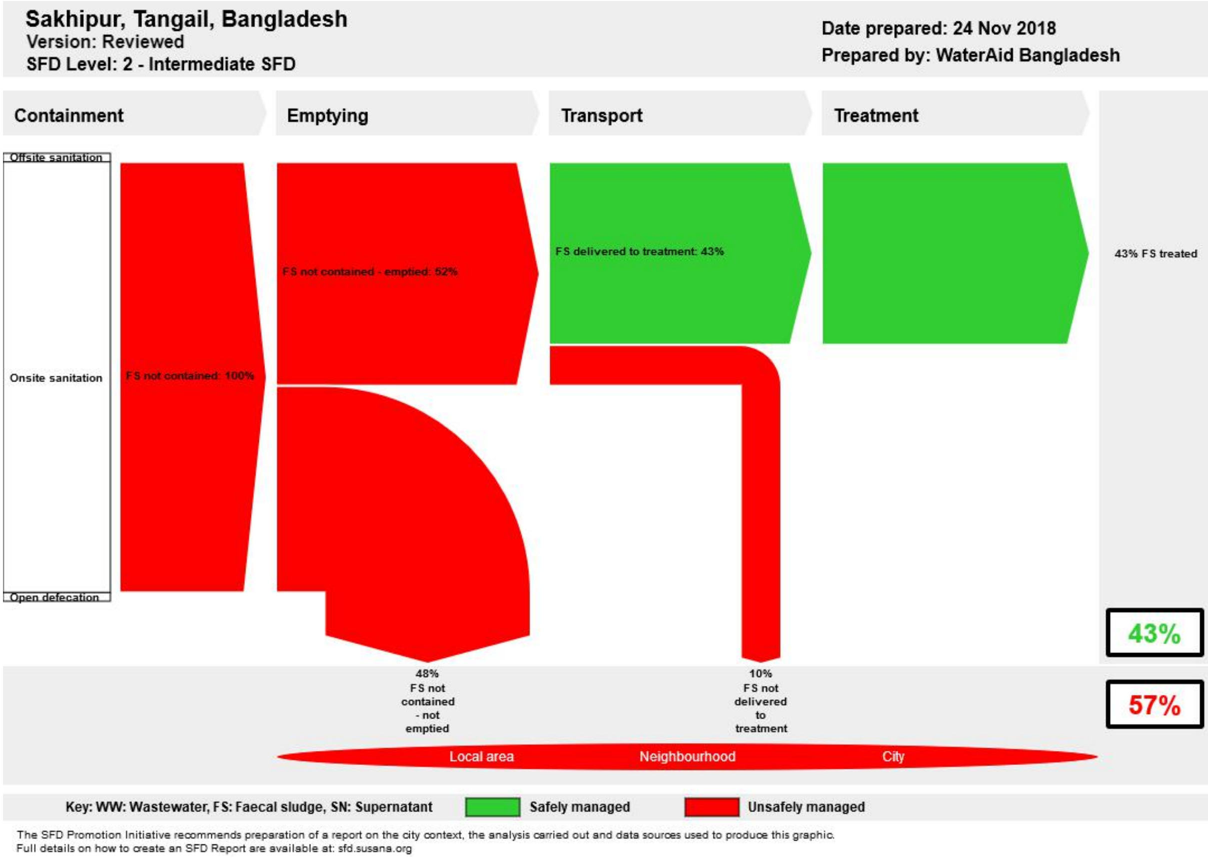
Produced by:

Abdullah Al-Muyeed

Suman Kanti Nath

Md. Samiul Basar

1. The SFD Graphic



2. Diagram information

SFD Level:

Intermediate - Level 2 report.

Produced by:

WaterAid Bangladesh.

Collaborating partners:

A Local NGO named BASA and Sakhipur municipality played vital roles in producing this SFD.

Status:

This is a final SFD report.

Date of production: 24/11/2018

3. General city information

Sakhipur is a town of Sakhipur Upazila, tangail, Bangladesh. The city is recognised as a Municipality. It is located about 39 km by road from Tangail and 77 km northwest of Dhaka city, the capital of Bangladesh. Sakhipur became a Pourashava (municipality) in October 2000. It is an ‘A’ category *pourashava*, which means that it has an annual income of 6 million Bangladeshi *Taka* (BDT) over the last three years. It consists of 9 wards. It covers an area of 27.62 square kilometers, out of which residential area covers 7.88 square kilometres.

The number of households in Sakhipur Municipality is 7,473 and the total population of the Municipality is 30,028, with a density of 1,100 persons per sq.km. The literacy rate is 57.6% (BBS, 2011). This city faces the challenges of a poor and insufficient waste management system. The city does not have a dedicated sewerage system. The whole city relies on onsite sanitation systems like pit latrines and septic tanks.

4. Service outcomes

Forty three percent (43%) of the excreta flow is classified as safely managed, and the remaining fifty seven (57%) percent is classified as unsafely managed.

Almost all the households in the city have their own latrine. However, very few of the latrines are environmentally safe. Most of those who do not have latrines use community latrines. Very few people use their neighbour's latrine.

According to a 2015 study, 5% of the toilets have septic tanks as the containment system, and 95% have pits (Baseline, 2015).

The city's total faecal waste is not contained. Groundwater pollution risk calculated using the decision matrix in the SFD Graphic Generator was found to be significant.

Around 50% of households with pit latrines have emptied their pits at least once in their lifetime. On the other hand, almost 90% of households with septic tanks have emptied them at least once. There are two types of emptying services in the municipality. The municipality operates vacu-tugs, but customers have to apply to the municipality for this service, and waiting times are long due to high demand for the service. Unfortunately, only a small percentage of the population can avail this service. There are also some private sweepers, who empty pits and septic tanks manually using a bucket and rope. In practice, septic tanks are not emptied regularly, but only when a tank malfunctions. Fifty percent of people claim that they have not emptied their pits in its lifetime (Baseline, 2015). This can be attributed to the fact that some pits are connected to low land or water bodies and some are emptied manually, a portion of which were not mentioned as emptied.

The city has several types of sludge transport systems. Since the introduction of vacu-tugs, some sludge is now transported by trucks. However, private sweepers transport sludge at night in buckets and dump it into holes dug on open ground or simply into open drains or ditches or by the railway line. A large proportion of the sludge is transported to water bodies directly from pits or septic tanks or through storm drains.

The municipality has a treatment plant. Around 50,000 litres of faecal sludge are collected and treated in this plant each month.

5. Service delivery context

The 2009 Paurashava Act states that, "A municipality shall make adequate arrangements for the removal of refuse from all public streets, public latrines, urinals, drains, and all buildings and land vested in the municipality and for the collection and proper disposal of such refuse." Although the term 'faecal sludge' is not specifically mentioned in the act, it is clear that the responsibility of management of faecal sludge lies with the municipality.

The institutional and regulatory framework (IRF) for faecal sludge management (FSM) states that the municipality shall execute these responsibilities in accordance with the provisions of the 2009 Paurashava Act. However, if a municipality deems necessary, it may formulate rules, regulations and by-laws according to the provisions of the act. The municipality (known as '*paurashava*' in Bangladesh) may collaborate with the Department of Public Health Engineering (DPHE), Local Government Engineering Department (LGED) and private sector to plan and implement FSM infrastructure and services (IRF, 2017). The municipality is required to take steps to include provision of infrastructure for the implementation of FSM services in its master plan.

According to sub-section 4.2.3 of the IRF, The *Paurashava* shall be responsible for proper execution of the entire FSM service chain, including collection (emptying) and transportation. The *Paurashava* shall carry out and/or oversee the collection (emptying) and transportation, making sure that these operations are carried out in a hygienic manner without adversely affecting health and safety of emptiers, the public and the environment. In the sub-section 4.2.4, the municipality is given the responsibility for proper execution of faecal sludge treatment, disposal and end-use. It is stated that the municipality shall carry out and/or oversee these operations. Until a treatment facility for faecal sludge is built, the sludge shall be disposed in a land/area designated by the municipality by digging pits/trenches in the ground.

6. Overview of stakeholders

The municipal authority is the lead government institution in delivery of Water, Sanitationd and Hygene (WASH) services in the city. However, the authority is unable to deliver WASH services effectively for several reasons, including insufficient allocation of human resources and funding for improving and establishing adequate infrastructure in this sector. However, the municipal authority is eager to engage private stakeholders in this sector, through a GO-NGO partnership approach.

Private sector investment in sanitation is an indication of the favourable institutional arrangement that exists in Sakhipur. A good number of local entrepreneurs are producing rings, slabs and other products to meet local demand.

Key Stakeholders	Institutions / Organisations
Public Institutions	Local Government, Municipality
Local NGOs	BASA
Private Sector	Private sweepers, local entrepreneurs
Development Partners, I/NGOs	WaterAid Bangladesh
Other	ITN-BUET

Table 1: Stakeholders in Sakhipur

7. Process of SFD development

As there is no recent study regarding the sanitation situation of the municipality, numbers of different sanitation facilities used in this report are a bit old. Percentage of emptying of different sanitation facilities was calculated from the number of total trips of the vacutug as manual emptying is now officially banned. However, this SFD represents the present scenario of the municipality.

8. Credibility of data

Required data for the preparation of the SFD were collected from 'Baseline Survey on Faecal Sludge, Solid waste and Poultry litter Management in Shakhipur Municipality', July 2015. This survey consisted of household interview and desk review of relevant documents. A key informant interview was also conducted. Discussions were held with conservancy staff, town level coordination committee members and sweepers. As there was no treatment plant during the baseline survey, the amount of faecal sludge collected and treated was calculated from internal sludge trip report of the plant and a key informant interview was done.

9. List of data sources

1. BBS, 2011. Census of Bangladesh Bureau of Statistics.
2. BASA-WaterAId, 2015. Baseline Survey on Faecal Sludge, Solid waste and Poultry litter Management in Shakhipur Municipality.
3. KII1, 2018. Interview with Mr. Sumon Kumar Saha, Project Officer, WaterAid Bangladesh.
4. IRF, 2017. Institutional and Regulatory Framework for FSM: Section on municipalities.
5. Paurashava Act, 2009.

Sakhipur, Bangladesh, 2018

Produced by:

WaterAid Bangladesh

Editing: WaterAid Bangladesh

This Executive Summary and the SFD Report are available from: www.sfd.susana.org

Table of Contents

List of tables

List of figures

Abbreviations

BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi *Taka*
DPHE	Department of Public Health Engineering
FGD	Focus group discussion
HH	Household
IRF	Institutional and Regulatory Framework
LGED	Local government engineering department
SFD	Shit Flow Diagram
SW	Solid Waste
WASH	Water, Sanitation and Hygiene
WB	World Bank
WFP	World Food Programme

1 City context

Sakhipur is a populous city in Tangail District, Bangladesh. The city occupies an area of 27.62 km^2. However, only 7.88 km^2 is residential area. Most of the municipality is covered by forest. The city is recognised as municipality (*Pourashava*) with 9 wards.

As per Census 2011 conducted by the Bangladesh Bureau of Statistics (BBS), the total number of holdings is 7,518 in the Pourashava, out of which 6,720 holdings (89%) are residential and reaming 11% are non-residential. In Sakhipur, the total number of Households (HHs) is 7473, of which highest number of HHs are located in ward no 7. Total population in the *Pourashava* was 30,028 and population density per square kilometre was 1,100. The population density is highest in ward 7 (4,654) and lowest in ward 1 (1,556). The *Pourashava* is denser compared to the country average as the overall country population density as per census 2011 is 1,015. As per census 2011, the average national household's size is 4.3 whereas average HH size was 4.0 in the Sakhipur Pourashava (varied from 3.7 in ward 8 to 4.5 in ward 4).

The *Pourashava* has 29 educational institutions, 19 health institutions, 12 markets and trade centres, 34 religious places like mosques and temples, and 21 public places.

The main economy of Sakhipur is agriculture, specially the paddy, jute, sugarcane, mango and banana. The main source of revenue of the *Pourashava* comes from the lease of different Bazar (Hat). According to BBS/WB/WFP Map 2009 poverty map indicates that Sakhipur Upazilla where the Pourashava belongs is in an area of 36%-48% poverty group. The *Pourashava* being an urban area, the level of poverty is assumed to be lower than the rural area.

Where sanitation is concerned, the most widely used latrine in the municipality is the water sealed pit latrine. There are also pit latrines without a water seal and septic tanks. However, currently, installation of septic tanks is on the rise. The yellow dotted line in the map below indicates the boundary of the municipality. Tangail has a tropical climate with an average temperature of 25.5ºC.

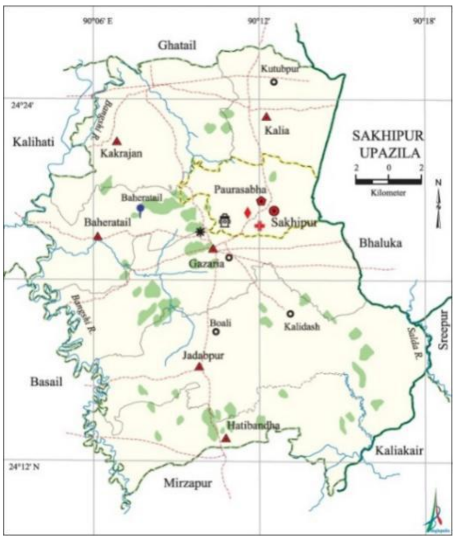
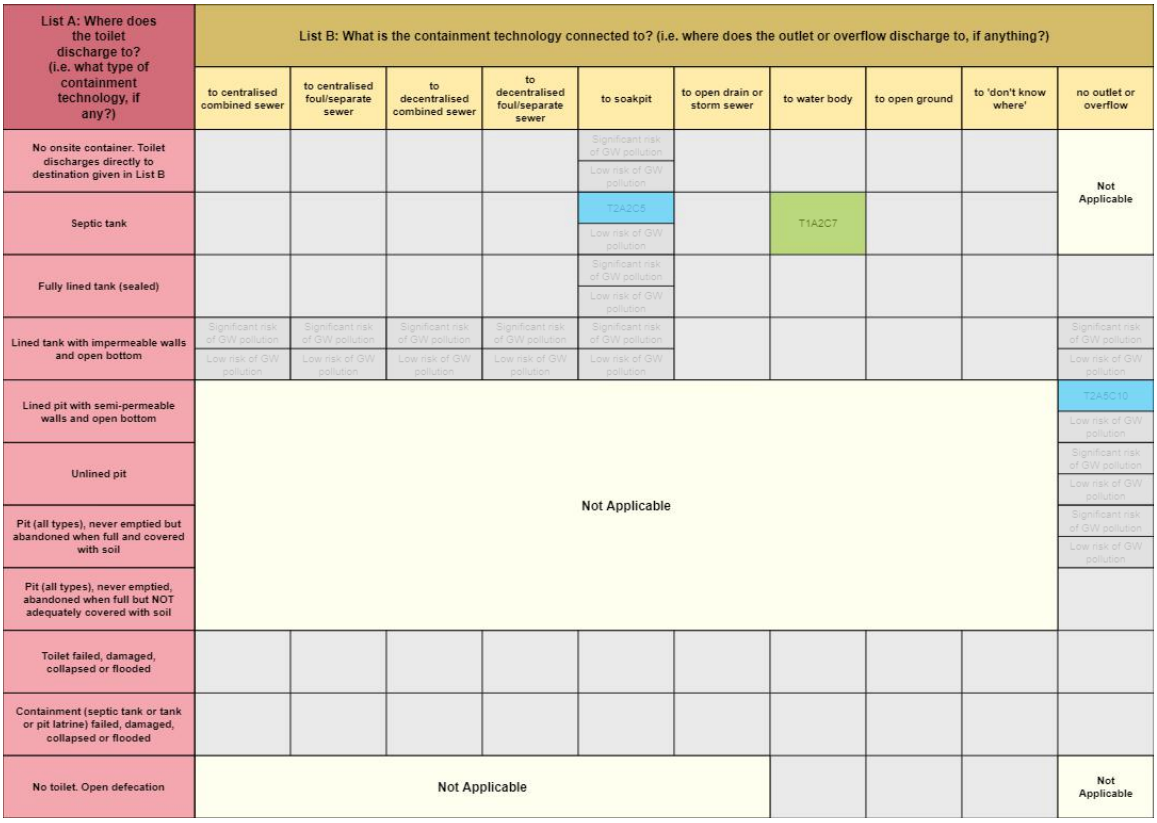


Figure 1: Sakhipur Upazilla

2 Service Outcomes

2.1 Overview



List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					T2A2C5 Low risk of GW pollution		T1A2C7			
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution					Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									T2A5C10 Low risk of GW pollution
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										
No toilet. Open defecation	Not Applicable									Not Applicable

Figure 2: SFD selection grid

There is no centralised sewer in Sakhipur. The most common on-site containment system is pit latrines in the households of Sakhipur. However, in recent years, it has become common practice to build septic tanks when constructing new buildings. The number of septic tanks is likely to increase in the near future. A small portion of the population use community latrines, which use septic tank technology.

Most commercial enterprises have septic tanks in their buildings. A negligible number of single chamber septic tanks are also found in this municipality, which for the purpose of developing the SFD are categorised as lined tanks.

Half the people claim that they have not emptied their pits in their lifetime (BASA-WaterAid, 2015). This can be attributed to the fact that many of the pits are over-sized. Also, because most of the containments are connected to water bodies, the liquid portion of the sludge drains out and the tank takes a long time to fill.

The city has two types of emptying service providers. The municipality owns one vacu-tug with a capacity of 1,000 litres. This vacu-tug collects sludge from septic tanks and pits and transports the sludge to the only treatment plant in the municipality. Customers have to fill in a form to apply for this service, and wait for their number to come up before they receive the service. There is a charge for this service. There are also some private sweepers, who empty pits and septic tanks manually using a bucket and rope, with little support and no safety protocol.

The sludge is transported by vacu-tug, open drains and water bodies, and manually in buckets. The sweepers usually ditch the sludge in open fields, drains or sometimes into holes dug on open ground. The municipality treats the mechanically emptied sludge in the treatment plant.

The treatment plant in Sakhipur municipality has drying beds, constructed wetlands, polishing pond, compost bed and post maturation zone. It is a co-compost plant. The organic part of the solid waste from households and faecal sludge transported through vacu-tugs is used to produce good quality compost.

2.2 SFD Matrix

Sakhipur, Tangail, Bangladesh, 24 Nov 2018. SFD Level: 2 - Intermediate SFD
Population: 30028
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tank

System label	Pop	F3	F4	F5
System description	Proportion of population using this type of system	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
T1A2C7 Septic tank connected to open water body	4.0	90.0	100.0	100.0
T2A2C5 Septic tank connected to soak pit, where there is a 'significant risk' of groundwater pollution	1.0	90.0	100.0	100.0
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	95.0	50.0	80.0	100.0

Figure 3: SFD Matrix

2.2.1 Technologies and methods used

The percentages presented in Figure 3 and discussed in this section are based on data collected from BASA-WaterAid (2015) and KII1 (2018).

Containment

The entire population of Sakhipur uses a toilet of some sort. These toilets are connected to a range of containment systems, including:

- Septic tank connected to a soak pit.

- Fully lined tank connected to a soak pit.

- Septic tank connected to open water body.
- Fully lined tank connected to open water body.
- Lined pits with semi-permeable walls and open bottoms, no outlet or overflow.
- Unlined pits, no outlet or overflow.

Table 1: Summary of the containment options and the equivalence according to the SFD-PI methodology

System	System label	Proportion of people using this system	Comments
Septic tank connected to a soak pit	T2A2C5	1%	High risk of groundwater pollution
Fully lined tank connected to a soak pit	T2A3C5	<1%	Not shown in the SFD
Septic tank connected to open water body	T1A2C7	4%	--
Fully lined tank connected to open water body	T1A3C7	<1%	Not shown in the SFD
Lined pits with semi-permeable walls and open bottoms, no outlet or overflow	T2A5C10	95%	High risk of groundwater pollution
Unlined pits, no outlet or overflow	T2A6C10	<1%	Not shown in the SFD

As Figure 3 shows, 5% of people use septic tanks. The portion of some containment systems is neglected in the SFD matrix due to a very small percentage (Table 1). The important part here is that the risk of groundwater pollution in this area is significant. As a result, septic tanks with soak pits also contribute to the large portion of the unsafely managed faecal sludge.

Ninety-five percent of people use pit latrines. Half the population have never emptied their pits in their lifetime.

Emptying

Almost half the population did not require cleaning or emptying the pits after the construction. Manual emptying is the predominant practice in the *Pourashava*. Mechanical emptying of the toilets has started recently in the municipal area by one NGO with support from WaterAid, Bangladesh. Emptying in the urban and rural areas of Bangladesh is overwhelmingly done manually by the sweepers. In Sakhipur, manual emptying of the toilets is done by the sweepers. The manual emptying is most hazardous as the sweepers usually do not use anything other than some buckets and a plastic drum for transport. These manual sweepers do not even use hand gloves to avoid contact with sludge. In few instances, they use pump machines to pump out liquids from the septic tank or pit and then manually empty the remaining solid manually. This saves time but the liquid is usually pumped out to nearby drains, channels or water-bodies. Thus, the method is extremely harmful for both the emptier and the environment.

Most households prefer to use manual emptying as the cost, flexibility of timing and ease of availing of the service is favourable. However, the only vacu-tug available does not have access to all the households due to narrow roads so people still go for manual emptying service. But as the mechanical emptying service is relatively new, it is gaining popularity and there is an increase in the portion of mechanically emptied sludge.

It was assumed that around 50% of households with pit latrines have emptied their pits at least once in their lifetime. On the other hand, almost 90% of households with septic tanks have emptied them at least once (BASA-WaterAid, 2015).

Transport

There is one type of formal transport system for sludge in Sakhipur which is municipal vacuum trucks. As mentioned above, other informal methods of transport include the use of a plastic drum. All the septic tanks are emptied by vacu-tugs and the sludge is transported to the treatment plant. However, around 20% pits are not accessible by the vacu-tugs and are manually desludged (KII1, 2018). This portion of the sludge is not delivered to the treatment plant.

Faecal sludge collected by vacu-tugs is transported to the co-compost plant in Sakhipur.

Treatment

There is a treatment plant in Sakhipur. Liquid faecal sludge is collected and discharged into the unplanted drying bed by vacu-tugs. The sludge is pre-treated through a series of drying beds. Each bed consists of different layers of filter media of different thickness and gravel sizes. The drying process is enhanced by evaporation and solid-liquid separation by gravity. All the drying beds are protected by heavy transparent celluloid sheet which protects the sludge from rain and also entraps heat. It is experienced that 2 weeks is required to separate liquid and solid part of the raw sludge with significant reductions in indicator pathogens. The dried sludge (e.g. dry sludge cake) is removed from the bed and left in a maturation bed for 1 week. The separated liquid part (leachate) of raw FS, which is pre-treated on drying beds further undergoes through planted constructed wetland followed by a polishing pond and the effluent is then discharged into the environment as safe effluent meeting the Bangladesh Standard for Waste Water (ECR ‘97). *Canna indica* is planted out in the constructed wetland to aid further leachate treatment at the constructed wetland. Similarly, solid waste (SW) is collected and the organic fraction is separated for co-composting. The organic components are segregated during the separation process and the inorganic part is recycled and used by different industries as required. Each batch is kept in the beds for 2 weeks. During the drying process, the temperature within the bed is kept at 50ºC–55ºC in order to kill pathogens and dry the sludge. It takes about 2 weeks to separate the liquid and solid parts of the raw sludge and achieve significant reductions of pathogens. The dried sludge is then removed from the bed and left in a maturation bed for 1 week. The liquid part of the raw faecal sludge is dewatered on drying beds and the leachate is further treated in a 12-metre long planted constructed wetland and polishing pond. *Canna indica*, a perennial plant that grows to height of 0.5m–2.5m high, depending on the variety, is planted out in the constructed wetland to aid evapo-transpiration. Also, hybrid flow (vertical flow + horizontal flow) is maintained throughout the wetland.

The organic solid waste, dried faecal sludge and sawdust are mixed at a volume ratio of 3:1:1. Saw dust is added to increase the solids content and balance the carbon to nitrogen (C: N) ratio. If the C: N ratio is high, decomposition slows down; if it is too low, the compost may become too hot, killing the compost microorganisms. The mixture is then composted aerobically for eight weeks. Turning, watering, temperature measurement, weighing, sampling and laboratory analysis are carried out during the composting cycle.

A customized, mechanical turner is used to ensure uniform turning of the mixture regularly at 3 days' intervals which provides sufficient aeration and increases the nutrient value. If the temperature of compost exceeds 60ºC, water is added. The temperature data is captured using continuous data logger and thermophilic composting is identified during 8 weeks of the decomposition period. The compost is then kept in a post maturation chamber for 1 week where it undergoes hot air treatment in a hot chamber for 48 -72 hours to kill pathogens for achieving hygienic co-compost. During composting, a temperature of 50ºC–55ºC is maintained. The process of turning reduces the temperature.

During the 8 weeks of composting, the moisture content reduces from 55%–60 % to 25%–30 %, and drops to 20%–25% during the maturation process. The moisture content settles below 16% after hot air treatment. Finally, after packaging, this is sold in local market as a soil conditioner which meets the criteria of compost according to Bangladesh standard.

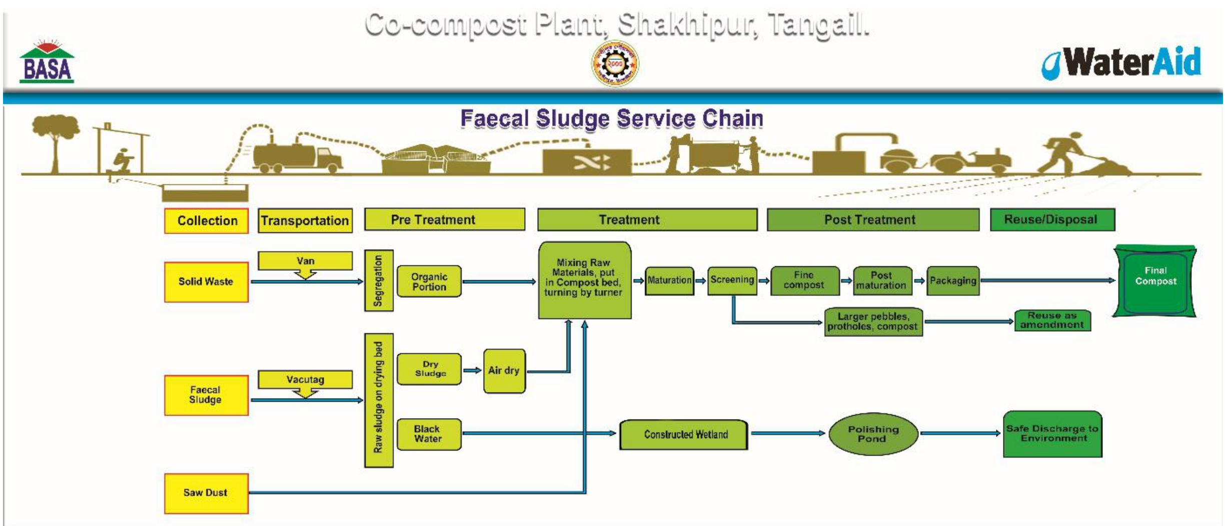


Figure 4: Faecal sludge service chain in Sakhipur Municipality

Figure 5: Schematic diagram of Sakhipur Co-compost plant

Figure 6: Sakhipur Co-compost plant

End-use and disposal

Produced compost of the plant is used by the farmers to grow different kinds of vegetables. So far, the result is good. Effluent from the plant is discharged into the environment after proper treatment and maintaining national standards. The sludge emptied by other means is discharged improperly into the environment.

2.2.2 Risk of groundwater contamination

People in Sakhipur municipality get their water from their own source. There is no provision of municipal water supply for the population. Almost all the people use groundwater sources, typically extracted from a depth of 30-40 feet (9-12 metres). Tube wells provided by NGOs are 180-250 feet (55-76 metres) deep. The depth to groundwater in the city is more than 30 feet (9 metres). The most common water production technology is protected wells. Lateral separation between sanitation facilities and water source varies from one area to another. Considering all these factors, it is estimated that there is significant risk of groundwater pollution in the city.

2.2.3 Credibility of data

The availability of quantitative data on sanitation services in Sakhipur is limited. However, the baseline survey conducted in July, 2015 contains detailed data on different stages of sanitation value chain. This survey consisted of household interviews and desk review of relevant documents. The SFD relied on this data source plus internet websites and key informant interview. Finally all these sources were compiled to produce the SFD.

2.2.4 SFD Outcomes

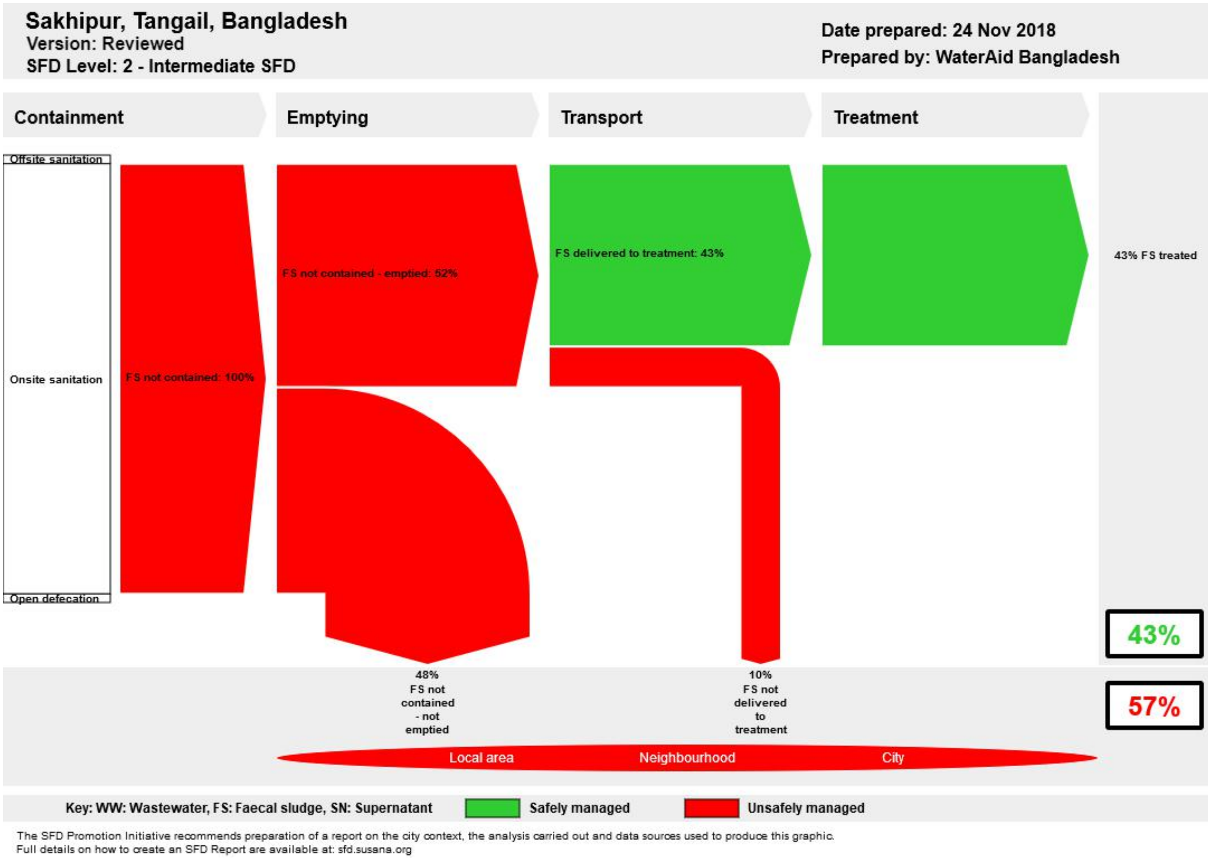


Figure 7: SFD graphic

From the produced SFD graphic, it was estimated that 43% of the excreta flow can be classified as safely managed, while the remaining 57% can be considered unsafely managed. The details along the sanitation service chain are discussed here. It should be mentioned here that there is no sewerage system in the area. At the containment level, the whole portion of the excreta is unsafely managed as they are not contained. This can be attributed to the fact that the risk of groundwater pollution in the area is high. For this reason, even unemptied portion of excreta in septic tanks connected to soak pits (48%) is considered as not contained. Other containment systems like septic tanks connected to water bodies and lined pits are also considered not being able to contain the FS.

43% of the total excreta is transported to treatment plant and is treated. This is the only portion of the excreta which is finally safely managed. Another 10% of excreta is emptied but not delivered to treatment, eventually adding to the unsafely managed portion of the excreta. This is due to manual emptiers who do not take the FS to the treatment plant.

3 Service delivery context

3.1 Policy, legislation and regulation

3.1.1 Policy

According to the regulatory guidelines, it is a major responsibility of the municipality to manage all kind of wastes, specifically 'solid waste and 'liquid waste'. However, existing policy in the Paurashava Act provides no specific instructions regarding 'faecal sludge'. Faecal sludge is considered a different type of waste. With the characteristics of both solid and liquid waste, faecal sludge needs to be managed using specific technologies and treatment options. Although the term 'faecal sludge' is not specifically mentioned in the policy, it is clear that the responsibility of management of faecal sludge lies with the municipality.

The institutional and regulatory framework for FSM states that the Department of Public Health Engineering (DPHE) and the local government engineering department (LGED) shall support implementation of the FSM system in the municipality. This is a clear indication that the DPHE and LGED should be included as the key institutions in developing the institutional framework on FSM in Sakhipur municipality.

The 2009 Paurashava Act, requires each municipality to take steps to include provision of infrastructure for the implementation of FSM services in its master plan. However, most municipalities have yet to even create a master plan, even though they may seek expert support from the external sources to assist with this complex process. Also, in the absence of a building code for septic tanks, it is not a requirement that development of multi-storey buildings include construction of septic tanks.

3.1.2 Institutional roles

In general, the municipal authority is responsible for providing basic services to citizens. Chapter two of the 2009 Paurashava Act mentions the responsibility and function of municipalities with regard to WASH. According to clause (50) (2), the municipality is responsible for (a) Water supply for residential, industrial and commercial use, (b) Water and sanitation, (c) Waste management, and (d) Issuing plans that promote economic and social justice. Even though it is not mentioned explicitly, faecal sludge management is considered to be included in the Clause (50)(2)(b) on water and sanitation and therefore is the responsibility of the municipality.

Ministries are responsible for securing funding and formulating policy, strategy and amendments. The DPHE and LGED provide technical assistance, and the municipalities are responsible for FSM services, including engaging and supporting all stakeholders (the government, non-government organisations, development partners, research organisations, civil society and the media) in raising awareness, developing FSM infrastructure and effective delivery of FSM services.

3.1.3 Service provision

Sakhipur municipality has trucks, vans, and pick-ups to collect solid waste, but they are insufficient to meet demand. They have only one vacu-tug of 1,000 litres for mechanical collection of faeces from septic tanks or pits. However, this vacu-tug cannot access a major portion of the city due to narrow roads.

3.1.4 Service standards

Under the 2009 Paurashava Act 2009, municipalities are responsible for the execution of the entire FSM service chain. They are also in charge with ensuring that this is carried out in compliance with existing rules and regulations on the disposal of liquid effluent and quality of end products such as compost, and without adversely affecting health and the environment. Until further treatment facilities are built, faecal sludge will continue to be disposed of in pits or trenches dug on land designated by the municipality. The Ministry of the Environment and Forestry through the Department of Environment is responsible for ensuring that all relevant environmental laws, regulations and principles are followed to the letter by all concerned throughout the FSM service chain.

3.1.5 Monitoring and reporting access to services

In the Institutional and Regulatory Framework (IRF) for FSM, different institutions have been identified for playing effective roles in the overall planning, development, implementation, practice and monitoring and evaluation of faecal sludge management in municipalities. The Ministry of Environment and Forest (MoEF) through the Department of Environment (DoE) shall ensure that all relevant environmental laws, regulations and principles are strictly followed by all concerned throughout the FSM service chain.

4 Stakeholder Engagement

Discussions were held with the municipal authority and a local NGO (BASA) were involved throughout the whole process. Councillor Zahid Hossain and Md. Ziaur Rahman, project manager, WASH4UrbanPoor Project, BASA and Sakhipur were specially consulted during the process. The local NGO made all the arrangements for the meetings and discussions, keeping in constant contact with the municipality. The municipality extended us a helping hand whenever needed. They participated in our discussions and provided us with valuable information. The SFD was developed based on these discussions.

5 Acknowledgements

The authors are grateful to the mayors, councillors and Mr. Sumon Kumar Saha, project officer and WaterAid Bangladesh for their help developing this report.

6 References

1. BASA-WaterAid, 2015. Baseline Survey on Faecal Sludge, Solid waste and Poultry litter Management in Shakhipur Municipality.
2. BBS, 2011. Census of Bangladesh Bureau of Statistics.
3. KII1, 2018. Interview with Mr. Sumon Kumar Saha, Project Officer, WaterAid Bangladesh.
4. IRF, 2017. Institutional and Regulatory Framework for FSM: Section on municipalities
5. Paurashava Act, 2009.

7 Appendix

7.1 Appendix 1: Stakeholder identification

Name	**Designation**
Zahid Hossain	Councillor, 5 no ward, Sakhipur Municipality
Md. Ziaur Rahman	Project manager, WASH4UrbanPoor Project, BASA, Sakhipur municipality